



**SURESH**  
**GYAN VIHAR**  
**UNIVERSITY**  
The first research oriented University of state

**Department of Computer Applications**

## **SYLLABUS**

1. BCA
2. MCA

**Edition-2013**

# **Department of Computer Applications**

**B.C.A. Full-Time (Bachelor's of Computer Applications - 3 Years Course)**  
**M.C.A. Full-Time (Master's of Computer Applications - 3 Years Course)**  
**M.C.A. Full Time (Master's of Computer Applications, Lateral Entry – 2 Years Course)**

## **Highlights of the syllabi of BCA & MCA Programs , Full Time (3 years)**

1. The Six semesters BCA and MCA Programs are offered by the Department of Computer Applications of Suresh Gyan Vihar University is based on the credit system and provides a student with wide choice of courses.
2. These programs include courses covering the core of Computer Science and Engineering discipline and several electives in areas of Intelligent Systems and Knowledge Engineering, Theoretical Computer Science, Networks and Distributed Systems and Hardware Systems.
3. Programs contain job oriented and advanced practical labs.
4. Programs contain the best combination of various computing technologies.
5. PG in Computer Applications is the most dynamic program that will provide foundation for research. Compulsion to publish research papers in reputed journals makes this program more effective and research oriented.

## **Highlights of the syllabi of MCA Program, Full Time (Lateral Entry - 2 years)**

1. This is the Four semesters MCA Program offered by the Department of Computer Applications of Suresh Gyan Vihar University for student who have already passed BCA with Mathematics as one of the subject. Such students are eligible to take admission in the third semester of MCA directly. This program is based on the credit system and provides a student with wide choice of courses.
2. These programs include courses covering the core of Computer Science and Engineering discipline and several electives in areas of Intelligent Systems and Knowledge Engineering, Theoretical Computer Science, Networks and Distributed Systems and Hardware Systems.
3. Programs contain job oriented and advanced practical labs.
4. Programs contain the best combination of various computing technologies.
5. PG in Computer Applications is the most dynamic program that will provide foundation for research. Compulsion to publish research papers in reputed journals makes this program more effective and research oriented.



**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY  
DEPARTMENT OF COMPUTER APPLICATIONS**

**TEACHING AND EXAMINATION SCHEME  
AND  
DETAILED SYLLABUS FOR**

**Bachelor's of Computer Applications (BCA) 3 Year Course**

**EDITION 2013**



**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**Teaching and Examination Scheme for Bachelor's of Computer Applications 3 Year Course**  
**EFFECTIVE FROM ACADEMIC SESSION 2013-14**

Year: I

Semester: I

S. No.	Course Code	Course Name	Credits	Contact Hrs/Wk.			Exam Hrs.	Weightage (in%)	
				L	T/S	P		CE	ESE
<b>A. Theory Papers</b>									
1	CA 101	Fundamentals of Computer	4	3	1	-	3	30	70
2	CA 107	Office Automation Tools	4	3	1	-	3	30	70
3	HS 201	Communication Skills	4	3	1	-	3	30	70
4	ES 101	Environmental Studies	3	3	-	-	3	30	70
5	CA 111	Web Designing	3	3	-	-	3	30	70
6	CA 113	Programming Logic & Techniques	4	3	1	-	3	30	70
<b>B. Practical &amp; Sessional:</b>									
7	CA 155	Office Automation Lab	1	-	-	2	2	60	40
8	CA 159	Communication & Soft Skills Lab	1	-	-	2	2	60	40
9	CA 157	Web Designing Lab	1	-	-	2	2	60	40
<b>C. Discipline and Co Curricular Activities</b>									
10	DE 101	Discipline and Co Curricular Activities – I	2	-	-	-	-	100	-
<b>Total</b>			<b>27</b>	<b>18</b>	<b>4</b>	<b>6</b>			
<b>Total Teaching Load</b>				<b>28</b>					

Year: I

Semester: II

S. No.	Course Code	Course Name	Credits	Contact Hrs/Wk.			Exam Hrs.	Weightage (in%)	
				L	T/S	P		CE	ESE
<b>A. Theory Papers</b>									
1	CA 102	Programming in C	4	3	1	-	3	30	70
2	CA 104	Desktop Publishing & Multimedia	4	3	1	-	3	30	70
3	CA 110	Fundamentals of Operating System	3	3	-	-	3	30	70
4	CA 112	Principles of Programming Language	4	3	1	-	3	30	70
5	CA 116	System Analysis & Designing Fundamentals	3	3	-	-	3	30	70
6	HS 202	Cognitive Skills	4	3	1	-	3	30	70
<b>B. Practical &amp; Sessional:</b>									
7	CA 152	Computer Programming Lab	1	-	-	2	2	60	40
8	CA 156	DTP & Multimedia Lab	1	-	-	2	2	60	40
9	CA 160	System Analysis & Designing Lab	1	-	-	2	2	60	40
10	CA 162	Operating System Lab	1	-	-	2	2	60	40
<b>C. Discipline and Co Curricular Activities</b>									
11	DE 102	Discipline and Co Curricular Activities – II	2	-	-	-	-	100	-
<b>Total</b>			<b>28</b>	<b>18</b>	<b>4</b>	<b>8</b>			
<b>Total Teaching Load</b>				<b>30</b>					



**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**Teaching and Examination Scheme for Bachelor's of Computer Applications 3 Year Course**  
**EFFECTIVE FROM ACADEMIC SESSION 2014-15**

Year: II

Semester: III

S. No.	Course Code	Course Name	Credits	Contact Hrs/Wk.			Exam Hrs.	Weightage (in%)	
				L	T/S	P		CE	ESE
<b>A. Theory Papers</b>									
1	CA 209	Internet Technology & Programming	4	3	1	-	3	30	70
2	CA 201	Object Oriented Programming & C++	4	3	1	-	3	30	70
3	CA 211	Computer Organization & Architecture	4	3	1	-	3	30	70
4	CA 213	Database Management System	4	3	1	-	3	30	70
5	HS 301	Verbal and Non-Verbal Reasoning	3	3	-	-	3	30	70
6		<b>Elective I (Departmental)</b>	3	3	-	-	3	30	70
	CA 217	Introduction to Distributed Systems							
	CA 215	Information Systems							
	CA 221	Fundamentals of E-Commerce							
<b>B. Practical &amp; Sessional:</b>									
7	CA 251	Object Oriented Programming & C++ Lab	1	-	-	2	2	60	40
8	CA 257	Database Lab	1	-	-	2	2	60	40
9	CA 259	Internet Programming Lab	1	-	-	2	2	60	40
10	CA 261	Colloquium (Group Discussion)	1	-	-	2	2	60	40
<b>C. Discipline and Co Curricular Activities</b>									
11	DE 201	Discipline and Co Curricular Activities – III	2	-	-	-	-	100	-
		<b>Total</b>	<b>28</b>	<b>18</b>	<b>4</b>	<b>8</b>			
		<b>Total Teaching Load</b>		<b>30</b>					

Year: II

Semester: IV

S. No.	Course Code	Course Name	Credits	Contact Hrs/Wk.			Exam Hrs.	Weightage (in%)	
				L	T/S	P		CE	ESE
<b>A. Theory Papers</b>									
1	CA 228	Open Source Technologies	4	3	1	-	3	30	70
2	CA 216	Software Engineering Fundamentals	3	3	-	-	3	30	70
3	CA 208	Data Structure & Algorithm	4	3	1	-	3	30	70
4	CA 218	Programming in Java	4	3	1	-	3	30	70
5	HS 302	Technical Writing	4	3	1	-	3	30	70
6		<b>Elective I (Departmental)</b>	3	3	-	-	3	30	70
	CA 222	Introduction to Embedded System							
	CA 224	Data Warehousing & Mining Concepts							
	CA 220	E-Banking Concepts							
<b>B. Practical &amp; Sessional:</b>									
7	CA 264	LINUX Lab	1	-	-	2	2	60	40
8	CA 262	Java Programming Lab	1	-	-	2	2	60	40
9	CA 256	Data Structure Algorithm Lab	1	-	-	2	2	60	40
10	PE 204	Minor Project	2	-	-	2+2	3	60	40
<b>C. Discipline and Co Curricular Activities</b>									
11	DE 202	Discipline and Co Curricular Activities – IV	2	-	-	-	-	100	-
		<b>Total</b>	<b>29</b>	<b>18</b>	<b>4</b>	<b>10</b>			
		<b>Total Teaching Load</b>		<b>32</b>					



**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**Teaching and Examination Scheme for Bachelor's of Computer Applications 3 Year Course**  
**EFFECTIVE FROM ACADEMIC SESSION 2015-16**

Year: III

Semester: V

S. No.	Course Code	Course Name	Credits	Contact Hrs/Wk.			Exam Hrs.	Weightage (in%)	
				L	T/S	P		CE	ESE
<b>A. Theory Papers</b>									
1	CA 309	ASP.NET with C#	4	3	1	-	3	30	70
2	CA 311	Computer Networks	4	3	1	-	3	30	70
3	CA 313	Intellectual Property & Rights	3	3	-	-	3	30	70
4	HS 401	Technical Aptitude	3	3	-	-	3	30	70
5	<b>Elective I (Departmental)</b>		3	3	-	-	3	30	70
	CA 315	Introduction to Computer Graphics							
	CA 317	Software Quality Assurance							
	CA 319	Business Organization & Automation							
6	<b>Elective II (Open)</b>		4	3	1	-	3	30	70
	BM 606	Foreign Language (French)							
	MA 103	Elementary Mathematics							
	BM 317	Accounting and Financial Management							
<b>B. Practical &amp; Sessional:</b>									
7	CA 355	ASP.NET Lab (Using C#)	1	-	-	2	2	60	40
8	PE 305	Dissertation	2	-	-	3	2	60	40
9	PE 307	Major Project	3	-	-	3+3	3	60	40
10	SM 303	Seminar	1	-	-	2	2	60	40
<b>C. Discipline and Co Curricular Activities</b>									
11	DE 301	Discipline and Co Curricular Activities – V	2	-	-	-	-	100	-
<b>Total</b>			<b>30</b>	<b>18</b>	<b>03</b>	<b>13</b>			
<b>Total Teaching Load</b>				<b>34</b>					

Year: III

Semester: VI

S. No.	Course Code	Course Name	Credits	Contact Hrs/Wk.			Exam Hrs.	Weightage (in%)	
				L	T/S	P		CE	ESE
<b>Practical &amp; Sessional:</b>									
				L	T	P			
1	PT 304	Industrial training	18	-	-	36	3	120	80
<b>Total</b>			<b>18</b>	<b>0</b>	<b>0</b>	<b>36</b>			
<b>Total Teaching Load</b>				<b>36</b>					



**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY  
DEPARTMENT OF COMPUTER APPLICATIONS**

**TEACHING AND EXAMINATION SCHEME  
AND  
DETAILED SYLLABUS FOR**

**Master's of Computer Applications (MCA) 3 Year Course  
and**

**M.C.A. Full Time (Master's of Computer Applications, Lateral Entry – 2 Years Course  
(From III Semester onwards))**

**EDITION 2013**



**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**Teaching and Examination Scheme for Master's of Computer Applications 3 Year Course**  
**EFFECTIVE FROM ACADEMIC SESSION 2013-14**

Year: I

Semester: I

S. No.	Course Code	Course Name	Credits	Contact Hrs/Wk.			Exam Hrs.	Weightage (in%)	
				L	T/S	P		CE	ESE
<b>A. Theory Papers</b>									
1	CA 503	Discrete Mathematics Structure	4	3	1	-	3	30	70
2	CA 513	Fundamentals of Computer & Operating System	4	3	1	-	3	30	70
3	HS 503	Employability Skills – I	4	3	1	-	3	30	70
4	CA 517	Problem Solving using C	3	3	-	-	3	30	70
5	CA 519	System Analysis and Design	3	3	-	-	3	30	70
6	CA 521	Internet & Web Designing Tools	4	3	1	-	3	30	70
<b>B. Practical &amp; Sessional:</b>									
7	CA 553	Communication & Soft Skill Lab	1	-	-	2	2	60	40
8	CA 559	C Language Lab	1	-	-	2	2	60	40
9	CA 561	System Analysis and Design Lab	1	-	-	2	2	60	40
10	CA 563	Web Designing Lab	1	-	-	2	2	60	40
<b>C. Discipline and Co Curricular Activities</b>									
11	DE 501	Discipline and Co Curricular Activities – I	2	-	-	-	-	100	-
<b>Total</b>			<b>28</b>	<b>18</b>	<b>4</b>	<b>8</b>			
<b>Total Teaching Load</b>				<b>30</b>					

Year: I

Semester: II

S. No.	Course Code	Course Name	Credits	Contact Hrs/Wk.			Exam Hrs.	Weightage (in%)	
				L	T/S	P		CE	ESE
<b>A. Theory Papers</b>									
1	CA 514	Object Oriented Programming & C++	4	3	1	-	3	30	70
2	CA 506	Database Management System	4	3	1	-	3	30	70
3	CA 504	Data Structure and Algorithm	4	3	1	-	3	30	70
4	CA 516	Management Information System	3	3	-	-	3	30	70
5	CA 518	E-Commerce	3	3	-	-	3	30	70
6	HS 504	Employability Skills – II	4	3	1	-	3	30	70
<b>B. Practical &amp; Sessional:</b>									
7	CA 560	Office Automation Lab	1	-	-	2	2	60	40
8	CA 562	C++ Language Lab	1	-	-	2	2	60	40
9	CA 564	DBMS Lab	1	-	-	2	2	60	40
10	CA 554	Data Structure & Algorithm Lab	1	-	-	2	2	60	40
<b>C. Discipline and Co Curricular Activities</b>									
11	DE 502	Discipline and Co Curricular Activities – II	2	-	-	-	-	100	-
<b>Total</b>			<b>28</b>	<b>18</b>	<b>4</b>	<b>8</b>			
<b>Total Teaching Load</b>				<b>30</b>					





**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**Teaching and Examination Scheme for Master's of Computer Applications 3 Year Course**  
**and 2 years Lateral Entry Course**  
**EFFECTIVE FROM ACADEMIC SESSION 2014-15**

Year: II

Semester: III

S. No.	Course Code	Course Name	Credits	Contact Hrs/Wk.			Exam Hrs.	Weightage (in%)	
				L	T/S	P		CE	ESE
<b>A. Theory Papers</b>									
1	CA 613	Data Communication and Networking	4	3	1	-	3	30	70
2	CA 615	Programming in Java	4	3	1	-	3	30	70
3	HS 603	Employability Skills – III	4	3	1	-	3	30	70
4	CA 605	Computer Graphics	4	3	1	-	3	30	70
	CA 617	Software Engineering	3	3	-	-	3	30	70
5	<b>Elective I (Departmental)</b>		4	3	1	-	3	30	70
	CA 619	Cloud Computing							
	CA 621	Mobile Commerce							
	CA 623	Data Mining and Warehousing							
<b>B. Practical &amp; Sessional:</b>									
7	CA 659	Networking Lab	1	-	-	2	2	60	40
8	CA 661	Java Language Lab	1	-	-	2	2	60	40
9	CA 655	Computer Graphics Lab	1	-	-	2	2	60	40
<b>C. Discipline and Co Curricular Activities</b>									
10	DE 601	Discipline and Co Curricular Activities – III	2	-	-	-	-	100	-
<b>Total</b>			<b>28</b>	<b>18</b>	<b>5</b>	<b>6</b>			
<b>Total Teaching Load</b>				<b>29</b>					

Year: II

Semester: IV

S. No.	Course Code	Course Name	Credits	Contact Hrs/Wk.			Exam Hrs.	Weightage (in%)	
				L	T/S	P		CE	ESE
<b>A. Theory Papers</b>									
1	CA 614	Advance Java	4	3	1	-	3	30	70
2	HS 604	Employability Skills – IV	4	3	1	-	3	30	70
3	CA 618	Object Oriented Analysis & Design	3	3	-	-	3	30	70
4	CA 620	E-Banking & Security Transactions	3	3	-	-	3	30	70
5	CA 608	Artificial Intelligence	4	3	1	-	3	30	70
6	<b>Elective I (Departmental)</b>		3	3	-	-	3	30	70
	CA 622	Software Testing							
	CA 624	Embedded System							
	CA 616	Advance Computer Architecture							
<b>B. Practical &amp; Sessional:</b>									
7	CA 660	Advance Java Lab	1	-	-	2	2	60	40
8	CA 662	OOAD Lab	1	-	-	2	2	60	40
9	CA 658	Colloquium (Group Discussion)	1	-	-	2	2	60	40
10	PE 652	Minor Project	3	-	-	3+3	3	60	40
<b>C. Discipline and Co Curricular Activities</b>									
11	DE 602	Discipline and Co Curricular Activities – IV	2	-	-	-	-	100	-
<b>Total</b>			<b>29</b>	<b>18</b>	<b>3</b>	<b>12</b>			
<b>Total Teaching Load</b>				<b>33</b>					



**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
**Teaching and Examination Scheme for Master's of Computer Applications 3 Year Course**  
**and 2 years Lateral Entry Course**  
**EFFECTIVE FROM ACADEMIC SESSION 2015-16**

Year: III

Semester: V

S. No.	Course Code	Course Name	Credits	Contact Hrs/Wk.			Exam Hrs.	Weightage (in%)	
				L	T/S	P		CE	ESE
<b>A. Theory Papers</b>									
1	CA 719	Advanced Web Development	3	3	-	-	3	30	70
2	CA 709	ERP System	3	3	-	-	3	30	70
3	CA 721	Information Protection & Security	4	3	1	-	3	30	70
	HS 701	Employability Skills – V	3	3	-	-	3	30	70
4	<b>Elective I (Departmental)</b>		3	3	-	-	3	30	70
	CA 715	Distributed Systems							
	CA 711	Decision Support System							
	CA 703	Analysis and Design of Algorithm							
5	<b>Elective II (Open)</b>		4	3	1	-	3	30	70
	CA 723	Research Methodologies							
	EC 220	Digital Electronics							
	BM 517	Accounting and Financial Management							
<b>B. Practical &amp; Sessional:</b>									
6	CA 753	Advanced Web Development Lab	1	-	-	2	2	60	40
7	PE 703	Dissertation	2	-	-	3	2	60	40
8	SM 701	Seminar	2	-	-	2	2	60	40
9	PE 701	Major Project	2	-	-	3+3	2	60	40
<b>C. Discipline and Co Curricular Activities</b>									
10	DE 701	Discipline and Co Curricular Activities – V	2	-	-	-	-	100	-
<b>Total</b>			<b>29</b>	<b>18</b>	<b>2</b>	<b>13</b>			
<b>Total Teaching Load</b>				<b>33</b>					

Year: III

Semester: VI

S. No.	Course Code	Course Name	Credits	Contact Hrs/Wk.			Exam Hrs.	Weightage (in%)	
				L	T/S	P		CE	ESE
<b>Practical &amp; Sessional:</b>									
		L	T	P					
1	PT 702	Industrial training	18	-	-	36	3	120	80
<b>Total</b>			<b>18</b>	<b>0</b>	<b>0</b>	<b>36</b>			
<b>Total Teaching Load</b>				<b>36</b>					



**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY  
DEPARTMENT OF COMPUTER APPLICATIONS**

**LIST OF COURSES OFFERED BY THE DEPARTMENT  
EDITION 2013**

S.No.	Course Code	Course Name	Credits	Contact Hrs/Wk.			Exam Hrs.	Weightage (in%)	
				L	T/S	P		CE	ESE
	CA 101	Fundamentals of Computer	4	3	1	-	3	30	70
	CA 102	Programming in C	4	3	1	-	3	30	70
	CA 104	Desktop Publishing & Multimedia	4	3	1	-	3	30	70
	CA 107	Office Automation Tools	4	3	1	-	3	30	70
	CA 110	Fundamentals of Operating System	3	3	-	-	3	30	70
	CA 111	Web Designing	3	3	-	-	3	30	70
	CA 112	Principles of Programming Language	4	3	1	-	3	30	70
	CA 113	Programming Logic & Techniques	4	3	1	-	3	30	70
	CA 116	System Analysis & Designing Fundamentals	3	3	-	-	3	30	70
	CA 152	Computer Programming Lab	1	-	-	2	2	60	40
	CA 155	Office Automation Lab	1	-	-	2	2	60	40
	CA 156	DTP & Multimedia Lab	1	-	-	2	2	60	40
	CA 157	Web Designing Lab	1	-	-	2	2	60	40
	CA 159	Communication & Soft Skills Lab	1	-	-	2	2	60	40
	CA 160	System Analysis & Designing Lab	1	-	-	2	2	60	40
	CA 162	Operating System Lab	1	-	-	2	2	60	40
	CA 201	Object Oriented Programming & C++	4	3	1	-	3	30	70
	CA 208	Data Structure & Algorithm	4	3	1	-	3	30	70
	CA 209	Internet Technology & Programming	4	3	1	-	3	30	70
	CA 211	Computer Organization & Architecture	4	3	1	-	3	30	70
	CA 213	Database Management System	4	3	1	-	3	30	70
	CA 215	Information Systems	3	3	-	-	3	30	70
	CA 216	Software Engineering Fundamentals	3	3	-	-	3	30	70
	CA 217	Introduction to Distributed Systems	3	3	-	-	3	30	70
	CA 218	Programming in Java	4	3	1	-	3	30	70
	CA 220	E-Banking Concepts	3	3	-	-	3	30	70
	CA 221	Fundamentals of E-Commerce	3	3	-	-	3	30	70
	CA 222	Introduction to Embedded System	3	3	-	-	3	30	70
	CA 224	Data Warehousing & Mining Concepts	3	3	-	-	3	30	70
	CA 228	Open Source Technologies	4	3	1	-	3	30	70
	CA 251	Object Oriented Programming & C++ Lab	1	-	-	2	2	60	40
	CA 256	Data Structure Algorithm Lab	1	-	-	2	2	60	40
	CA 257	Database Lab	1	-	-	2	2	60	40
	CA 259	Internet Programming Lab	1	-	-	2	2	60	40
	CA 261	Colloquium (Group Discussion)	1	-	-	2	2	60	40
	CA 262	Java Programming Lab	1	-	-	2	2	60	40
	CA 264	LINUX Lab	1	-	-	2	2	60	40

CA 309	ASP.NET with C#	4	3	1	-	3	30	70
CA 311	Computer Networks	4	3	1	-	3	30	70
CA 313	Intellectual Property & Rights	3	3	-	-	3	30	70
CA 315	Introduction to Computer Graphics	3	3	-	-	3	30	70
CA 317	Software Quality Assurance	3	3	-	-	3	30	70
CA 319	Business Organization & Automation	3	3	-	-	3	30	70
CA 355	ASP.NET Lab (Using C#)	1	-	-	2	2	60	40
CA 503	Discrete Mathematics Structure	4	3	1	-	3	30	70
CA 504	Data Structure and Algorithm	4	3	1	-	3	30	70
CA 506	Database Management System	4	3	1	-	3	30	70
CA 513	Fundamentals of Computer & Operating System	4	3	1	-	3	30	70
CA 514	Object Oriented Programming & C++	4	3	1	-	3	30	70
CA 516	Management Information System	3	3	-	-	3	30	70
CA 517	Problem Solving using C	3	3	-	-	3	30	70
CA 518	E-Commerce	3	3	-	-	3	30	70
CA 519	System Analysis and Design	3	3	-	-	3	30	70
CA 521	Internet & Web Designing Tools	4	3	1	-	3	30	70
CA 553	Communication & Soft Skill Lab	1	-	-	2	2	60	40
CA 554	Data Structure & Algorithm Lab	1	-	-	2	2	60	40
CA 559	C Language Lab	1	-	-	2	2	60	40
CA 560	Office Automation Lab	1	-	-	2	2	60	40
CA 561	System Analysis and Design Lab	1	-	-	2	2	60	40
CA 562	C++ Language Lab	1	-	-	2	2	60	40
CA 563	Web Designing Lab	1	-	-	2	2	60	40
CA 564	DBMS Lab	1	-	-	2	2	60	40
CA 605	Computer Graphics	4	3	1	-	3	30	70
CA 608	Artificial Intelligence	4	3	1	-	3	30	70
CA 613	Data Communication and Networking	4	3	1	-	3	30	70
CA 614	Advance Java	4	3	1	-	3	30	70
CA 615	Programming in Java	4	3	1	-	3	30	70
CA 616	Advance Computer Architecture	3	3	-	-	3	30	70
CA 617	Software Engineering	3	3	-	-	3	30	70
CA 618	Object Oriented Analysis & Design	3	3	-	-	3	30	70
CA 619	Cloud Computing	4	3	1	-	3	30	70
CA 620	E-Banking & Security Transactions	3	3	-	-	3	30	70
CA 621	Mobile Commerce	4	3	1	-	3	30	70
CA 622	Software Testing	3	3	-	-	3	30	70
CA 623	Data Mining and Warehousing	4	3	1	-	3	30	70
CA 624	Embedded System	3	3	-	-	3	30	70
CA 655	Computer Graphics Lab	1	-	-	2	2	60	40
CA 658	Colloquium (Group Discussion)	1	-	-	2	2	60	40
CA 659	Networking Lab	1	-	-	2	2	60	40
CA 660	Advance Java Lab	1	-	-	2	2	60	40
CA 661	Java Language Lab	1	-	-	2	2	60	40
CA 662	OOAD Lab	1	-	-	2	2	60	40
CA 703	Analysis and Design of Algorithm	3	3	-	-	3	30	70
CA 709	ERP System	3	3	-	-	3	30	70
CA 711	Decision Support System	3	3	-	-	3	30	70
CA 715	Distributed Systems	3	3	-	-	3	30	70

CA 719	Advanced Web Development	3	3	-	-	3	30	70
CA 721	Information Protection & Security	4	3	1	-	3	30	70
CA 723	Research Methodologies	4	3	1	-	3	30	70
CA 753	Advanced Web Development Lab	1	-	-	2	2	60	40
BM 317	Accounting and Financial Management	4	3	1	-	3	30	70
BM 517	Accounting and Financial Management	4	3	1	-	3	30	70
BM 606	Foreign Language (French)	4	3	1	-	3	30	70
DE 101	Discipline and Co Curricular Activities – I	2	-	-	-	-	100	-
DE 102	Discipline and Co Curricular Activities – II	2	-	-	-	-	100	-
DE 201	Discipline and Co Curricular Activities – III	2	-	-	-	-	100	-
DE 202	Discipline and Co Curricular Activities – IV	2	-	-	-	-	100	-
DE 301	Discipline and Co Curricular Activities – V	2	-	-	-	-	100	-
DE 501	Discipline and Co Curricular Activities – I	2	-	-	-	-	100	-
DE 502	Discipline and Co Curricular Activities – II	2	-	-	-	-	100	-
DE 601	Discipline and Co Curricular Activities – III	2	-	-	-	-	100	-
DE 602	Discipline and Co Curricular Activities – IV	2	-	-	-	-	100	-
DE 701	Discipline and Co Curricular Activities – V	2	-	-	-	-	100	-
EC 220	Digital Electronics	4	3	1	-	3	30	70
ES 101	Environmental Studies	3	3	-	-	3	30	70
HS 201	Communication Skills	4	3	1	-	3	30	70
HS 202	Cognitive Skills	4	3	1	-	3	30	70
HS 301	Verbal and Non-Verbal Reasoning	3	3	-	-	3	30	70
HS 302	Technical Writing	4	3	1	-	3	30	70
HS 401	Technical Aptitude	3	3	-	-	3	30	70
HS 503	Employability Skills – I	4	3	1	-	3	30	70
HS 504	Employability Skills – II	4	3	1	-	3	30	70
HS 603	Employability Skills – III	4	3	1	-	3	30	70
HS 604	Employability Skills – IV	4	3	1	-	3	30	70
HS 701	Employability Skills – V	3	3	-	-	3	30	70
MA 103	Elementary Mathematics	4	3	1	-	3	30	70
PE 204	Minor Project	2	-	-	2+2	3	60	40
PE 305	Dissertation	2	-	-	3	2	60	40
PE 307	Major Project	3	-	-	3+3	3	60	40
PE 652	Minor Project	3	-	-	3+3	3	60	40
PE 701	Major Project	2	-	-	3+3	2	60	40
PE 703	Dissertation	2	-	-	3	2	60	40
PT 304	Industrial training	18	-	-	36	3	120	80
PT 702	Industrial training	18	-	-	36	3	120	80
SM 303	Seminar	1	-	-	2	2	60	40
SM 701	Seminar	2	-	-	2	2	60	40

Units	Course Contents	Total Contact Hrs.
1	Brief history of development of computers, Computer system concepts, Computer system characteristics, Capabilities and limitation, Types of computer, Generation of Computers, Personal Computer(PCs)- evolution of PCs, configurations of PCs- Pentium and Newer, PCs specification and main characteristics. Basic components of a computer system – Control unit, ALU, Input/Output functions and characteristics, memory –RAM, ROM, EPROM, PROM and other types of memory.	7
2	Input/Output & Storage Units:- Keyboard, Mouse, Trackball, Joystick, Digitizing, tablet, Scanners, Digital Camera, MICR, OCR,OMR, Bar-code Reader, Voice Recognition, Light pen, Touch Screen, Monitors – characteristics and types of monitor – Digital, Analog, Size, Resolution, Refresh Rate, Interlaced / Non Interlaced, Dot Pitch, Video Standard – VGA, SVGA, XGA etc, Printers & Types – Daisy wheel, Dot Matrix, Inkjet, Laser, Line Printer, Plotter, Sound Card, and Speakers.	8
3	Number System: Binary, octal, decimal and hexadecimal representation of numbers. Integers and floating numbers. Representation of character, ASCII and EBCDIC codes. Binary arithmetic: addition, subtraction, complements.	7
4	Storage fundamentals – Primary Vs Secondary Data Storage and Retrieval methods – Sequential, Direct and Index Sequential, SIMM, Various Storage Devices- Magnetic Tape, Magnetic Disks, Cartridge Tape, Hard Disk Drivers, Floppy Disks (Winchester Disk ), Optical Disks, CD, VCD, CD- R, CD-RW, Zip Drives, Flash drives Video Disk, Blue Ray Disc, SD/MMc Memory cards, Physical structure of floppy & hard disk, drive naming conventions in PC. DVD, DVD-RW.	8
5	Software and its Needs, Types of Software- System software, Application software, System Software- Operating system, Utility Program, Programming language, Assemblers, Compilers and Interpreter, Introduction to operating system for PCs-DOS Window, Linux, File Allocation Table(FAT & FAT32), files & directory structure and its naming rules, booting process details of DOS and Windows, DOS system files Programming languages- Machine, Assembly, High Level, 4GL, their merits and demerits, Application Software and its types- Word-processing, Spreadsheets, Presentation Graphics, Data Base Management Software, characteristics, Uses and example and area of applications of each of them, Virus working principles, Virus working principles, Types of viruses, Virus detection and prevention viruses on network.	7
Total		37

**Reference Books:**

1. Computer Fundamentals by P.K.Sinha, BPB Publications
2. Fundamentals of information Technology and Computer Programming by V.K.Jain
3. Introduction to Computers and Information Systems by Dr. Sushila Madan, Taxmann Publications

**CA 102 PROGRAMMING IN C**

C(L,T,P)=4(3,1,0)

Units	Course Contents	Total Contact Hrs.
1	C program structures, Variables, Data Types, Declarations, Operators (Arithmetic, Relational, Logical), increment and decrement operators, Assignment operators and expressions, Arithmetic expressions, statements, symbolic constants, conditional expressions, Bitwise operators, precedence and order of evaluations, input-output functions.	7
2	Statements and Blocks, branching statements (if, switch), Loops (while, for, do-while, repeat-until), Break and continue, go to and labels.	7
3	Array, Type of Array, Strings, Functions, external variables, scope rules, header files, static variables, initialization, parameter passing (call-by-value, call-by-reference), recursion	7
4	Pointers and addresses, pointers and function arguments, pointer and arrays, Pointer as Function Arguments. Memory allocation in C, storage Classes C preprocessor.	8
5	Structures: Defining and processing, passing to a function, Unions. Files: Standard input and output, formatted output, formatted input, file access,	8
Total		37

**Reference Books:**

1. Programming in C by E. Balaguruswamy, TMH Publications
2. Programming with C by Gottfried, Schaums, TMH Publications
3. Thinking in C by Mahapatra, PHI Publications

**CA 104 DESKTOP PUBLISHING & MULTIMEDIA**
**C(L,T,P)=4(3,1,0)**

Units	Course Contents	Hrs.
1	Introduction to Multimedia: definition, classification (discrete, continuous, passive, interactive), properties. Medium perception, representation, presentation, storage, and transmission, MM hardware, application areas, stages of MM project, design issues (speed, simplicity, clarity, consistency, ease of use, and navigation)	7
2	Text: text importance, encoding, fonts (type, size, style, leading, and kerning), text in MM (font design, menus, buttons, fields, portrait, landscape), editing design tools, hypertext vs. hypermedia, Sound terminology (acoustic, electromagnetic wave, cycle, frequency, amplitude, decibel)	8
3	MIDI files (creation, size, advantages, and disadvantages). MIDI vs. digital audio, Speech: generation (TTS), recognition (STT), applications, Sound summary, Digital image (bitmap, vector graphic), Bitmap (pixels, color encoding, palette, and models, resolution), Vector graphics (types, properties, drawing, advantages, disadvantages, file size)	6
4	Animation: transition, cell animation (key frames, tweening, layers, morphing, formats), Video: concepts, standards, capturing, analog vs. digital, TV vs. computer video, compression and streaming. Encoding requirements (entropy, source, and adaptive),	7
5	Compression (symmetric vs. asymmetric, dialogue mode vs. retrieval mode, RLE, Huffman), Compression techniques (JPEG and MPEG).	7
Total		35

**Reference Books:**

1. Vaughan Tay, Multimedia: Making it work, Berkeley Osborne McGraw-Hill, 6th Edition 2004.
2. Ralf Steinmetz & Klara Nahrstedt, Multimedia fundamentals Volume 1: Media coding and content processing, Prentice-Hall, 2002.
3. Stephen McLoughlin, Multimedia: Concepts and Practice, Prentice hall, 2001.
4. Ze-Nian Li & Mark S Drew, Fundamentals of Multimedia, Prentice hall, 2004.
5. Jen Dehaan, Macromedia FLASH MX 2004, training from the source, Macromedia press

**CA 107 OFFICE AUTOMATION TOOLS**
**C(L,T,P)=4(3,1,0)**

Unit	Course Contents	Hrs.
1	<b>Ms Window:</b> Introduction to M.S Window; Features of Window; Various version of Window & it use; Working with Window ;My computer & recycle bin; Desktop, Icon And Window Explorer; Screen description & working style of window ;Dialog Boxes & Toolbars; Working with Windows; My Computer & Recycle bin; Desktop, Icons and Windows; Dialog Boxes & Toolbars; Windows Explorer; Screen description & working Styles of Windows; Dialog Boxes & Toolbars; Working with files & Folder; Simple operations like copy, delete, moving of files and folders from one drive to another, Shortcuts & Auto starts; Accessories and Windows Settings using Control Panel, modem, printers, audio, networks, fonts, creating users, internet settings, Starts button & Program lists; Installation and Uninstalling new Hardware & Software program on your computer;	7
2	<b>Office Package-</b> Office activates and their software requirements, Word-processing, Spreadsheets, Presentation graphics, Database, introduction to MS Office; Introduction to MS-Word; Features & areas of use. Working with MS Word.; Menus & Commands; Toolbars & Buttons; Shortcuts Menus, Wizards & Templates; Creating a New Document; Different Page Views and layouts; Applying various Text Enhancements; Working with - Styles, Text Attributes; Paragraph and Page Formatting; Text Editing using various features; Bullets, Numbering, Auto Formatting, Printing & various print options.	8
3	<b>Advanced Features of MS-Word:</b> Spell Check, Thesaurus, Find & Replace; Headers & Footers; Inserting - Page Numbers, Pictures, Files, Auto texts, Symbols etc.; Working with Columns, Tabs & Indents; Creations & Working with Tables including conversion to and from text; Margins & Space management in Documents; Adding Reference and Graphics; Mail Merge, Envelopes and mailing labels, Importing and Exporting to and from various formats .	6
4	<b>MS Excel:</b> Introduction and area of use; Working with MS- Excel.; concepts of Workbook & Worksheets; Using Wizard; Various Data Types; Using different features with Data, Cell and Texts; Inserting, Removing & Resizing of Columns & Rows; Working with Data & Ranges; Different views of Worksheets; Column Freezing, Labels, Headings, Splitting etc; Using different Features with Data and Text; Use of Formulas, calculation and function; Cell formatting including Models Shading; Working with different Chart Types ; Printing of Workbook and Worksheet with various option .	7
5	<b>MS-PowerPoint:</b> Introduction and area of Use; Working with MS-PowerPoint; Creating A New Presentation; Working with Presentation; Using Wizard; Slides and its different views; Inserting, Deleting and Copying of Slides; Working with notes, Handouts, Columns and lists; Adding Graphics, Sound and movies to a slide; Working with PowerPoint objects; Designing and presentation of a Slide show; Printing Presentation, nodes, Handouts with print option, Outlook Express and its features	7
Total		35

**Reference Books:**

1. Windows XP Complete Reference, BPB Publication
2. MS-Office XP Complete Reference, BPB Publication
3. MS-Windows XP Home Edition Complete Reference

**CA 110 FUNDAMENTALS OF OPERATING SYSTEM**
**C(L,T,P)=3 (3,0,0)**

Units	Course Contents	Total Contact Hrs.
1	Introduction: Definition and types of operating systems, Batch Systems, multi programming, time-sharing parallel, distributed and real-time systems, Operating system structure, Operating system components and services, System calls, system programs, Virtual machines.	7
2	Process Management: Process concept, Process scheduling, Cooperating processes, Threads, Inter-process communication, CPU scheduling criteria, Scheduling algorithms, Multiple-processor scheduling, Real-time scheduling and Algorithm evaluation.	7
3	Process Synchronization and Deadlocks: The Critical-Section problem, synchronization hardware, Semaphores, Classical problems of synchronization, Critical regions, Monitors, Deadlocks-System model, Characterization, Deadlock prevention, Avoidance and Detection, Recovery from deadlock.	8
4	Storage management: Memory Management-Logical and Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation with paging, Virtual Memory, Demand paging and its performance, Page replacement algorithms, Allocation of frames, Thrashing, Page Size and other considerations, Demand segmentation, File systems, secondary Storage Structure, File concept, access methods, directory implementation, Efficiency and performance, recovery, Disk structure, Disk scheduling methods, Disk management, Recovery, Disk structure, disk scheduling methods, Disk management.	8
5	Protection and Security-Goals of protection, Domain of protection, Revocation of Access Rights, language based protection, The Security problem, Authentication, One Time passwords, Program threats, System threats, Threat Monitoring, Encryption.	8
Total		38

**Reference Books:**

1. Tannenbaum, "Operating System Design and Implementation", PHI.
2. Stalling, William, "Operating System", Maxwell Macmillan
3. Silveschatza, Peterson J, "Operating System Concepts", Willey.

**CA 111 WEB DESIGNING**
**C(LTP)= 3(3,0,0)**

Units	Course Contents	Total Contact Hrs.
1	The Internet, Classification of Networks, Networking Models, What is Packet Switching, Accessing the Internet, Internet Protocols, Internet Protocol (IP), Transmission Control Protocol (TCP), Internet Address, Structure of Internet Servers Address, Address Space, How does the Internet work, Intranet & Extranet, Internet Infrastructure, Protocols and Services on Internet, Domain Name System, SMTP and Electronic Mail, Http and World Wide Web, Usenet and Newsgroups, FTP, Telnet, Search Engines, Web Browser	6
2	Introduction of HTML: introduction, markup language, editing HTML : common tags, headers, text styles, linking, images, formatting text, horizontal rules and more line breaks, unordered lists, nested and ordered lists, basic HTML tables : intermediate HT ML tables and formatting : basic HTML forms, more complex HTML forms, internal linking, creating and using image maps.	7
3	Cascading Style Sheets: Introduction, What is CSS?, How does CSS work?, Colors and backgrounds, Fonts, Text, Links, Identification and grouping of elements (class and id), Grouping of elements (span and div), The box model, The box model - margin & padding, The box model - borders, The Box model - Height and width, Floating elements (floats), Positioning of elements, Web-standards and validation	8
4	FrontPage: Creating Your First Web Pages, Create a Web Page, Organize a Page with Links, Lists, and Tables, Display Graphics and Photos on a Page, Layout a Page with Tables, Designing an Entire Web Site, Create a New Web Site, Develop a Site Quickly with Templates, Make Your Site Look Great with Themes, Publish Your Site, Connect a Database to Your Site, Format Your Site Through Cascading Style Sheets, Divide a Page into Separate Frames	7
5	JavaScript: Introduction to JavaScript, JavaScript Variables and Data Types, Declaring Variables, Data Types, Statements and Operators , Control Structures, Conditional Statements, Loop Statements, Object-Based Programming, Functions, Executing Deferred Scripts, Objects, Message box in JavaScript, Dialog Boxes, Alert Boxes, Confirm Boxes, Prompt Boxes, JavaScript with HTML, Events	7
Total		35

**Reference Books:**

1. Pro XML Development with Java Technology: From ... - by Ajay Vohra, Deepak Vohra
2. Information Technology and Economic Development - by Yutaka Kurihara, Sadayoshi Takaya, Hisashi



**CA 112 PRINCIPLES OF PROGRAMMING LANGUAGE**
**C(L,T,P)=4 (3,1,0)**

Units	Course Contents	Hours
1	Language Design issues, why Study Programming Languages, The Impact of Programming Paradigms, Role of Programming Language?, Programming Environments, C Overview, Virtual Computers and Binding Times.	7
2	Programming Language Syntax, Stages in Translation, Formal Translation Models, Properties of types and Objects , Scalar Data Types, Composite Data types	7
3	Structured Data Types, Abstract data Types, Encapsulation by Subprograms, C++ Overview	8
4	Implicit and Explicit Sequence control, Sequencing with Arithmetic Expressions, Sequence control between statements Sequence control Between statements, Sequencing with Non arithmetic Expression	8
5	Subprogram Sequence control, Attributes of Date Control, Parameter Transmission, Explicit Common Environment.	8
Total		38

**Reference Books:**

1. Terrance W.Pratt, "Programming Languages: Design and Implementation", Pearson Education.

**CA 113 PROGRAMMING LOGIC & TECHNIQUE**
**C(LTP)= 4(3,1,0)**

Units	Course Contents	Hours
1	An Overview of Computers and Logic, Structure, Modules, Hierarchy Charts, and Documentation, Writing a Complete Program	6
2	Making Decisions, Looping, Control Breaks, Arrays, Advanced Array Manipulation	7
3	Using Menus and Validating Input, Sequential File Merging, Matching, and Updating, Advanced Modularization Techniques and Object-Oriented Programming.	8
4	Programming Graphical User Interfaces, Program Design, System Modeling with UML	7
5	Using Databases Appendices, Solving Difficult Structuring Problems, Understanding Numbering Systems and Computer Codes, Using a Large Decision Table.	7
Total		35

**Reference Books:**

1. Programming Logic and Design, Comprehensive Edition, Joyce Farrell, Cengage Learning Starting Out With Programming Logic And Design by Jim Messinger

**CA 116 SYSTEM ANALYSIS & DESIGNING FUNDAMENTALS**
**C(L,T,P)=3(3,0,0)**

Units	Course Contents	Total Contact Hrs.
1	System Concept: Definition, Characteristics, Elements of system, Physical and abstract system, open and closed system, man-made information systems. System Development Life Cycle: Various phases of system development, Considerations for system planning and control for system success. System Planning.	7
2	Initial Investigation: Determining user's requirements and analysis, fact finding process and techniques. Feasibility study: Determination of feasibility study, Technical, Operational & Economic Feasibilities, System performance constraints, and identification of system objectives, feasibility report. Cost/Benefit Analysis of the new/proposed system	7
3	Structured Analysis: Tools of System Analysis Structured Design: Tools of System Design with I/O and Form Design.	7
4	Documentation for the new system: User Manual, system development manual, programming manual, programming specifications, operator manual. System testing & quality: System testing and quality assurance, steps in system implementation and software maintenance.	8
5	System security: Data Security, Disaster/ recovery and ethics in system development, threat and risk analysis. Hardware and software procurement – In-house purchase v/s hiring and lease	6
Total		35

**Reference Books:**

1. System Analysis & Design by V K Jain, Dreamtech Press
2. Modern System Analysis & Design by A Hoffer, F George, S Valaciah Low Priced Ed. Pearson Education

**CA 152 COMPUTER PROGRAMMING LAB C(L,T,P)=1(0,0,2)**

Units.	List of Experiments	Total Contact Hrs.
1	Simple input output program integer, real character and string. (Formatted & Unformatted)	2 hrs (Weekly)
2	Conditional statement programs (if, if-else-if, switch-case).	
3	Looping Program. (for, while, do-while).	
4	Program based on array (one, two, and three dimensions).	
5	Program using structure and unions.	
6	Program using Function (With and without recursion).	
7	Simple programs using pointers.	
8	File handling.	

**CA 155 OFFICE AUTOMATION LAB C(L,T,P)=1(0,0,2)**

Units	List of Experiment	Total Contact Hrs.
1	Installation of Operating Systems.	2 hrs (Weekly)
2	Introduction to control panel, Add remove hardware and software, Installation of Hard disk, RAM,CD, ROM,CPU, Mother Board, Keyboard, Mouse,	
3	Ms-Word Basics: Working with MS Word; Menus Commands; Toolbars & Buttons; Shortcut Menus, Wizards & Templates; Creating a New Document	
4	Ms-Word Lab 2:Spell Check, Thesaurus, Find & Replace; Headers & Footers; inserting-Page Number, Pictures, File, Auto texts, Symbols etc.	
5	Ms-Word lab 3 Working with Columns, Tabs & Indent; Creation & Working with Tables including conversion to and from text; Margins & Space management in Document; adding References and Graphics.	
6	Ms-Word lab 4: Mail Merge, Envelops& Mailing Labels. Importing and exporting to and from various formats.	
7	MS Excel Lab 1: Working with Ms Excel; concepts of Workbook & Worksheets; using Wizards; Various Data Types; Using Different features with Data, Cell and Texts; Inserting, Removing & Resizing of Columns & Rows; Working with Data & Ranges; different Views of Worksheets; Column Freezing,Labels, Hiding, Splitting etc.	
8	Ms Power Point: Working with MS Power Point; Creating a New Presentation; Working with Presentation & Presentation of Slide Show;Printing Presentation.	

**CA 156 DTP & MULTIMEDIA LAB C(L,T,P)=1(0,0,2)**

Units	List of Experiments	Total Contact Hrs.
1.	Create resume in html language.	02 hrs (Weekly)
2.	Create list of sports celebrities in order list.	
3.	Create a program to show a picture.	
4.	Create list of sports celebrities in unordered list.	
5.	Create buttons (checkbox, radio button etc) in html.	
6.	Create a program of hyperlink in html.	
7.	Create a program in html to link up a picture, a word file & a text. File	
8.	Create a rectangle in dream weaver.	

**CA 157 WEB DESIGNING LAB C(LTP) = 1(0,0,2)**

Units	List of Experiments	Hours
1	Use of HTML tags Text formatting, text styles	2 hrs Weekly
2	lists(ordered list and unordered list with nesting control)	
3	Tables with Rowspan and colspan	
4	Linking documents( hyper linking and image maps) linking to a particular location(within page, another page)	
5	Adding graphics to HTML documents	
6	Frames: use of frames set, targeting frames	
7	Preparation of the static website with the help of HTML tag	
8	Use of the forms in HTML(buttons,text,drop down menu etc)	
9	CSS:In line,internal,external	
10	Use of the Java Script	

**CA 159 COMMUNICATION & SOFT SKILL LAB****C(L,T,P) = 1(0,0,2)**

Units	List of Experiments	Total Contact Hrs.
1	Practice for communication skill and per market standard	2 hrs Weekly
2	Weekly group discussion	
3	Presentation skill development	

**CA 160 SYSTEM ANALYSIS & DESIGNING LAB****C(L,T,P)=1(0,0,2)**

Units	List of Experiments	Total Contact Hrs.
1	The experiment will be based on the topic to covered in the syllabus of CA 108	2 hrs Weekly

**CA 162 OPERATING SYSTEM LAB****C(LTP)=1(0,0,2)**

Units	List of Experiments	Total Contact Hrs.
1	The experiment will be based on the topic to covered in the syllabus of CA 110	2 hrs Weekly

**CA 201 OBJECT ORIENTED PROGRAMMING & C++****C(L,T,P)=4(3,1,0)**

Units	Course Contents	Total Contact Hrs.
1	Introduction to OOPs and C++ Element - Introduction to OOPs, Features & Advantages of OOPs, Different element of C++ (Tokens, Keywords, Identifiers, Variable, Constant, Operators, Expression, String).	7
2	Program Control Statements – Sequential Constructs, Decision Making Construct, Iteration / Loop Construct, Arrays, Functions (User defined Function, Inline Function, Function Overloading), User Defined Data Types (Structure, Union and Enumeration).	7
3	Class, Object, Constructor & Destructor – Class, Modifiers (Private, Public & Protected), Data Member, Member Function, Static Data Member, Static Member Function, Friend Function, Object, Constructor (Default Constructor, Parameterized Constructor and Copy Constructor), Destructor.	7
4	Pointer, Polymorphism & Inheritance – Pointer (Pointer to Object, this Pointer, Pointer to Derive Class), Introduction to Polymorphism (Runtime Polymorphism, Compiletime Polymorphism), Operator Overloading, Virtual Function, Inheritance (Single Inheritance, Multiple Inheritance, Multilevel Inheritance, Hierarchical Inheritance, Hybrid Inheritance), Virtual Base Class, Abstract Class	8
5	File Handling, Exception Handling - Files I/O, Exception Handling (Exception Handling Mechanism, Throwing Mechanism, Catching Mechanism, Re-throwing an Exception).	6
	Total	35

**Reference Books:**

1. Object Oriented programming with C++ by E. Balaguruswami
2. Success with C++ by Kris James
3. Object Oriented programming with C++ by David Parsons
4. Programming in C++ by D. Ravichandran
5. Programming in C++ by Dewhurst and Stark
6. Mastering C++ by Venugopal, Ravishankar, Rajkumar

## CA 208 DATA STRUCTURE &amp; ALGORITHM

C(L,T,P)=4(3,1,0)

Units	Course Contents	Total Contact Hrs.
1	The concept of data structure, Abstract data type, Concept of list & array Introduction to stack, Stack as an abstract data type, primitive operation on stack, Stacks application: Infix, post fix, Prefix and Recursion, Multiple Stack.	8
2	Introduction to queues, Primitive Operations on the Queues, Queue as an abstract data type, Circular queue, Dequeue, Priority queue, Applications of queue	7
3	Introduction to the Linked List , Basic operations on linked list, Stacks and queues linked list, Header nodes, Doubly Linked List, Circular Linked List, Stacks & Queues as a Circular Linked List, Application of Linked List	7
4	TREES - Basic Terminology, Binary Trees, Tree Representations using Array & Linked List, Basic operation on Binary tree, Traversal of binary trees:- In order, Preorder & post order, Application of Binary tree, Threaded binary tree, B-tree & Height balanced tree, Binary tree representation of trees	7
5	Analysis of algorithm, complexity using big 'O' notation. Searching: linear search, Binary search, their comparison. Sorting :Insertion sort, Selection sort, Quick sort, Bubble sort, Heap sort, Comparison of sorting methods. Hash Table, Collision resolution Techniques	7
Total		36

**Reference Books:**

1. Fundamentals Of Data Structure, By S. Sawhney & E. Horowitz
2. Data Structure : By Trembley & Sorrenson
3. Data Structure : By lipschuists (Schaum's Outline Series Mcgraw Hill Publication)
4. Fundamentals Of Computer Algorithm: By Ellis Horowitz and Sartaj Sawhney

## CA 209

## INTERNET TECHNOLOGIES &amp; PROGRAMMING

C(L,T,P)=4(3,1,0)

Units	Course Contents	Total Contact Hrs.
1	<b>Internet Connection Concepts</b> – Server, Client and Parts, DNS, Telephone, Cable and Satellite connections- Dialup, ISDN, ADSL and Leased live based connection, Cable and DSS a/c, Web TV and Internet, ISP features. TCP and UDP protocols, URL's, CGI, MIME and introduction to SGML.	7
2	<b>HTML:</b> Introduction to HTML, Elements of HTML syntax, Head and Body sections, Building HTML documents, Inserting text, images, hyperlinks, Backgrounds and Color Control, ordered and unordered lists, content layout & presentation. Tables: use of table tags, DIV and SPAN and various other HTML tags. forms – frames – table	6
3	<b>Introduction of intranet</b> - Intranet v/s LAN, Components of Internet-Workstations and Client software, Server and Network operating system. Network cards, cabling and hubs, steps for creating an intranet. Maintenance and connecting to internet.	8
4	<b>Web technology</b> - Elements of web – clients and servers languages and protocols, web page and web sites, special kinds of web sites, web resources – search engines, message boards, clubs, news groups and chat, web page creation concepts – planning, navigation, themes and publishing. Analyzing web traffic – log file data, analyzing log file and product for analyzing web traffic.	7
5	<b>E-mail technology</b> - features and concepts – message headers, address book, attachment, filtering and forwarding mails. Scripting languages HTML –webpage design – java script introduction – control structures – functions – arrays – objects – simple web applications.	7
Total		35

**Reference Books:**

1. Roy and Sinha, Internet Technologies by BPB Publications
2. Mukharjee S., Web Designing and Development by TMH

Units	Contents of the Subject	Hours
1	Data Movement around registers, Data movement from/to memory arithmetic and logic micro operations. Concept of bus and timings in register transfer.	7
2	Addressing Modes, Instruction Format, CPU organization with large registers, stacks and handling of interrupts & subroutines Instruction pipelining.	6
3	Array multiplier Booth's algorithm, Addition/subtraction for signed/unsigned number and 2's complement number. Basic organization of micro programmed controller,	6
4	Concept of RAM/ROM, basic cell of RAM, Associative memory, Cache memory organization, Virtual memory organization.	7
5	Introduction to Peripherals & their interfacing. Strobe based and handshake based communication, DMA based transfer, I/O Processor, DMA Controller	7
Total =		33

**Reference Books:**

1. J.P. Hayes-Computer Architecture & Organization, Mc-Graw Hill.
2. Heuring-Computer System Design and Architecture, Pearson Education.
3. M.Morrismanno-Computer System Architecture Prentice Hall of India.
4. Bartee-Computer Architecture, Tata Mc-Graw Hill.
5. Stallings-Computer Organization and Architecture Pearson Education

Units	Course Contents	Total Contact Hrs.
1	Overview of DBMS, Basic DBMS terminology, data base system v/s file system, data independence. Architecture of a DBMS	7
2	Introduction to data models: entity relationship model, hierarchical model: from network to hierarchical, relational model, comparison of network, hierarchical and relational models	7
3	Data modeling using the Entity Relationship Model: ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation, reduction of an ER diagrams to tables, extended ER model, relationships of higher degree	8
4	Relational model: storage organizations for relations, relational algebra, relational calculus. Normalization: Functional dependencies, normal forms, first, second, third normal forms, BCNF, inclusion dependencies, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design	8
5	Introduction to SQL: Characteristics of SQL, Advantages of SQL, SQL data types and literals, Types of SQL commands, SQL operators and their procedure, Tables, views and indexes, Queries and sub queries, Aggregate functions, insert, update and delete operations, Joins, Unions, Intersection, Minus in SQL	8
Total		38

**Reference Books:**

1. Database Management Systems by Raghu Ramakrishnan
2. Fundamentals of Database Management Systems by Mark L. Gillenson
3. Database System Concepts by Abraham Silberschatz, Henry F. Korth, and S. Sudarshan
4. Database Systems: Design, Implementation, and Management by Peter Rob and Carlos Coronel
5. Database Systems: A Practical Approach to Design, Implementation and Management (5th Edition) by Thomas M. Connolly and Carolyn E. Begg
6. Fundamentals of Database Systems (6th Edition) by Ramez Elmasri and Shamkant Navathe
7. Database Systems: The Complete Book (2nd Edition) by Hector Garcia-Molina, Jeffrey D. Ullman, and Jennifer Widom

## CA 215 INFORMATION SYSTEMS

C(L,T,P)=3(3,0,0)

Units	Course Contents	Total Contact Hrs.
1	Information Systems and the Environment: Overview and Perspectives, The Information Technology Revolution and Industrial Ecology, The Information Revolution and Sustainability: Mutually Reinforcing Dimensions of the Human Future	7
2	Intellectual Property Rights in Data, Information Systems within the Firm, Improving Environmental Knowledge Sharing, Using Environmental Knowledge Systems	7
3	Environmental Information Management Systems , Environmental Knowledge-Sharing in Manufacturing, Modular Design for Recyclability: Implementation and Knowledge Dissemination	8
4	Environmental Information in Supply-Chain Design and Coordination, Simulation Models for Information Sharing and Collaboration	8
5	Opportunities for Collaboration and New Technologies, Knowledge Networking for Global Sustainability: New Modes of Cyberpartnering	8
Total		38

**Reference Books:**

1. Information Systems and the Environment, The National Academic Press

## CA 216 SOFTWARE ENGINEERING FUNDAMENTALS

C(L,T,P)=3(3,0,0)

Units	Course Contents	Total Contact Hrs.
1	Introduction to Software Engineering: Introduction, Definitions of Software Engineering, Program V/s. Software, Software Characteristics, Software Components, Software Applications, Software Crisis, Software Processes, Software Quality Attributes, Key challenges faced by the Software Engineering, Software Engineer, SDLC, Software System Development Methodologies, CASE tools	6
2	Software Project Management: Project Management Process, Feasibility Study, Software Project Planning, Project Execution, Monitoring and Control, Project Termination Analysis, SCM, Process Management Process, CMM, Risk Management Process, Software Project Planning, Scheduling a Software Project.	7
3	Requirement Engineering: Introduction to Requirement Engineering, Functional Requirements, Non-Functional Requirements, Domain Requirements, Requirement Engineering Process, Software Requirements Specification (SRS)	7
4	Structured Analysis & Design: Data Modeling, Data Objects, Attributes And Relationships, Cardinality And Modality, Entity – Relationship Diagram, Functional Modeling, Data Flow Diagram, Logical And Physical DFDs, Leveling Of DFDs, Control Flow Diagram, Behavioral Modeling, Data Dictionary, Structured English, Decision Trees, Decision Table, Software Design Model, Conceptual and Technical Designs, Characteristics of a Good Design, Design Principles, Design Guidelines, Decomposition and Modularity	8
5	Quality Assurance Activities: Types of Quality Assurance Activities , Verification and Validation, Testing, Testing Fundamentals, Strategic Issues in Testing, Test Plan, Testing Principles, General Testing Strategies, Code Testing, Specification Testing, Black Box Testing, White Box Testing, Testing Process	6
Total		34

**Reference Books:**

1. Gill N.S., Software Engineering: Software Reliability, Testing and Quality Assurance, Khanna Book Publishing Co (P) Ltd, New Delhi, 2002
2. Keswani & Banerjee, Software Engineering, Genius Publications, 2009
3. Sabharwal S., Software Engineering: Principles, Tools and Techniques, Second Ed., Umesh Publications, Delhi, 2005.

**CA 217 INTRODUCTION TO DISTRIBUTED SYSTEMS**
**C(L,T,P)=3(3,0,0)**

Units	Course Contents	Total Contact Hrs.
1	CHARACTERIZATION OF DISTRIBUTED SYSTEMS: Introduction, Examples of distributed Systems, Resource sharing and the Web Challenges. System Models: Architectural models, Fundamental Models Theoretical Foundation for Distributed System: Limitation of Distributed system, absence of global clock, shared memory, Logical clocks, Lamport's & vectors logical clocks, Causal ordering of messages, global state, termination detection.	7
2	Distributed Mutual Exclusion: Classification of distributed mutual exclusion, requirement of mutual exclusion theorem, Token based and non token based algorithms, performance metric for distributed mutual exclusion algorithms.	7
3	.DISTRIBUTED DEADLOCK DETECTION: system model, resource Vs communication deadlocks, deadlock prevention, avoidance, detection & resolution, centralized dead lock detection, distributed dead lock detection, path pushing algorithms, edge chasing algorithms.	7
4	DISTRIBUTED OBJECTS AND REMOTE INVOCATION: SECURITY: Overview of security techniques, Cryptographic algorithms, Digital signatures Cryptography pragmatics, Case studies: Needham Schroeder, Kerberos, SSL & Millicent.	7
5	TRANSACTIONS AND CONCURRENCY CONTROL: Transactions, Nested transactions, Locks, Optimistic Concurrency control, Timestamp ordering, Comparison of methods for concurrency control. DISTRIBUTED FILE SYSTEMS: File service architecture, Sun Network File System, The Andrew File System, Recent advances	7
Total		35

**Reference Books:**

1. Coulousis, dollimore, kindberg "distributed system concept and design"
2. Distributed system, principles and paradigm by AS tannenbaum

**CA 218 PROGRAMMING IN JAVA**
**C(L,T,P) = 4(3,1,0)**

Units	Course Contents	Total Contact Hrs.
1	Overview of Java, Object Oriented Concepts in Java. Abstraction, OOP Principles and Java applications, Java features like security, portability, byte code, java virtual machine, object oriented, robust, multithreading, architectural neutral, distributed and dynamic, Data types and Keyword	6
2	Operators: Arithmetic, Bitwise, Relation, increment Decrement, logical, special, Assignment Control Structures, Type Casting , Array, Java methods, Classes, Constructor, method overriding, method overloading, abstract class, Inheritance of procedures and Data, packages java. lang, java.util and their uses, java.io, basics of networking using Java, Javap, javadoc command And interface, Inner class.	7
3	String handling and various string functions, String Buffer, object class method toString (), hashCode (), equals (), Exception handling, multithreaded programming thread priorities, synchronization, messaging, creating and controlling of threads. New(),run(),Wait() ,join() method of thread class, Runnable thread and method ,i/o stream, garbage collection, externalization	9
4	Java utilities like Applets, Java applets and their use – Event Handling – AWT and working with Windows – Event Handling – Event Handling Mechanisms, Delegation Event Model, Event Class, Event Listener Interfaces, Adapter Classes, Inner Class. AWT and working with windows – AWT. Classes, Window fundamentals, frame windows, frame window in An Applet, Working with Graphics, color, fonts and text. , JAR files	7
5	JDBC – JDBC API, JDBC Drivers, Products, JDBC Design considerations, Two Tier and Three Tier client server model, Basic steps to JDBC, setting up a connection to database, Creating and executing SQL statements, Result set and Result set Metadata Object.	8
Total		37

**Reference Books:**

1. The Complete Reference: Patrick Naughton and Herbert Schildt
2. Khalid Maugham LPE Publisher

**CA 220 E-BANKING CONCEPTS****C(L,T,P) = 3(3,0,0)**

Units	Course Contents	Hrs.
1	Introduction, Definition of E-Banking, Various E-Channels of E-Banking, Types of E-Banking, Components of E-Banking, E-Banking Activities, Advantage of E-Banking, Disadvantages of E-banking	7
2	E-Banking Support Services, Web-linking, Account Aggregation, Electronic Authentication, Website Hosting, Payments for E-Commerce, Framework of a Payment System, Payment Protocols, Macro Payment System versus Micro Payment System, Electronic Bill Payment and Presentment, Person-to-Person Payments, Wireless E-Banking	8
3	Wired E-banking versus Wireless E-banking, Components of a Wireless System, Handheld Devices, Connectivity, Coverage, and Gateways, Middleware Processing Engine, Transcoding, API Connection, Data System Backend, Wireless e-Banking Services, Technologies Enabling Wireless Banking, Risks in Wireless Banking, Challenges in Wireless Banking	7
4	E-Banking Risk, Classification based on E-banking Services, E-Banking in India, Characteristics of E-Banking, Categories of E-Banking Risks	8
5	Electronic Money , E-Payment Transaction Process , E-Cash Transaction Process , Credit Card Transaction Process , Smart Card Transaction Process, IT ACT 2008	7
	Total	37

**Reference Books:**

1. E commerce by T N Chandra
2. The E Commerce Book: Building the E empire – by Steffano Korper, Juanita Ellis

**CA 221 INTRODUCTION TO E-COMMERCE****C(L,T,P)=3(3,0,0)**

Units	Course Contents	Hrs.
1	Introduction: Motivation, Forces behind E-Commerce Industry Framework, Brief history of ECommerce, Advantages and Disadvantages of E-Commerce	7
2	Inter Organizational E-Commerce Intra Organizational E-Commerce	7
3	Architectural framework, Network Infrastructure for E-Commerce Network Infrastructure for ECommerce, Market forces behind I Way, Component of I way Access Equipment, Global Information Distribution Network, Broad band Telecommunication.	7
4	Electronic Payments: Overview of Electronics payments, Digital Token based Electronics payment System, Smart Cards, Credit Card I Debit Card based EPS, Emerging financial Instruments, Home Banking, Online Banking	7
5	Encryption: World Wide Web & Security, Encryption, Transaction security, Secret Key Encryption, Public Key Encryption, Virtual Private Network (VPM), Implementation Management Issues.	7
	Total	35

**Reference Books:**

1. David Whiteley-E-Commerce Strategy, Technology and Applications, Tata McGraw Hill.
2. Mathew Reynolds-Beginning E-commerce with visual Basic ASP, SQL Server 7.0 and MTS

**CA 222 INTRODUCTION TO EMBEDDED SYSTEMS****C(L,T,P) = 3(3,0,0)**

Units	Course Contents	Hrs.
1	Embedded Computing Requirements: Characteristics and applications of embedded systems; Components of Embedded Systems; challenges in Embedded System Design and design process;	7
2	Formalism for system design. Embedded Processors: RISC vs. CISC architectures; ARM processor – processor architecture and memory organization, instruction set, data operations and flow control;	8
3	SHARC processor – memory organization, data operations and flow control, parallelism within instructions; Input and output devices, supervisor mode, exception and traps; Memory system, pipelining and superscalar execution.	7
4	Embedded Computing Platform: CPU Bus – Bus protocols, DMA, system bus configurations, ARM bus;	8
5	Timers and counters, A/D and D/A converters, Keyboards, LEDs, displays and touch screens; Design examples.	7
	total	37

**Reference Books:**

1. Embedded System Design by Steve Heath published by Elsevier Inc
2. Embedded System design: A unified hardware/software Introduction by Frank Vahid & Tony Givagi by John Wiley



## CA 224 DATA WAREHOUSING &amp; MINING CONCEPTS

C(L,T,P) = 3(3,0,0)

Units	Course Contents	Total Contact Hrs.
1	Overview, Motivation (for Data Mining) ,Data Mining-Definition & Functionalities, Data Processing, Form of Data Preprocessing, Data Cleaning: Missing Values, Noisy Data,(Binning, Clustering, Regression, Computer and Human inspection), Inconsistent Data, Data Integration and Transformation. Data Reduction:-Data Cube Aggregation, Dimensionality reduction, Data Compression, Numerosity Reduction, Clustering, Discretization and Concept hierarchy generation.	7
2	Concept Description: Definition, Data Generalization, Analytical Characterization, Analysis of attribute relevance, Mining Class comparisons, Statistical measures in large Databases.	7
3	Measuring Central Tendency, Measuring Dispersion of Data, Graph Displays of Basic Statistical class Description, Mining Association Rules in Large Databases, Association rule mining, mining Single-Dimensional Boolean Association rules from Transactional Databases.	7
4	Data Warehousing: Overview, Definition, Delivery Process, Difference between Database System and Data Warehouse, Multi Dimensional Data Model, Data Cubes, Stars, Snow Flakes, Fact Constellations, Concept hierarchy, Process Architecture, 3 Tier Architecture, Data Marting.	7
5	Aggregation, Historical information, Query Facility, OLAP function and Tools. OLAP Servers, ROLAP, MOLAP, HOLAP, Data Mining interface, Security, Backup and Recovery, Tuning Data Warehouse, Testing Data Warehouse.	7
	Total	35

**Reference Books:**

1. Alex bezon,Stephen j.smith''data warehousing,data mining and olap'' McGraw hill edition 2001.
2. W.H Immam'' Building the data warehouse 3<sup>rd</sup> edition wiley 2003

## CA 228 OPEN SOURCE TECHNOLOGY

C(LTP)= 4(3,1,0)

Units	Course Contents	Total Contact Hrs.
1	Open source technology (OST): Introduction, Evolution & development of OST and contemporary technologies, Factors leading to its growth, Free Software Foundation and the GNU Project, principle and methodologies. Applications of open source, Risk Factors, Myths regarding open source.	7
2	Philosophy of Software Freedom: Free Software, OSS, Closed software, Public Domain Software, Shared software, Shared source. Detail of few OSS like Open Audio, Video, 2d & 3d graphics software, system tools, office tools, Networking & internet, Security, Educational tools and Games.	8
3	Open Source Development Model: Starting and Maintaining an Open Source Project, Open Source Hardware, Open Source Design, Ongoing OS Projects. Case Study: - Linux, Wikipedia etc.	8
4	Licenses of open source: What Is A License, How to create your own Licenses? Important FOSS Licenses (Apache, BSD, GPL, LGPL), copyrights and copy lefts.	6
5	Economics of FOSS: Social and Financial impacts of open source technology, Zero Marginal Cost, Income generation opportunities, Problems with traditional commercial software, Internationalization, Open Source as a Business Strategy.	7
	Total	36

**Reference Books:**

1. Embedded Linux Primer by Hallinan
2. Embedded Linux: Hardware, Software, and Interfacing by Hollabaugh
3. Linux Kernel Programming by Beck
4. Open Source Development with Lamp: Using Linux Apache, MySQL, Perl and PHP by LEE

**CA 251 OBJECT ORIENTED PROGRAMMING & C++ LAB****C(L,T,P)=1(0,0,2)**

S.No.	List of Experiments	Total Contact Hrs.
1	Write a program to perform the complex arithmetic.	2 hrs Weekly
2	Write a program to perform the rational number arithmetic.	
3	Write a program to perform the matrix operations (Transpose, addition, subtraction, Multiplication).	
4	Implement Morse code to text conversion and vice-versa.	
5	To calculate GCD of given numbers.	
6	To implement Tower of Hanoi problem.	
7	To implement spell checker using dictionary.	
8	To implement a Color selector from a given set of colors.	
9	To implement a shape selector from a given set of shapes.	
10	By mapping keys to pens of different colours, implement Turtle graphics.	
11	To implement a calculator with its functionality.	
12	To implement a graph and display BFS/DFS order of nodes.	

**CA 256 DATA STRUCTURE ALGORITHM LAB****C(L,T,P)=1(0,0,2)**

S.No.	List of Experiments	Hours
1.	The experiment will be based on the topic to covered in the syllabus of CA 208	2 hrs Weekly

**CA 257 DATABASE LAB****C(L,T,P)=1(0,0,2)**

S.No.	List of Experiments	Hours
1.	The experiment will be based on the topic to covered in the syllabus of CA 213	2 hrs Weekly

**CA 259 INTERNET PROGRAMMING LAB****C(L,T,P)=1(0,0,2)**

S.No.	List of Experiments	Total Contact Hrs.
1	Create a biodata of self using HTML with a photograph on the page and containing marks in a table.	2 hrs (Weekly)
2	Develop your web page with the following properties. 2 Photographs display at the same place flip on mouse over. Link to separate HTML file for academic, sports and other interests.	
3	Enhance your web page using style sheets frames and setup a hyper link to your friends page.	
4	And 5 Make a form for submission of Querying about the interest rates of bank (use Text fields of HTML) and submit buttons of HTML.	
5	Make a local query form, which takes in the input the range of marks through Text fields (of Java) and display the list of students having marks in that range in another window.	
6	Enhance the above query through password protection.	
7	Build a shopping Cart page in which items of 10 types are picked and quantity and a bill is generated by the web page.	
8	Enhance the above page for making a payment through electronic billing system.	
9	Associate guest book in your web page.	

**CA 261 COLLOQUIUM (GROUP DISCUSSION)****C(L,T,P) = 1(0,0,2)**

Units	Course Contents	Total Contact Hrs.
1	Group discussion on different technical topics by small group of students	2 hrs
2	Preparing student on small and latest topic as per industry requirement.	weekly

**CA 262 JAVA PROGRAMMING LAB****C(L,T,P)=1(0,0,2)**

S.No.	List of Experiments	Hours
1.	The experiment will be based on the topic to covered in the syllabus of CA 218	2 hrs Weekly

**CA 264 LINUX LAB****C(L,T,P)=1(0,0,2)**

S.No.	List of Experiments	Hours
1.	The experiment will be based on the topic to covered in the syllabus of CA 228	2 hrs Weekly

**CA 309 ASP.NET WITH C#****C(LTP) = 4(3,1,0)**

Units	Course Contents	Total Contact Hrs.
1	<b>Asp .Net Basics</b> Understanding the .Net framework – principal, feature, design, goal, Benefits of .Net framework, Event Logging, Performance Counter, Tracing, CTS, CLS, CLR, .Net class library, GIT, Type of GIT, Assemblies - version, culture, strong name, Type of Assemblies, Metadata, Manifest, MSIL, Managed and Unmanaged code, Memory Management, Garbage Collection, Security, Reflection, WPF, WCF, Window Card Space, GAC, CASPOL, REGEN, ILASM, ILDASM. DLL HELL Problem, Page life cycle.	7
2	<b>Introduction Ado.NET</b> Ado.Net Basics, Ado.Net object model, Ado.Net class for OLE DB data source, SQL Server, DataSet, Data View, Data Reader, Data Adapter, Data Table, Data Column, Data Row, Difference between Ado and Ado.Net, Communication with OLEDB data source using Ado.Net.	6
3	<b>Understanding Caching</b> Overview, Introduction to Caching, Client dedicated server, Reverse proxy, Absolute expiration and Relative expiration, Http Cache Policy, HttpCacheability, Output Cache, HttpCacheVaryByParams, HttpCacheVaryByHeaders, CachingPageOutput, Data caching, PageFragment Caching, PageOutput caching.	8
4	<b>State Management</b> Client state management- View state, Hidden field, Cookies, QueryString, Server state management- Application state, Session state, Advantage and Disadvantage of database support.	7
5	<b>Web Services and XML</b> Introduction to xml, Advantage of xml, xml Element, Naming Rules, Attributes, Introduction to web service, web service Infrastructure, SOAP, UDDI, WSDL.	7
Total		35

**Reference Books:**

1. Beginning ASP.NET 3.5 in C# 2008: From Novice to Professional, Second Edition by Matthew MacDonald
2. ASP .NET Programming with C# & SQL Server (The Web Technologies) by Don Gosselin
3. Developing Web Applications with ASP.NET and C# by Hank Meyne and Scott Davis

**CA 311 COMPUTER NETWORKS**

**C(L,T,P) = 4(3,1,0)**

Units	Course Contents	Total Contact Hrs.
1	Components – Direction of Data flow – networks – Components and Categories – types of Connections – Topologies –Protocols and Standards – ISO / OSI model – Transmission Media – Coaxial Cable – Fiber Optics – Line Coding – Modems – RS232 Interfacing sequences.	7
2	Error – detection and correction – Parity – LRC – CRC – Hamming code – low Control and Error control - stop and wait – go back-N ARQ – selective repeat ARQ- sliding window – HDLC. - LAN - Ethernet IEEE 802.3 - IEEE 802.4 - IEEE 802.5 - IEEE 802.11 – FDDI - SONET – Bridges.	8
3	Internetworks – Packet Switching and Datagram approach – IP addressing methods – Subnetting – Routing – Distance Vector Routing – Link State Routing – Routers.	7
4	Duties of transport layer – Multiplexing – Demultiplexing – Sockets – User Datagram Protocol (UDP) – Transmission Control Protocol (TCP) – Congestion Control – Quality of services (QOS) – Integrated Services.	8
5	Domain Name Space (DNS) – SMTP – FTP – HTTP - WWW – Security – Cryptography.	7
	total	37

**CA 313 INTELECTUAL PROPERTY & RIGHTS**

**C(L,T,P) = 3(3,0,0)**

Units	Course Contents	Total Contact Hrs.
1	Introduction to IPR, Issue in IPR	8
2	COPY RIGHT Issues	7
3	TRADEMARKS Issues	8
4	Information Technology Act	6
5	CASE STUDY on IPR	7
	Total	36

**CA 315 INTRODUCTION TO COMPUTER GRAPHICS**

**C(L,T,P) = 3(3,0,0)**

Units	Course Contents	Total Contact Hrs.
1	Introduction: What is Computer Graphics, Elements of a Graphics, Workstation, Graphics hardware, I/O devices, Introduction to Raster scan displays, Storage tube displays, refreshing, flicking, interlacing, color monitors, display processors resolution	7
2	Point Clipping. Line Clipping Algorithms, Polygon Clipping algorithms, Introduction to Hidden Surface elimination, Basic illumination model, diffuse reflection, specular reflection, phong shading, Gourand shading ray tracing, color models like RGB, YIQ, CMY, HSV etc.	8
3	Scan conversion techniques, image representation, line drawing, simple DDA, Bresenham’s Algorithm, Circle drawing, general method, symmetric DDA, Bresenham’s Algorithm, curves, parametric function, Beizier Method, B-sp-line Method.	7
4	2D & 3D Co-ordinate system, Translation, Rotation, Scaling, Reflection Inverse Transformation, Composite transformation, world coordinate system, screens coordinate system.	8
5	Parallel and perspective projections, Representation of 3D object on 2D screen.	7
	Total	37

**Reference books:**

1. D.Rogers and J. Adams, Mathematical Elements for Computer Graphics, McGraw –Hill International Edition.
2. Computer Graphics (Schaum Series) by Lipschutz (MC Graw Hill)
3. Hearn and P. Baker. Computer Graphics, Prentice Hall.
6. Computer Graphics by Yashwant Kanetkar

**CA 317 SOFTWARE QUALITY ASSURANCE****C(L,T,P) = 3(3,0,0)**

Units	Course Contents	Total Contact Hrs.
1	Quality Assurance Activities: Types of Quality Assurance Activities	7
2	Verification and Validation, Testing, Testing Fundamentals	8
3	Strategic Issues in Testing, Test Plan, Testing Principles	7
4	General Testing Strategies, Code Testing, Specification Testing	8
5	Black Box Testing, White Box Testing, Testing Process	7
	Total	37

**Reference books:**

1. Oehm B. W., A Spiral Model of Software Development and Enhancement, IEEE Computer, 21.pp 61-72, May 1988.
2. Fairley R., Software Engineering Concepts, McGraw Hill, New York, 1985.
3. Keswani and Banerjee, Software Engineering, Genius Publications, 2009
4. Gill N.S., Software Engineering: Software Reliability, Testing and Quality Assurance, Khanna Book Publishing Co (P) Ltd, New Delhi, 2002
5. Sabharwal S., Software Engineering: Principles, Tools and Techniques, Second Ed., Umesh Publications, Delhi, 2005.

**CA 319 BUSINESS ORGANIZATION & AUTOMATION****C(LTP)=3(3,0,0)**

Units	Course Contents	Total Contact Hrs.
1	Business –Meaning and Contents, Business as a system, Business and Legal and Economic Environment, Forms of Business Organization (meaning, merits & demerits).	7
2	Management- Management Principles, Henry fayol’s principles of management, Taylor’s Scientific Management, Management Process, Basic Functions (in short), Meaning, Nature and Process, Role of Manager.	7
3	Organizational Behavior- Need of Understanding human behavior in organizations, Challenges and opportunities for OB, Contributing disciplines to the field of OB Conceptual Models of OB.	8
4	Managing Personnel- HRM- Meaning and Functions, Man Power Planning, Job Analysis and Design, Training, Career Planning & Development, Motivation, Compensation Management Managing Finance-Concept of fixed and Working Capital, Main Sources of Finance, Accounting, Meaning, Users, Budgeting- Meaning, Type of Budgets.	7
5	Automation tools used in business organization	7
	Total	36

**Reference Books:**

1. B.P. Singh & T.N. Chabbra, Business Organisation and Management Functions, Dhanpat Rai & Co. 2000.
2. Philip Kotler, Marketing Management –(9<sup>th</sup> Ed.) Prentice Hall of India.
3. Dr. S.N. Maheshwari, Financial Management – Principles and Practice (6<sup>th</sup> revised Ed.) S. Chand & Sons.
4. Stephen P. Robbins, Organisational Behaviour (8<sup>th</sup> Ed.) Prentice Hall of India.

**CA 355 ASP.NET (Using C#) LAB****C(L,T,P) = 1(0,0,2)**

S. No.	List of Experiments	Total Contact Hrs.
1	Introduction to SQL data source , grid view, detail view, Data list	2 hrs Weekly
2	By using SQL data source insert the data in the grid view, detail view, repeater, form view , Data list	
3	By using grid view insert the record in the grid view and select particular record and find out the detail to the another grid view with in page or another page.	
4	By using ADO.NET insert the record in the database and also the display the record.(with different validation controls)	
5	Use of the master page	
6	Use of themes	
7	Insert the data in the drop down menu and select the particular record from the drop down menu and find out the related information into the another drop down menu	
8	Use of three tier architecture	
9	Use of the config file	

**CA 503 DISCRETE MATHEMATICS STRUCTURE**

**C(L,T,P) = 4(3,1,0)**

Units	Course Contents	Total Contact Hrs.
1	Fundamentals: Sets & Relations- Sets, Types of Sets, Multi Sets, Operations on Sets, Relations and Properties of Relations, Representation of Relations, Equivalence Relation, Closures of Relations, recurrence relation	6
2	Formal logic-statement, tautologies, quantifier, predicator and validity, normal form, propositional. Logic, predicate logic, Proposition Methods of Proof-Direct Proofs, Indirect Proofs, Mathematical Induction, Method of Contradiction., Permutations and Combinations, Lattices, Pigeon Hole Principle	7
3	Groups: definition of semi group, subsemigroup, cyclic semigroup, homomorphism and isomorphism, monoid, Group, abelian group, properties of group, subgroup, group homomorphism, kernel of homomorphism, permutation group, dihedral group, cyclic group, cosets, normal subgroup	7
4	Graphs and Tree: Basic Introduction of Graphs, Terminology, types of graph-simple graph, multigraph, pseudograph, subgraph, isomorphism, path, circuits, cycles, connected, graph, cutset, euler path, circuit, euler graph, Hamilton graph. weighted graph and shortest path algo, planner graph, graph coloring, polya's theory of enumeration	7
5	Finite State Machines and Languages: Grammar and Languages- Phrase structure Grammar, Types of Grammars and Languages, Finite State Machines and Languages, Minimization of Finite State Machines.	8
Total		35

**Reference Books:-**

1. Lipschutz, Seymour, "Discrete Mathematics", McGraw Hill.
2. Trembley, J.P & R. Manohar, "Discrete Mathematical Structure with Application to Computer Science", McGraw Hill.
3. Kenneth H. Rosen, "Discrete Mathematics and its applications", McGraw Hill.
4. Deo, Narsingh, "Graph Theory With application to Engineering and Computer Science.", PHI.
5. Krishnamurthy, V., "Combinatorics Theory & Application", East-West Press Pvt. Ltd., New Delhi.
- 6 Kolman B., Busby R: Discrete Mathematical

**CA 504 DATA STRUCTURE AND ALGORITHM**

**C(L,T,P) = 4(3,1,0)**

Units	Course Contents	Total Contact Hrs.
1	Introduction of data structure, definition, importance of data structure, types, operation, application of data structure, algorithm, performance and analysis of algorithm, complexity of algorithm, asymptotic notations, Array-one-D array, initialization, traversal, insertion, deletion, searching (linear binary) address calculation, 2-D array, initialization, implementation of 2-D array (Row, Column major), address calculation, sparse matrix	7
2	Linked list-dynamic memory allocation (function), advantage of link list over array, definition, types, single linklist, insertion, deletion, searching of node, doubly link list, advantage, insertion, deletion of node, circular link list, insertion, deletion, circular doubly linklist, insertion, deletion, polynomial using link list	7
3	Stack & Queue: definition, array representation of stack, linklist representation of stack, stack application, arithmetic expression conversion, evaluation of prefix and postfix, infix expression, recursion (tower of Hanoi), Concept of Queue, simple queue, insertion, deletion in simple queue, circular queue, priority queue, Dequeue	7
4	Tree: definition, tree terminology, binary tree, strictly binary tree, complete binary tree, binary tree traversal (preorder, in-order, post-order), expression tree, binary search tree, creation, insertion, deletion, AVL-tree, insertion, deletion, multiway search tree-tree	8
5	<u>Graph, Sorting and searching, their complexity:</u> graph definition, terminology, computer representation of graph, graph traversal (Breadth first traversal, Depth first traversal), minimum spanning tree (prim's algo, kruskal's algo), shortest path algo (dijkstra algo), types of sorting, bubble sort, selection sort, insertion sort, radix sort, quick sort, merge sort, Heap sort, hashing	8
Total		37

**Reference Books:**

- 1) Data Structures and Algorithms by Alfred V. Aho, Jeffrey D. Ullman, and John E. Hopcroft
- 2) Sams Teach Yourself Data Structures and Algorithms in 24 Hours by Robert Lafore

**CA 506 DATABASE MANAGEMENT SYSTEM****C(L,T,P) = 4(3,1,0)**

Units	Course Contents	Total Contact Hrs.
1	Overview of DBMS, Basic DBMS terminology, data base system v/s file system, data independence. Architecture of a DBMS.	6
2	Introduction to data models: entity relationship model, hierarchical model: from network to hierarchical, relational model, comparison of network, hierarchical and relational models.	8
3	Data modeling using the Entity Relationship Model: ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation, reduction of an ER diagrams to tables, extended ER model, relationships of higher degree.	7
4	Relational model: storage organizations for relations, relational algebra, relational calculus. Normalization: Functional dependencies, normal forms, first, second, third normal forms, BCNF, inclusion dependencies, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design.	8
5	Introduction to SQL: Characteristics of SQL, Advantages of SQL, SQL data types and literals, Types of SQL commands, SQL operators and their procedure, Transaction Manager, Recovery, Concurrency control	6
Total		35

**Reference Books:**

1. Database Management Systems by Raghu Ramakrishnan
2. Fundamentals of Database Management Systems by Mark L. Gillenson
3. Database System Concepts by Abraham Silberschatz, Henry F. Korth, and S. Sudarshan
4. Database Systems: Design, Implementation, and Management by Peter Rob and Carlos Coronel
5. Database Systems: The Complete Book (2nd Edition) by Hector Garcia-Molina, Jeffrey D. Ullman, and Jennifer Widom

**CA 513 FUNDAMENTALS OF COMPUTER & OPERATING SYSTEM****C(L,T,P)=4(3,1,0)**

Units	Course Contents	Total Contact Hrs.
1	Brief history of development of computers, Computer system concepts, Computer system characteristics, Capabilities and limitation, Types of computer, Generation of Computers, Personal Computer(PCs), Input/Output & Storage Units, Number System, Data Storage and Retrieval methods, Software and its Needs and types of Software	7
2	Definition and types of operating systems, Batch Systems, multi programming, time-sharing parallel, distributed and real-time systems, Operating system structure, Operating system components and services, System calls, Process Management: Process concept, Process scheduling, Cooperating processes, Threads, Inter-process communication, CPU scheduling criteria, Scheduling algorithms, Multiple-processor scheduling, Real-time scheduling and Algorithm evaluation.	8
3	Process Synchronization and Deadlocks: The Critical-Section problem, synchronization hardware, Semaphores, Classical problems of synchronization, Critical regions, Monitors, Deadlocks-System model, Characterization, Deadlock prevention, avoidance and Detection, Recovery from deadlock, Combined approach to deadlock handling.	7
4	Storage management: Memory Management-Logical and Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation with paging, Virtual Memory, Demand paging and its performance, Page replacement algorithms, Allocation of frames, Thrashing, Page Size and other considerations, Demand segmentation, File systems, secondary Storage Structure, File concept, access methods, directory implementation, Efficiency and performance, recovery, Disk structure, Disk scheduling methods, Disk management, Recovery, Disk structure, disk scheduling methods, Disk management, Swap-Space management, Disk reliability.	8
5	Protection and Security-Goals of protection, Domain of protection, Access matrix, Implementation of access Matrix, Revocation of Access Rights, language based protection, The Security problem, Authentication, One Time passwords, Program threats, System threats, Threat Monitoring, Encryption. Case study : Windows NT-Design principles, System components, Environmental subsystems, File system, Networking and program interface.	7
Total		37

**Reference Books:**

1. Fundamentals of information Technology and Computer Programming by V.K.Jain
2. Introduction to Computers and Information Systems by Dr. Sushila Madan, Taxmann Publications
3. Milenekovie, "Operating System Concept", McGraw Hill.
4. Diatal, "An Introduction to Operating System", Addison Wesley.
5. Tannenbaum, "Operating System Design and Implementation", PHI.
6. Gary Nutt, "Operating System, A Modern Perspective", Addison Wesley.
7. Stalling, Willium, "Operating System", Maxwell Macmillan

Units	Course Contents	Total Contact Hrs.
1	Introduction about program and programming language, History of C, Salient Features, Structure of a C Program, Data Types and Storage, Data Type Qualifiers, Variables, Declaring Variables, Initializing Variables, Constants, Integer Constants, Floating Point Constants, Character Constants, String Constants, Symbolic Constants, Expressions and Operators: Assignment Statements, Arithmetic Operators, Relational Operators, Logical Operators, Comma and Conditional Operators, Type Cast Operator, Size of Operator.	7
2	Control Statements, Arrays and Functions: Decision Control Statements, if Statement, switch Statement, Loop Control Statements, Introduction to Arrays, Array Declaration, Syntax of Array Declaration, Size Specification, Array Initialization, Initialization of Array Elements in the Declaration, Character Array Initialization, Subscript, Processing the Arrays, Multi-Dimensional Arrays, Strings, Functions, Definition of a Function, Declaration of a Function, Function Prototypes, The Return Statement, Types of Variables and Storage Classes, Automatic Variables, External Variables, Static Variables, Register Variables, Types of Function Invoking, Call by Value, Call by Reference, Recursion	8
3	Pointers, Structures & Unions: Pointers and their Characteristics, Address and Indirection Operators, Pointer Type Declaration and Assignment, Pointer to a Pointer, Null Pointer Assignment, Pointer Arithmetic, Passing Pointers to Functions, A Function Returning More than One Value, Function Returning a Pointer, Arrays and Pointers, Arrays of Pointers, Pointers and Strings, Declaration of Structures, Accessing the Members of a Structure, Initializing Structures, Structures as Function Arguments, Structures and Arrays, Unions, Initializing an Union, Accessing the Members of an Union	7
4	C Preprocessor Directives and File Handling: The C Preprocessor, # define to Implement Constants, # define to Create Functional Macros, Reading from Other Files using # include, Conditional Selection of Code using #ifdef, Using #ifdef for different computer types, Using #ifdef to temporarily remove program statements, Other Preprocessor Commands, Predefined Names Defined by Preprocessor, Macros v s Functions, Files, File Handling in C Using File Pointers, Open a file using the function fopen ( ), Close a file using the function fclose( ), Input and Output using file pointers, Character Input and Output in Files, String Input / Output Functions, Formatted Input / Output Functions, Block Input / Output Functions, Sequential v s Random Access Files, Positioning the File Pointer	8
5	Graphics in C: Introduction to graphics, initialization of Graphics, Graphics Functions, Programs using Library Functions, Working with Text, Filling Patterns with Different Colors and Styles, Mouse Programming	7
Total		37

**Reference Books:**

1. Programming in C by E. Balaguruswamy, TMH Publications
2. Programming with C by Gottfried, Schaums, TMH Publications
3. Thinking in C by Mahapatra, PHI Publications



Units	Contents of the Subject	Hours
1	Introduction: Motivation, Forces behind E-Commerce Industry Framework, Brief history of ECommerce, Inter Organizational E-Commerce Intra Organizational E-Commerce, and Consumer to Business Electronic Commerce, Architectural framework, Network Infrastructure for E-Commerce Network Infrastructure for ECommerce, Market forces behind I Way, Component of I way Access Equipment, Global Information Distribution Network, Broad band Telecommunication.	8
2	Mobile Commerce: Introduction to Mobile Commerce, Mobile Computing Application, Wireless Application Protocols, WAP Technology, Mobile Information Devices, Web Security, Introduction to Web security, Firewalls & Transaction Security, Client Server Network, Emerging Client Server Security Threats, firewalls & Network Security.	8
3	Encryption: World Wide Web & Security, Encryption, Transaction security, Secret Key Encryption, Public Key Encryption, Virtual Private Network (VPM), Implementation Management Issues.	7
4	Electronic Payments: Overview of Electronics payments, Digital Token based Electronics payment System, Smart Cards, Credit Card I Debit Card based EPS, Emerging financial Instruments, Home Banking, Online Banking.	7
5	Net Commerce: EDA, EDI Application in Business, Legal requirement in E -Commerce, Introduction to supply Chain Management, CRM, issues in Customer Relationship Management.	7
	Total	37

**Reference Books:**

1. David Whiteley-E-Commerce Strategy, Technology and Applications, Tata McGraw Hill.
2. Mathew Reynolds-Beginning E-commerce with visual Basic ASP, SQL Server 7.0 and MTS,
3. Shroff Publishers & Distributors Pvt. Ltd.
4. Perrone & Chaganti-Building Java Enterprise Systems with J2EE, Techmedia.
5. Kalakota-Frontiers of Electronic Commerce, Pearson Education

Units	Course Contents	Total Contact Hrs.
1	System Concept: Definition, Characteristics, Elements of system, Physical and abstract system, open and closed system, man-made information systems. System Development Life Cycle: Various phases of system development, Considerations for system planning and control for system success. System Planning.	7
2	Initial Investigation: Determining user's requirements and analysis, fact finding process and techniques. Feasibility study: Determination of feasibility study, Technical, Operational & Economic Feasibilities, System performance constraints, and identification of system objectives, feasibility report. Cost/Benefit Analysis of the new/proposed system	8
3	Structured Analysis: Tools of System Analysis Structured Design: Tools of System Design with I/O and Form Design.	6
4	Documentation for the new system: User Manual, system development manual, programming manual, programming specifications, operator manual. System testing & quality: System testing and quality assurance, steps in system implementation and software maintenance.	7
5	System security: Data Security, Disaster/ recovery and ethics in system development, threat and risk analysis. Hardware and software procurement – In-house purchase v/s hiring and lease	8
	Total	36

**Reference Books:**

1. System Analysis Design and Development by Charles S Wasson

## CA 521 INTERNET &amp; WEB DESIGNING TOOLS

C(L,T,P) = 4(3,1,0)

Units	Course Contents	Total Contact Hrs.
1	The Internet, Classification of Networks, Networking Models, What is Packet Switching, Accessing the Internet, Internet Protocols, Internet Protocol (IP), Transmission Control Protocol (TCP), Internet Address, Structure of Internet Servers Address, Address Space, How does the Internet work, Intranet & Extranet, Internet Infrastructure, Protocols and Services on Internet, Domain Name System, SMTP and Electronic Mail, Http and World Wide Web, Usenet and Newsgroups, FTP, Telnet, Search Engines, Web Browser	7
2	Introduction of HTML: introduction, markup language, editing HTML : common tags, headers, text styles, linking, images, formatting text, horizontal rules and more line breaks, unordered lists, nested and ordered lists, basic HTML tables : intermediate HTML tables and formatting : basic HTML forms, more complex HTML forms, internal linking, creating and using image maps FrontPage: Creating Your First Web Pages, Create a Web Page, Organize a Page with Links, Lists, and Tables	8
3	Cascading Style Sheets: Introduction, CSS and its working, Colors and backgrounds, Fonts, Text, Links, Identification and grouping of elements (class and id), Grouping of elements (span and div), The box model, The box model - margin & padding, The box model - borders, The Box model - Height and width, Floating elements (floats), Positioning of elements, Web-standards and validation	6
4	JavaScript: Introduction to JavaScript, JavaScript Variables and Data Types, Declaring Variables, Data Types, Statements and Operators , Control Structures, Conditional Statements, Loop Statements, Object-Based Programming, Functions, Executing Deferred Scripts, Objects, Message box in JavaScript, Dialog Boxes, Alert Boxes, Confirm Boxes, Prompt Boxes, JavaScript with HTML, Events, Event Handlers, Forms, Forms Array, String Object, Date & Time Object, Number Object	7
5	DHTML: Introduction, Applications of DHTML, Use of DHTML, Combining JavaScript and CSS, Working with Objects, Browser Detection, Pop Up Menus, Animating a Layer, Filters and Transitions	8
Total		36

**Reference Books:**

1. Pro XML Development with Java Technology - by Ajay Vohra, Deepak Vohra
2. Information Technology and Economic Development - by Yutaka Kurihara, Sadayoshi Takaya, Hisashi

## CA 553 COMMUNICATION &amp; SOFT SKILL LAB

C(L,T,P) = 1(0,0,2)

S.No.	List of Experiments	Total Contact Hrs.
1	Practice for communication skill and per market standard	2 hrs Weekly
2	Weekly group discussion	
3	Presentation skill development	

## CA 554 DATA STRUCTURE &amp; ALGORITHM LAB

C(L,T,P)=1 (0,0,2)

S.No.	List of Experiments	Total Contact Hrs.
1	The experiment will be based on the topic to covered in the syllabus of CA 504	2 hrs Weekly

## CA 559 C PROGRAMMING LAB

C(L,T,P)=1 (0,0,2)

S.No.	List of Experiments	Total Contact Hrs.
1	The experiment will be based on the topic to covered in the syllabus of CA 517	02 hrs (weekly)

CA 560

## OFFICE AUTOMATION LAB

C(L,T,P) = 1(0,0,2)

S.No.	List of Experiments	Total Contact Hrs.
1	<b>Introduction to MS windows:</b> Control Panel- setting common devices using control panel, modem, printers, audio, network, fonts, creating users, internet settings, Start button & Program lists; Installing and Uninstalling new Hardware & Software program on your computer.	2 hrs Weekly
2	Office package: Word-processing, Spreadsheet, Presentation graphics.	
3	<b>MS Word Basics:</b> Working with MS Word.; Menus & Commands; Toolbars & Buttons; Shortcut Menus, Wizards & Templates; Creating a New Document.	
4	<b>MS-Word lab 2:</b> Spell Check, Thesaurus, Find & Replace; Headers & Footers ; Inserting – Page Numbers, Pictures, Files, Auto texts, Symbols etc.	
5	<b>MS- Word lab 3:</b> Working with Columns, Tabs & Indents; Creation & Working with Tables including conversion to and from text; Margins & Space management in Document; Adding References and Graphics.	
6	<b>MS-Word lab 4:</b> Mail Merge, Envelops & Mailing Labels. Importing and exporting to and from various formats.	
7	<b>MS Excel Lab 1:</b> Working with MS Excel.; concepts of Workbook & Worksheets; Using Wizards; Various Data Types; Using different features with Data, Cell and Texts; Inserting, Removing & Resizing of Columns & Rows; Working with Data & Ranges; Different Views of Worksheets; Column Freezing, Labels, Hiding, Splitting etc.	
8	<b>MS Excel Lab 2:</b> Using different features with Data and Text; Use of Formulas, Calculations & Functions; Cell Formatting including Borders & Shading; Working with Different Chart Types; Printing of Workbook & Worksheets with various options.	
9	<b>MS PowerPoint:</b> Working with MS PowerPoint; Creating a New Presentation; Working with Presentation; Using Wizards; Slides & its different views; Inserting, Deleting and Copying of Slides; Working with Notes, Handouts, Columns & Lists; Adding Graphics, Sounds and Movies to a Slide; Working with PowerPoint Objects; Designing & Presentation of a Slide Show; Printing Presentations, Notes, Handouts with print options.	
10	<b>MS Access:</b> Creation of table with primary key, fire the different queries, creation of reports.	

CA 561

## SYSTEM ANALYSIS AND DESING LAB

C(L,T,P)=1 (0,0,2)

S.No.	List of Experiments	Total Contact Hrs.
1	The experiment will be based on the topic to covered in the syllabus of CA 519	02 hrs (weekly)

CA 562

## C++ LANGUAGE LAB

C(L,T,P)=1 (0,0,2)

S.No.	List of Experiments	Total Contact Hrs.
1	The experiment will be based on the topic to covered in the syllabus of CA 514	02 hrs (weekly)

CA 563

## WEB DESIGNING LAB

C(L,T,P)=1 (0,0,2)

S.No.	List of Experiments	Total Contact Hrs.
1	The experiment will be based on the topic to covered in the syllabus of CA 521	02 hrs (weekly)

CA 564

## DBMS LAB

C(L,T,P)=1 (0,0,2)

S.No.	List of Experiments	Total Contact Hrs.
1	The experiment will be based on the topic to covered in the syllabus of CA 506	02 hrs (weekly)

**CA 605 COMPUTER GRAPHICS****C(L,T,P) = 4(3,1,0)**

Units	Course Contents	Total Contact Hrs.
1	Introduction: What is Computer Graphics, Elements of a Graphics, Workstation, Graphics hardware, I/O devices, Introduction to Raster scan displays, Storage tube displays, refreshing, flicking, interlacing, color monitors, Display processors resolution.	7
2	Point Clipping. Line Clipping Algorithms, Polygon Clipping algorithms, Introduction to Hidden Surface elimination, Basic illumination model, diffuse reflection, specular reflection, phong shading, Gourand shading ray tracing, color models like RGB, YIQ, CMY, HSV etc.	8
3	Scan conversion techniques, image representation, line drawing, simple DDA, Bresenham's Algorithm, Circle drawing, general method, symmetric DDA, Bresenham's Algorithm, curves, parametric function, Beizier Method, B-sp-line Method.	7
4	2D & 3D Co-ordinate system, Translation, Rotation, Scaling, Reflection Inverse Transformation, Composite transformation, world coordinate system, screens coordinate system, parallel and perspective projections, Representation of 3D object on 2D screen.	8
5	Visibility: Image and object precision, z- buffer algorithms, area based algorithms, floating horizon.	7
Total		37

**Reference books:**

1. D.Rogers and J. Adams, Mathematical Elements for Computer Graphics, McGraw –Hill International Edition.
2. David F. Rogers, Procedural Elements for Computer Graphics, McGraw Hill
3. Computer Graphics (Schaum Series) by Lipschutz (MC Graw Hill)
4. Hearn and P. Baker. Computer Graphics, Prentice Hall.
5. C.Graphics by Yashwant Kanetkar.

**CA 608 ARTIFICIAL INTELLIGENCE****C(LTP)= 4(3,1,0)**

Units	Course Contents	Total Contact Hrs.
1	Intelligence: concept of intelligence, Artificial intelligence, areas of application. Search techniques, state space, Production rules, problem characteristics, production system characteristic, depth first, breadth first search methods and their analysis, Heuristic search method, generate and test, hill climbing, best first method.	7
2	Knowledge Representation: concept of knowledge, characteristics and representation schemes, Logic, propositional and predicate calculus, resolution, semiotics nets, frames, conceptual dependency.	7
3	No monotonic Reasoning: default reasoning, minimalist reasoning, statistical reasoning – Bay's theorem, certainty factors, dumpsters Shafer theory, Fuzzy logic, Forward and Backward reasoning, logical reasoning etc.	7
4	Learning: concept of learning, various techniques used in learning, inductive and deductive. Knowledge acquisition, rote learning, discovery and analogy.	7
5	Expert System: concept of expert system, need for an expert system, Component and categories of an expert system, Stages in the development of an expert system, application & future scope of expert system.	7
Total		35

**Reference Books:**

1. Programming for Artificial Intelligence by Prolog
2. Artificial Intelligence by Rich & Night
3. Learning and Soft Computing: Support Vector Machines, Neural Networks, and Fuzzy Logic Models by Kecman

Units	Course Contents	Total Contact Hrs.
1	Network, Network Protocols, Edge, Access Networks and Physical Media, Protocol Layers and their services models, Internet Backbones, NAP's and ISPs.	7
2	Application Layer: Protocol and Service Provided by application layer, transport Protocols. The world wide web. HTTP, Message formats, User Server Interaction And Web caches. FTP commands and replies. Electronic Mail, SMTP, Mail Message Formats and MIME and Mail Access Protocols DNS The internet's directory service DNS records and Message.	7
3	Transport Layer: Transport Layer Service and Principles, Multiplexing and Demultiplexing applications, connectionless Transport. UDP Segment structure and UDP Checksum. Principles of Reliable Data Transfer-Go back to N and Selective Repeat. Connection Oriented Transport TCP Connection and Segment Structure, Sequence Numbers and acknowledgement numbers, Telnet, Round trip time and Timeout. TCP connection management.	8
4	Network Layer and Routing: Network service model, Routing principles. Link State routing Algorithm, A distant Vector routing & OSPF algorithm. Router Components; Input Prot, Switching fabric and output port. IPV6 Packet format. Point To Point Protocol (PPP), transition States, PPP Layers-Physical Layer and Data Link Layer, Link Control Protocols. LCP Packets and options. Authentication PAP and CHAP, Network Control Protocol (NCP).	8
5	Sonet/SDH :Synchronous Transport Signals. Physical configuration-SONET Devices, Sections, Lines and Paths. SONET Layers-Photonic Layer, section layer, Line layer, path layer and device layer relationship. Sonnet Frame format. Section Overhead, Line overhead and path overhead. Virtual Tributaries and types of VTs.	7
Total		37

**Reference Books:**

1. Data Communications and Networking (McGraw-Hill Forouzan Networking) by Behrouz A. Forouzan
2. Introduction to Data Communications and Networking by Wayne Tomasi
3. Networking and Data Communications by V. C. Marney-Petix

## CA 614 ADVANCE JAVA

C(L,T,P) = 4(3,1,0)

Units	Course Contents	Total Contact Hrs.
1	Introduction to Java Enterprise, J2EE Architecture, API JDBC, API J2EE fundamentals, J2EE multi-tier architecture, Web Applications in J2EE, Apache Tomcat 5.0 Server Configuration and important file. Http protocol with client and server model	7
2	Servlets fundamentals – architecture, life cycle of a servlet, method of Servlet life cycle, initialization, javax.servlet and javax.servlet.http package and method of this package, servlets and HTML, Handling HTTP requests and Responses, retrieving data in servlet using GET and POST methods,	8
3	JDBC Driver, Servlets with JDBC and Inter servlet communications – JDBC, JDBC servlet, inter servlet communication, different packages of JSP and servlets. Servlet sessions management technique using cookies, URL Rewriting, Hidden Form, HttpSession methods, JDBC connection pool, servlet security	9
4	JSP fundamentals – architecture, JSP Life Cycle, Difference between JSP and Servlet, JSP elements (JSP Expression, JSP Scriptlet, JSP Directives, JSP Declaration) standard – actions, (setProperty, getProperty, getParameter, setParameter, useBean, param), Implicit objects, JSP errors, JSP with JDBC connection.	8
5	J2ME – introduction, building MID lets, creating a user interface, event handling with commands, tickers, screens, textbox, lists and forms.	7
Total		39

**Reference books:**

1. Head First Servlet and JSP Kathy Sierra
  2. C. Horstmann and G. Cornell (Prentice-Hall).
  3. P. Wang (Thomson).
  4. T. Budd (Addison-Wesley).
- Patrick, Naughton, Herbert

**CA 615 PROGRAMMING IN JAVA**

**C(L,T,P) = 4(3,1,0)**

Units	Course Contents	Total Contact Hrs.
1	Overview of Java, Object Oriented Concepts in Java. Abstraction, OOP Principles and Java applications, Java features like security, portability, byte code, java virtual machine, object oriented, robust, multithreading, architectural neutral, distributed and dynamic, Data types and Keyword	6
2	Operators: Arithmetic, Bitwise, Relation, increment Decrement, logical, special, Assignment Control Structures, Type Casting , Array, Java methods, Classes, Constructor, method overriding, method overloading, abstract class, Inheritance of procedures and Data, packages java. lang, java.util and their uses, java.io, basics of networking using Java, Javap, javadoc command And interface, Inner class.	7
3	String handling and various string functions, String Buffer, object class method toString (), hashCode (), equals (), Exception handling, multithreaded programming thread priorities, synchronization, messaging, creating and controlling of threads. New(),run(),Wait() ,join() method of thread class, Runnable thread and method ,i/o stream, garbage collection, externalization	9
4	Java utilities like Applets, Java applets and their use – Event Handling – AWT and working with Windows – Event Handling – Event Handling Mechanisms, Delegation Event Model, Event Class, Event Listener Interfaces, Adapter Classes, Inner Class. AWT and working with windows – AWT.Classes, Window fundamentals, frame windows, frame window in An Applet, Working with Graphics, color, fonts and text. , JAR files	7
5	JDBC – JDBC API, JDBC Drivers, Products, JDBC Design considerations, Two Tier and Three Tier client server model, Basic steps to JDBC, setting up a connection to database, Creating and executing SQL statements, Result set and Result set Metadata Object.	8
Total		37

**Reference Books:**

1. The Complete Reference: Patrick Naughton and Herbert Schildt
2. Khalid Maugham LPE Publisher
3. Head First Java : Keith Sherrie

**CA 616 ADVANCE COMPUTER ARCHITECTURE**

**C(L,T,P) = 3(3,0,0)**

Units	Course Contents	Total Contact Hrs.
1	.Parallel Computer Model: The state of computing: Computer Development Milestones, Elements of Modern Computers, Evolution of computer Architecture, System Attributes of Performance. Multiprocessors & Multicomputer: Shared-Memory Multiprocessors, Distributed Memory Multicomputers, A Taxonomy of MIMD Computer. Multivector & SIMD Computers: Vector Supercomputer, SIMD Supercomputer PRAM and VLSI Models: Parallel Random Access Machines, VLSI Complexity model	7
2	Program And Network Properties: Condition of Parallelism: Data and Resource Dependences, Hardware & Software Parallelism, The Role Of Compilers. Program Partitioning and Scheduling: Grain Sizes And Latency, Grain Packing and Scheduling, Static Multiprocessors Scheduling. Program flow Mechanism: Control Flow v/s Data Flow, Demand Driven Mechanisms, Comparison of Flow Mechanism. System Interconnect Architecture: Network Properties and Routing, Static Connection Networks, Dynamic Connection Networks.	7
3	Processor and Memory Hierarchy: Advance Processor Technology: Design Space of Processors, Instruction-set Architecture, CISC Scalar Processor, RISC Scalar Processor. Super Scalar & Vector Processor: Super Scalar Processor, The VLIW Architecture, Vector & Symbolic Processor. Memory Hierarchy Technology, Inclusion, Coherence & Locality, Memory Capacity Planning. Virtual Memory Models, TLB, Paging & Segmentation, Memory Replacement Policies.	7
4	Bus, Cache and Shared Memory: Backplane Bus System: Back Plane Bus Specification, Addressing and Timing Protocols, Arbitration, Transaction and Interrupt, The IEEE Future Bus+ Standards Cache Memory Organizations: Cache Performance Issues. Shared Memory Organizations: Interleaved Memory Organization, Bandwidth and Fault Tolerance, Memory Allocation Schemes	7
5	Pipelining and Superscalar Techniques: Linear Pipeline Processors, Nonlinear Pipeline Processors, Instruction Pipeline Design, Arithmetic Pipeline Design, Cache Coherence, Synchronization Mechanism: The Cache Coherence Problem, Snoopy Bus Protocols ,Directory-Based Protocols,	7
Total		35

**Reference Books:**

1. Advance computer architecture by Ki hwang

## CA 617 SOFTWARE ENGINEERING

C(L,T,P) = 3(3,0,0)

Units	Course Contents	Total Contact Hrs.
1	Introduction to Software Engineering: Introduction, Definitions of Software Engineering, Program V/s. Software, Software Characteristics, Software Components, Software Applications, Software Crisis, Software Processes, Software Quality Attributes, Key challenges faced by the Software Engineering, Software Engineer, SDLC, Software System Development Methodologies, CASE tools	7
2	Software Project Management: Project Management Process, Feasibility Study, Software Project Planning, Project Execution, Monitoring and Control, Project Termination Analysis, SCM, Process Management Process, CMM, Risk Management Process, Software Project Planning, Scheduling a Software Project,	7
3	Requirement Engineering: Introduction to Requirement Engineering, Functional Requirements, Non-Functional Requirements, Domain Requirements, Requirement Engineering Process, Software Requirements Specification (SRS)	7
4	Structured Analysis & Design: Data Modeling, Data Objects, Attributes And Relationships, Cardinality And Modality, Entity – Relationship Diagram, Functional Modeling, Data Flow Diagram, Logical And Physical DFDs, Leveling Of DFDs, Control Flow Diagram, Behavioral Modeling, Data Dictionary, Structured English, Decision Trees, Decision Table, Software Design Model, Conceptual and Technical Designs, Characteristics of a Good Design, Design Principles, Design Guidelines, Decomposition and Modularity	7
5	Quality Assurance Activities: Types of Quality Assurance Activities , Verification and Validation, Testing, Testing Fundamentals, Strategic Issues in Testing, Test Plan, Testing Principles, General Testing Strategies, Code Testing, Specification Testing, Black Box Testing, White Box Testing, Testing Process	7
Total		35

**Reference Books:**

1. C. Banerjee, “Software Engineering”, First Edition, Genius Publications
2. Roger, S. Pressman, “Software Engineering-A Practitioner’s Approach”, Third Edition, McGraw Hill
3. R.E. Fairley, “Software Engineering Concepts”, McGraw Hill
4. Jalote “An Integrated Approach to Software Engineering”, Narosa Publishing House.

## CA 618 OBJECT ORIENTED ANALYSIS &amp; DESIGN

C(L,T,P) = 3(3,0,0)

Units	Course Contents	Total Contact Hrs.
1	Unified Modeling Language, Basic structures and modeling classes, common modeling techniques, relationships, common mechanism, class diagrams	7
2	Advanced structured modeling, advanced classes and relationships, interfaces, types and roles, instances and object diagram.	7
3	Behavioral modeling in OO perspective	7
4	Object- oriented concepts and principles. Identifying the elements of an object model. Object oriented projects metrics and estimation.	7
5	Design for object – oriented systems. The system design process.	7
Total		35

**Reference Books:**

Object oriented software engineering by Timothy C. Lethbridge and Robert Laganière

## CA 619 CLOUD COMPUTING

C(L,T,P) = 4(3,1,0)

Units	Course Contents	Total Contact Hrs.
1	Introduction to Cloud Computing, Uses of Cloud Computing, Advantages and Disadvantages of Cloud Computing, Cloud Service Delivery Models, Viewing the Cloud Holistically, Developing Your Cloud Strategy	7
2	Understanding the Nature of the Cloud, Seeing the Advantages of the Highly Scaled Data Center, Comparing Technology Costs: Cloud versus Traditional Data Center, Checking the Cloud's Workload Strategy, Managing Data, Discovering Private and Hybrid Clouds	7
3	Examining the Cloud Elements, Seeing Infrastructure as a Service, Exploring Platform as a Service, Using Software as a Service, Understanding Massively Scaled Applications and Business Processes, Setting some Standards	7
4	Managing the Cloud, Managing and Securing Cloud Services, Governing the Cloud, Virtualization and the Cloud, Managing Desktops and Devices in the Cloud, Service Oriented Architecture and the Cloud, Managing the Cloud Environment	7
5	Planning for the Cloud, Banking on Cloud Economics, Starting Your Journey to the Cloud, Cloud Computing Resources, Cloud Dos and Don'ts	7
Total		35

**Reference Books:**

1. Cloud computing for dummies, Judith Hurwitz, Robin Bloor, Marcia Kaufman - 2009
2. Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online, Michael Miller, Que Publishing

## CA 620 E-BANKING &amp; SECURITY TRANSACTIONS

C(L,T,P) = 3(3,0,0)

Units	Course Contents	Total Contact Hrs.
1	Introduction, Definition of E-Banking, Various E-Channels of E-Banking, Types of E-Banking, Components of E-Banking, E-Banking Activities, Advantage of E-Banking, Disadvantages of E-banking,	7
2	E-Banking Support Services, Web-linking, Account Aggregation, Electronic Authentication, Website Hosting, Payments for E-Commerce, Framework of a Payment System, Payment Protocols, Macro Payment System versus Micro Payment System, Electronic Bill Payment and Presentment, Person-to-Person Payments, Wireless E-Banking	7
3	Wired E-banking versus Wireless E-banking, Components of a Wireless System, Handheld Devices, Connectivity, Coverage, and Gateways, Middleware Processing Engine, Transcoding, API Connection, Data System Backend, Wireless e-Banking Services, Technologies Enabling Wireless Banking, Risks in Wireless Banking, Challenges in Wireless Banking	7
4	E-Banking Risk, Classification based on E-banking Services, E-Banking in India, Characteristics of E-Banking, Categories of E-Banking Risks, Electronic Money , E-Payment Transaction Process , E-Cash Transaction Process , Credit Card Transaction Process , Smart Card Transaction Process , Electronic Fund Transfer (EFT), Challenges of E-Commerce Payment Systems , Secure Electronic Transaction (SET), Joint Electronic Payment Initiatives (JEPI)	7
5	IT ACT 2008, Electronic Security, Understanding E-Security, Importance of E-Security, Threats and Attacks, Developing a Sound E-Security Policy, E-Security Solutions, E-Security Engineering	7
Total		35

**Reference Books:**

1. E commerce by T N Chandra
2. The E Commerce Book: Building the E empire – by Steffano Korper, Juanita Ellis
3. Banerjee and Keswani, E-Banking and Security Transactions, Genius Publications, 2009



## CA 621 MOBILE COMMERCE

C(L,T,P) = 4(3,1,0)

Units	Course Contents	Total Contact Hrs.
1	The Concept of Mobile Commerce, The Conceptual Background and Perspective, Defining Electronic Business and Electronic Commerce, Defining Mobile Business and Mobile Commerce, The Mobile Commerce Perspective, The Features of Mobile Commerce, The Specific Advantages of Mobile Commerce.	7
2	The Regulatory Framework of Mobile Commerce, The Regulatory Framework of Mobile Commerce, Regulations on Consumer- and Data Protection, Categories excluded from Mobile Commerce.	7
3	The Technological Framework of Mobile Commerce, Technologies for Mobile Data Transmission, The First Generation (1G), The Second Generation (2G), Global System for Mobile Communication (GSM), High Speed Circuit Switched Data (HSCSD), The 2.5 Generation (2.5G), General Packet Radio Service (GPRS), Enhanced Data-rates for Global Evolution (EDGE), The Third Generation (3G), Complementary Technologies of Data Transmission, Wireless Local Area Network (WLAN), Bluetooth, Display and Programming Standards, Wireless Application Protocol (WAP), i-mode, Future-Scenario: The fourth Generation (4G)	7
4	Mobile Applications & Methods of Payment, Overview of Mobile Applications, Payment Mechanisms for Utilizing Mobile Services, Mobile Commerce in Banking Sector, Definitions and Scope Issues, Services Offered in Mobile Banking, Mobile Banking Offers & Employed Mediums, Browser-based Applications, WAP Banking, i-mode Banking, Web-based Mobile Banking (PDA Banking), Messaging-based Applications, SMS Banking, MMS banking, Client-based Applications, SIM Toolkit (STK), JAVA-based Mobile Banking Clients.	7
5	Utility of Mobile Banking for Banks, The Outset of Banking Environment, Mobile Banking as Distribution Channel, Mobile Banking as Source of Revenue, Mobile Banking as Business Model, Mobile Banking as Image Product, Customer Acceptance of Mobile Banking, Customer Response to Service Offers, General Issues relating to Mobile Banking, Relevance of Mobile Banking, Appropriate scope of Mobile Banking	7
Total		35

**Reference Books:**

1. The Mobile Commerce Prospects: A Strategic Analysis of Opportunities in the Banking Sector ; Research Project Mobile Commerce, Hamburg University Press, 2007

## CA 622 SOFTWARE TESTING

C(L,T,P) = 3(3,0,0)

Units	Course Contents	Total Contact Hrs.
1	Introduction, The Need For Testing, Different Models Of Software Development, Other Models Of Software Development, Testing In The Software Development Life Cycle, Concepts Of Testing, The Testing Mindset, Test Early, Test Often, Regression Vs. Retesting, White-Box Vs lack-Box Testing, Verification And Validation	7
2	Functional Testing, Alpha And Beta Testing, White Box Testing, Unit, Integration And System Testing, Acceptance Testing, Test Automation, Non-Functional Testing, Testing The Design, Usability Testing, Performance Testing	7
3	Test Planning, The Purpose Of Test Planning, Risk Based Testing, Software In Many Dimensions, Test Preparation, Test Scripting, Test Cases	7
4	Test Execution, Tracking Progress, Adjusting the Plan, Defect Management	7
5	Test Reporting and Metrics, Software Defect Reports, Root Cause Analysis, Metrics, Release Control, Complexity In Software	7
Total		35

**References Books:**

1. A Software Testing Primer An Introduction to Software Testing by Nick Jenkins, 2008

**CA 623 DATA MINING AND WAREHOUSING**
**C(L,T,P) = 4(3,1,0)**

Units	Course Contents	Total Contact Hrs.
1	Overview, Motivation(for Data Mining),Data Mining-Definition & Functionalities, Data Processing, Form of Data Preprocessing, Data Cleaning: Missing Values, Noisy Data,(Binning, Clustering, Regression, Computer and Human inspection), Inconsistent Data, Data Integration and Transformation. Data Reduction:-Data Cube Aggregation, Dimensionality reduction, Data Compression, Numerosity Reduction, Clustering, Discretization and Concept hierarchy generation.	7
2	Concept Description: Definition, Data Generalization, Analytical Characterization, Analysis of attribute relevance, Mining Class comparisons, Statistical measures in large Databases. Measuring Central Tendency, Measuring Dispersion of Data, Graph Displays of Basic Statistical class Description, Mining Association Rules in Large Databases, Association rule mining, mining Single-Dimensional Boolean Association rules from Transactional Databases-.	7
3	What is Classification & Prediction, Issues regarding Classification and prediction,Decision tree, Bayesian Classification, Classification by Back propagation, Multilayerfeed-forward Neural Network, Back propagation Algorithm, Classification methods Knearest neighbor classifiers, Genetic Algorithm. Cluster Analysis,	7
4	Data Warehousing: Overview, Definition, Delivery Process, Difference between Database System and Data Warehouse, Multi Dimensional Data Model, Data Cubes, Stars, Snow Flakes, Fact Constellations, Concept hierarchy, Process Architecture, 3 Tier Architecture, Data Marting.	7
5	Aggregation, Historical information, Query Facility, OLAP function and Tools. OLAP Servers, ROLAP, MOLAP, HOLAP, Data Mining interface, Security, Backup and Recovery, Tuning Data Warehouse, Testing Data Warehouse.	7
	Total	35

**Reference Books:**

1. Alex bezon,Stephen j.smith”data warehousing,data mining and olap” McGraw hill edition 2001.
2. W.H Immam” Building the data warehouse 3<sup>rd</sup> edition wiley 2003

**CA 624 EMBEDDED SYSTEMS**
**C(L,T,P) = 3(3,0,0)**

Units	Course Contents	Total Contact Hrs.
1	Embedded Computing Requirements: Characteristics and applications of embedded systems; Components of Embedded Systems; challenges in Embedded System Design and design process;	7
2	Formalism for system design. Embedded Processors: RISC vs. CISC architectures; ARM processor – processor architecture and memory organization, instruction set, data operations and flow control;	8
3	SHARC processor – memory organization, data operations and flow control, parallelism within instructions; Input and output devices, supervisor mode, exception and traps; Memory system, pipelining and superscalar execution.	7
4	Embedded Computing Platform: CPU Bus – Bus protocols, DMA, system bus configurations, ARM bus; Timers and counters, A/D and D/A converters, Keyboards, LEDs, displays and touch screens; Design examples.	8
5	Embedded Software Analysis and Design: Software design pattern for Embedded Systems; Model programs – data flow graphs and control/data flow graphs; Assembly and linking; Compilation techniques; Analysis and optimization of execution time, energy, power and program size. Embedded System Accelerators: Processor accelerators, accelerated system design	7
	total	37

**Reference Books:**

1. Computer as Components by Wayne Wolf published by Elsevier Inc
2. ARM System Developer’s Guide by Andrew S. Loss published by Elsevier Inc
3. Embedded System Design by Steve Heath published by Elsevier Inc
4. Embedded System design: A unified hardware/software Introduction by Frank Vahid & Tony Givagi published by John Wiley & Sons Inc.

**CA 655 COMPUTER GRAPHICS LAB**
**C(L,T,P)=1 (0,0,2)**

S.No.	List of Experiments	Total Contact Hrs.
1	The experiment will be based on the topic to covered in the syllabus of CA 605	02 hrs (weekly)

**CA 658 COLLOQUIUM (GROUP DISCUSSION)****C(L,T,P) = 1(0,0,2)**

Units	Course Contents	Total Contact Hrs.
1	Group discussion on different technical topics by small group of students	2 hrs
2	Preparing student on small and latest topic as per industry requirement.	weekly

**CA 659 NETWORKING LAB****C(L,T,P)=1 (0,0,2)**

S.No.	List of Experiments	Total Contact Hrs.
1	The experiment will be based on the topic to covered in the syllabus of CA 613	02 hrs (weekly)

**CA 660 ADVANCE JAVA LAB****C(L,T,P)=1 (0,0,2)**

S.No.	List of Experiments	Total Contact Hrs.
1	The experiment will be based on the topic to covered in the syllabus of CA 614	02 hrs (weekly)

**CA 661 JAVA LAB****C(L,T,P)=1 (0,0,2)**

S.No.	List of Experiments	Total Contact Hrs.
1	The experiment will be based on the topic to covered in the syllabus of CA 615	02 hrs (weekly)

**CA 662 OOAD LAB****C(L,T,P)=1 (0,0,2)**

S.No.	List of Experiments	Total Contact Hrs.
1	The experiment will be based on the topic to covered in the syllabus of CA 618	02 hrs (weekly)

**CA 703 ANALYSIS AND DESIGN OF ALGORITHMS****C(L,T,P) = 3(3,0,0)**

Units	Course Contents	Total Contact Hrs.
1	Introduction:- algorithm definition and specification – Design of Algorithms, and Complexity of Algorithms, Asymptotic Notations, Growth of function, Recurrences.	7
2	Performance analysis – Elementary Data structures:- stacks and queues – trees – dictionaries – priority queues –sets and disjoint set union – graphs – basic traversal and search techniques.	7
3	Divide – and – conquer:- General method – binary search – merge sort – Quick sort – The Greedy method:-General method – knapsack problem – minimum cost spanning tree – single source shortest path.	7
4	Dynamic Programming – general method – multistage graphs – all pair shortest path – optimal binary search trees – 0/1 Knapsack – traveling salesman problem – flow shop scheduling. Backtracking:- general method – 8-Queens problem – sum of subsets – graph coloring – Hamiltonian cycles – knapsack problem – Branch and bound:- The Method – 0/1 Knapsack problem – traveling salesperson.	7
5	Parallel models:-Basic concepts, performance Measures, Parallel Algorithms: Parallel complexity, Analysis of Parallel Addition, Parallel Multiplication and division, parallel Evaluation of General Arithmetic Expressions, First-Order Linear recurrence.	7
Total		35

**Reference Books:**

1. Computer *Algorithms* by Horowitz, Sahni, Rajasekaran
2. Brassard & Bratley, Fundamentals of Algorithmics

**CA 709 ERP SYSTEMS****C(L,T,P) = 3(3,0,0)**

Units	Course Contents	Total Contact Hrs.
1	Enterprise wide information system, Custom built and packaged approaches, Needs and Evolution of ERP Systems, Common myths and evolving realities, ERP and Related Technologies, Business Process Reengineering.	7
2	ERP Benefits, classification, Present global and Indian market scenario, milestones and pitfalls, Forecast, Market players and profiles, Evaluation criterion for ERP product, ERP Life Cycle.	7
3	Analytical Hierarchy Processes (AHP), Various ERP modules and applications, Vendor selection criteria for successful ERP solution.	7
4	ERP implementation strategies, Success and failure factors for implementation, Hidden costs, ERP success inhibitors and accelerators, Management concern for ERP success, Useful guidelines for ERP Implementations.	7
5	Technologies in ERP Systems and Extended ERP, Case Studies Development and Analysis of ERP Implementations in focusing the various issues discussed in above units Learning and Emerging Issues. Concept of E-Governance : Concept, E-Governance frame work, area of application like public sector, service industry.	7
Total		35

**Reference Books:**

1. ERP Systems , THM

**CA 711 DECISION SUPPORT SYSTEM****C(L,T,P) = 3(3,0,0)**

Units	Course Contents	Total Contact Hrs.
1	Review of Decision making process in business and industrial environment, Quantitative techniques for decision making, Gaming and game theory, Group decision	7
2	Evolution of Decision Support System (DSS) Specific DSS, DSS generator and DSS Tools, Data, Model and Dialog Management System and Interfaces between them Graphical and quantitative tools to build model and model management	7
3	Group decision Evolution of Decision Support System (DSS)	7
4	Adaptive Design approach to DSS development. Accommodating cognitive style in DSS, Integrating Expert and decision support system and case studies	7
5	Integrating Expert and decision support system and case studies	7
Total		35

**Reference Books:**

1. Bennis, J.L. : Building Decision Support System Addison, Wesley Publ,Comp- 1983
2. Sprague, R.H.& Watson, HJ (Edn.) : Decision Support System, Putting Theory and Practices Prentice-Hall, New Jersey, 1986.
3. Keen, P.G.W. & Mortan, M,S,S, : Decision Support System:An Modeling44ional Perspective, Addison-Wesley Publ.
4. David: Applied Decision Support System, Prentice-Hall International1989.e:

## CA 715 DISTRIBUTED SYSTEM

C(L,T,P) = 3(3,0,0)

Units	Course Contents	Total Contact Hrs.
1	CHARACTERIZATION OF DISTRIBUTED SYSTEMS: Introduction, Examples of distributed Systems, Resource sharing and the Web Challenges. System Models: Architectural models, Fundamental Models Theoretical Foundation for Distributed System: Limitation of Distributed system, absence of global clock, shared memory, Logical clocks, Lamport's & vectors logical clocks, Causal ordering of messages, global state, termination detection. Distributed Mutual Exclusion: Classification of distributed mutual exclusion, requirement of mutual exclusion theorem, Token based and non token based algorithms, performance metric for distributed mutual exclusion algorithms.	7
2	.DISTRIBUTED DEADLOCK DETECTION: system model, resource Vs communication deadlocks, deadlock prevention, avoidance, detection & resolution, centralized dead lock detection, distributed dead lock detection, path pushing algorithms, edge chasing algorithms.	7
3	DISTRIBUTED OBJECTS AND REMOTE INVOCATION: SECURITY: Overview of security techniques, Cryptographic algorithms, Digital signatures Cryptography pragmatics, Case studies: Needham Schroeder, Kerberos, SSL & Millicent.	7
4	TRANSACTIONS AND CONCURRENCY CONTROL: Transactions, Nested transactions, Locks, Optimistic Concurrency control, Timestamp ordering, Comparison of methods for concurrency control. DISTRIBUTED FILE SYSTEMS: File service architecture, Sun Network File System, The Andrew File System, Recent advances	7
5	DISTRIBUTED ALGORITHMS: Introduction to communication protocols, Balanced sliding window protocol, Routing algorithms, Destination based routing, APP problem, Deadlock free Packet switching, Introduction to Wave & traversal algorithms, Election algorithm. CORBA CASE STUDY: CORBA RMI, CORBA services.	7
Total		35

**Reference Books:**

1. Coulousis,dollimore,kindberg "distributed system concept and design"  
Distributed system,principles and paradigm by AS tannenbaum

## CA 719 ADVANCED WEB DEVELOPMENT

C(LTP) = 3(3,0,0)

Units	Course Contents	Total Contact Hrs.
1	<b>Asp .Net Basics:</b> Understanding the .Net framework – principal, feature, design, gole, Benefits of .Net framework, Event Logging, Performance Counter, Tracing, CTS, CLS, CLR, .Net class library, GIT, Type of GIT, Assemblies - version, culture,strong name, Type of Assemblies, Metadata, Manifest, MSIL, Managed and Unmanaged code, Memory Management, Garbage Collection, Security, Reflection, WPF, WCF, Window Card Space, GAC, CASPOL, REGEN, ILASM, ILDASM. DLL HELL Problem, Page life cycle.	7
2	<b>Introduction Ado.NET:</b> Ado.Net Basics, Ado.Net object model, Ado.Net class for OLE DB data source, SQL Server, DataSet, Data View, Data Reader, Data Adapter, Data Table, Data Column, Data Row, Difference between Ado and Ado.Net, Communication with OLEDB data source using Ado.Net.	6
3	<b>Understanding Caching:</b> Overview, Introduction to Caching, Client dedicated server, Reverse proxy, Absolute expiration and Relative expiration, Http Cache Policy.	8
4	<b>State Management:</b> Client state management- View state, Hidden field, Cookies, QueryString Server state management- Application state, Session state, Advantage and Disadvantage of database support.	7
5	<b>Web Services and XML:</b> Introduction to xml, Advantage of xml, xml Element, Naming Rules, Attributes, Introduction to web service, web service Infrastructure, SOAP, UDDI, WSDL.	7
Total		35

**Reference Books:**

1. Beginning ASP.NET 3.5 in C# 2008: From Novice to Professional, Second Edition by Matthew MacDonald
2. ASP .NET Programming with C# & SQL Server (The Web Technologies) by Don Gosselin
3. Developing Web Applications with ASP.NET and C# by Hank Meyne and Scott Davis
4. Beginning ASP.NET 2.0 with C# (Wrox Beginning Guides) by Chris Hart, John Kauffman, David Sussman, and Chris Ullman

Units	Course Contents	Total Contact Hrs.
1	Introduction to security attacks, services and mechanism, introduction to cryptography. Conventional Encryption: Conventional encryption model, classical encryption techniques- substitution ciphers and transposition ciphers, cryptanalysis, stream and block ciphers. Modern Block Ciphers: Block ciphers principals, data encryption standard(DES), strength of DES, block cipher modes of operations, triple DES, IDEA encryption and decryption, strength of IDEA, confidentiality using conventional encryption, traffic confidentiality, key distribution,	8
2	Principals of public key crypto systems, RSA algorithm, security of RSA, key management, Diffie-Hellman key exchange algorithm, introductory idea of Elliptic curve cryptography, Elganel encryption	7
3	Message Authentication and Hash Function: Authentication requirements, authentication functions, message authentication code, hash functions, birthday attacks, security of hash functions and MACS, MD5 message digest algorithm, Secure hash algorithm(SHA).	8
4	Digital Signatures: Digital Signatures, authentication protocols, proof of digital signature algorithm. Authentication Applications: Kerberos and X.509, directory authentication service, electronic mail security-pretty good privacy (PGP), S/MIME.	6
5	IP Security: Architecture, Authentication header, Encapsulating security payloads, key management. Web Security: Secure socket layer and transport layer security, Secure Electronic Transaction (SET). System Security: Intruders, Viruses and related threads, firewall design principals, trusted systems.	7
	Total	36

**Reference Books:**

1. Atul Kahate," Cryptography and Network Security" TMH
2. William Stallings," Cryptography and Network Security" Prentice Hall /Pearson Education

Units	Course Contents	Total Contact Hrs.
1	<b>Introduction to Research Methods</b> Philosophy of Science, Evolutionary Epistemology, Scientific Methods, Hypotheses Generation and Evaluation, Code of Research Ethics, Definition and Objectives of Research, Various Steps in Scientific Research, Types of Research; Research Purposes - Research Design - Survey Research - Case Study Research.	6
2	<b>Data Collection and Sampling Design</b> Sources of Data: Primary Data, Secondary Data; Procedure Questionnaire- Survey and Experiments – Design of Survey and Experiments - Sampling Merits and Demerits - Control Observations - Procedures – Sampling Errors.	7
3	<b>Statistical Modeling and Analysis, Time Series Analysis</b> Probability Distributions, Fundamentals of Statistical Analysis and Inference, Multivariate methods, Concepts of Correlation and Regression, Fundamentals of Time Series Analysis and Spectral Analysis, Error Analysis, Applications of Spectral Analysis.	8
4	<b>Evolutionary Algorithms</b> Introduction to evolutionary algorithms - Fundamentals of Genetic algorithms, Simulated Annealing, Neural Network based optimization, Optimization of fuzzy systems.	7
5	<b>Research Reports</b> Structure and Components of Research Report, Types of Report, Layout of Research Report, Mechanism of writing a research report	8
	Total	36

**Reference Books:**

1. C.R. Kothari, Research Methodology Methods and Techniques, 2/e, Vishwa Prakashan, 2006.
2. Bendat and Piersol, Random data: Analysis and Measurement Procedures, Wiley Interscience, 2001.
3. Shumway and Stoffer, Time Series Analysis and its Applications, Springer, 2000.
4. Jenkins, G.M., and Watts, D.G., Spectral Analysis and its Applications, Holden Day, 1986.
5. Donald R. Cooper, Pamela S. Schindler, Business Research Methods, 8/e, Tata McGraw-Hill Co. Ltd., 2006.

	The experiment will be based on the topic to covered in the syllabus of CA 719	02 hrs (weekly)
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**BM 317 ACCOUNTING AND FINANCIAL MANAGEMENT****C(L,T,P) = 4(3,1,0)**

Units	Course Contents	Total Contact Hrs.
1	Definition of Accounting and its advantages & limitations, Scope of accounting, Types of Accounts and Rules for Debit and Credit. Cash and Credit Transaction, Cash discount and Trade discount. Preparation of Journal, Ledger and Trial Balance. Final Accounts, Preparation of Final Accounts, simple adjustments	8
2	Accounting Ratios: Meaning, Advantages and Limitations of Accounting ratios, Ratio Analysis	7
3	Cost Accounting: Meaning and definition of Cost Accounting – its Advantages & Limitations, Variance Analysis – Material, Labor and Overhead.	7
4	Budgetary Control, Definitions – Advantages – Limitations, Procedure for setting up Budgetary Control, Different types of budgets, Advantages and limitations of Cash Budget and preparation of Cash Budget.	8
5	Marginal Costing: Meaning-Advantages- Limitations, Break Even Point, Margin of Safety, Profit Volume Ratio.	7
	Total	37

**Reference Books:**

1. Accounting by Steven M. Bragg
2. Accounting and financial management

**BM 517 ACCOUNTING AND FINANCIAL MANAGEMENT****C(L,T,P) = 4(3,1,0)**

Units	Course Contents	Total Contact Hrs.
1	Definition of Accounting and its advantages & limitations, Scope of accounting, Branches of Accounting – Financial Accounting – Cost Accounting – Management Accounting, users of Accounting information, Methods of Accounting, Double Entry Accounting System, Types of Accounts and Rules for Debit and Credit. Cash and Credit Transaction, Cash discount and Trade discount. Preparation of Journal, Ledger and Trial Balance. Final Accounts and Accounting Ratios, Preparation of Final Accounts (Sole Proprietorship only), Preparation of Trading A/c, Profit & Loss A/c and Balance Sheet covering simple adjustments	8
2	Accounting Ratios: Meaning, Advantages and Limitations of Accounting ratios Computation of following ratios only.	7
3	Gross Profit Ratio, Net Profit Ratio, Stock Turnover Ratio, Operating Ratio, Current Ratio, Liquid Ratio, Debtors Ratio, Creditors Ratio, Return on Capital Employed, Earning Per Share, Return on shareholders fund.	7
4	Cost Accounting: Meaning and definition of Cost Accounting – its Advantages & Limitations Budgetary Control, Definitions – Advantages – Limitations, Procedure for setting up Budgetary Control, Different types of budgets, Advantages and limitations of Cash Budget and preparation of Cash Budget.	8
5	Marginal Costing: Meaning-Advantages- Limitations, Break Even Point, Margin of Safety, Profit Volume Ratio, Application of Marginal Costing including simple problems on make or buy and product mix..	7
	Total	37

**Reference Books:**

1. Accounting by Steven M. Bragg
2. Accounting and financial management

**BM 606 FOREIGN LANGUAGE (FRENCH)**

**C(LTP)=4(3,1,0)**

Unit	Course Contents	Hours
I	<b>BASIC KNOWLEDGE OF FRENCH :</b> Les alphabets , L'accents – L'accents aigu, L'accent grave , L'accent circonflexe , La cedilla , Le threma , L'apostrophe , Le trait d'union , Les Jours de la semaine , Les mois de l'annee , Les saisons , Les nombres – cardinaux et ordinaux , Les couleurs ,Les nationalites , Les salutations , Les professions et les adjectives.	8
II	<b>GRAMMER – ELEMENTARY KNOWLEDGE OF VERBS AND TENSES :</b> Conjugations – Verbs : I, II, III or irregular verbs, Articles defines , Articles indefinis , Sentences - Forme affirmative , Forme negative , Forme interrogative Les Passe Compose	8
III	<b>TRANSLATION : ( FRENCH TO ENGLISH )</b> Paragraph translations from French to English Book referred: Le Francais et la vie: I	8
IV	<b>TRANSLATION : ( ENGLISH TO FRENCH )</b> Paragraph translations from English to French Book referred: Le Francais et la vie: I	8
V	<b>COMPREHENSION</b> Comprehension, Answer the questions based on the text given. The paragraph should be from the prescribed book only, complete the dialogues.	8
<b>Total</b>		<b>40</b>

**Reference Books:**

1. Le Francaise et la vie : I – G.Mauger & Brueizire
2. Larousse compact Dictionary: French-English/ English-French

**EC 220 DIGITAL ELECTRONICS**

**C(LTP)=4(3,1,0)**

Units	Course Contents	Total Contact Hrs.
1	Number systems and different types of number systems,1's & 2's complement, Binary Fixed- Point Representation, Arithmetic operation on Binary numbers, Overflow & underflow, Floating Point Representation,ASCII, EBCDIC codes, Gray code, Excess-3 & BCD	6
2	Logic Gates, AND, OR, NOT GATES and their Truth tables, NOR, NAND & XOR gates, Boolean Algebra, Basic Boolean Law's, Demurrage's theorem, MAP Simplification, Minimization techniques, K -Map, Sum of Product & Product of Sum.	8
3	Combinational & Sequential circuits, Half Adder & Full Adder, Full subtractor Binary serial and parallel adders. BCD adder. Binary multiplier. Decoder: Binary to Gray decoder, BCD to decimal, BCD to 7-segment decoder.	7
4	Flip-flops - RS, D, JK & T Flip-flops, RAM and ROM, Multiplexer, Demultiplexer, Encoder, Octal to binary, BCD to excess-3 encoder. Decoder, Idea about Arithmetic Circuits, Program Control, Instruction Sequencing.	7
5	Counters, Asynchronous (ripple), synchronous and synchronous decade counter, Modulus counter, skipping state counter, counter design. Ring counter. Counter applications. Registers: buffer register, shift register	8
<b>Total</b>		<b>36</b>

**Reference Books:**

1. BARTEE, "Digital Computer Fundamentals " TMH Publication
  2. MALVINO, " Digital Computer Electronics " TMH Publication
- MORRIS MANO, "Computer System Architecture " PHI Publication



Units	Course Contents	Total Contact Hrs.
1	<b>Man &amp; Environment:</b> Definition of Environment & its various components. Ecosystem concepts. Dependence of Man on nature for its various various needs. Human population growth & its impacts on environment. Environment & human health. Environmental concerns including climate change, Global warming, Acid Rain, Ozone layer Depletion etc. Environmental ethics. Traditional ways of utilizing various components of environment. Sustainable developments.	7
2	<b>Natural Resources:</b> Forest resources, Mining , Dams & their effects on forests & tribal people. Water resources-over utilization of water, floods, droughts and conflicts over water resources. Mineral Resources- Use of various minerals for Human welfare & environmental effects of mining. Food resources -World food problem. Impacts of changing Agriculture practices on Environment. Energy Resources-Renewable and non renewable energy Resources & exploration of alternative energy sources. Land Resources- land degradation, soil erosion, desertification & soil contamination.	7
3	<b>Ecosystems:</b> Structure & function, energy flow, food chains, food webs, Ecological pyramids. Basics of forest grasslands, desert & aquatic ecosystem (Ponds, Streams, Lakes, Rivers, Oceans & Estuaries)	8
4	<b>Biological Diversity:</b> Genetic, species & ecosystem diversity, Values of Biodiversity, Global, National & Local Biodiversity. Hot-spots of Biodiversity, threat to biodiversity. Endangered & endemic species of India. Conservation of biodiversity in situ & ex-situ	7
5	<b>Environment pollution:</b> Causes, effects & control of- Air pollution, Water pollution, Soil pollution, Noise Pollution, Thermal pollution & Nuclear Hazards. Solid wastes & their Management. Disaster Management-Flood, Drought, Earthquake, Land slides etc.	7
	<b>Total</b>	<b>36</b>

**Reference Books:**

1. Agarwal KC, 2001. Environmental Biology, Nidi Publishers Ltd. Bikaner.
2. Bharucha Erach, 2003. The Biodiversity of India, Mapin Publishing Pvt. Ltd, Ahmedabad – 380013,India. Email: mapin@icenet.net
3. Brunner RC, 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480pgs.
4. Clark RS, Marine Pollution, Clanderson Press, Oxofrd (TB).
5. Cunningham WP, Cooper TH, Gorhani E & Hepworth MT, 2001. Environmental Encyclopaedia,
6. Jaico Publishing House, Mumbai, 1196pgs.
7. De AK, Environmental Chemistry, Wiley Eastern Ltd.

**HS 201 COMMUNICATION SKILLS****C(L,T,P)=4(3,1,0)**

Unit	Course Contents	Total Contact Hrs.
1	Foundation and background of organizational behaviour, contemporary challenges-workforce diversity, cross – cultural dynamics, changing nature of managerial work, ethical issues at work, emotional intelligence in contemporary business. Perception, Personality, Learning, Motivation – Concepts and applications, individual decision making.	7
2	Understanding and managing group processes-interpersonal & group dynamics, Group cohesiveness, Group decision making Emotional Intelligence-concept and applications, Understanding work teams, power & politics, Empowerment, Conflict & Negotiation.	8
3	Purpose and process of communication; myths and realities of communication; paths of communication; oral communication; noise, barriers to communication; listening process, types of listening, deterrents to listening process, essentials of good listening; telephonic communication.	6
4	Non verbal communication; gestures, handshakes, gazes, smiles, hand movements, styles of working, voice modulations, body sport for interviews; business etiquettes; business dining, business manners of people of different cultures, managing customer care.	7
5	Written communication; mechanics of writing, report writing, circulars, notices, memos, agenda and minutes; business correspondence-business letter format, style of letter arrangement, types of letters, telex managers, facsimiles, electronic mail; diary writing; development resume.	7
Total		35

**Reference Books:**

1. Enrich your English – by CIEFL (Academic Skills book)
2. Contemporary English Grammar – Raymond Murphy
3. Organizational Behavior, - Fred Luthans 9th Edition, McGraw-Hill Irwin, 2002.
4. Organizational Behavior, Tenth Edition, TMG, 1998. John W. Newstrom and Keith Davis
5. Business Communication Today – By Bovee, Thill, Schazman
6. G. Business Communication – by Pal and Korlahalli
8. Down to Earth, Center for Science and Environment (R)
9. Gleick HP, 1993. Water in Crisis, Pacific Institute for Studies in Development, Environment and Security. Stockholm Environmental Institute, Oxford University Press, 473pgs.
10. Hawkins RE, Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R) Heywood VH, and Watson RT, 1995. global Biodiversity Assessment. Cambridge University Press 1140pgs.
11. Jadhav H and Bhosale VM, 1995. Environmental Protection and Laws. Himalaya Publishing House, Delhi 284pgs.
12. McKinney ML and Schoch RM, 1996. Environmental Science Systems and Solutions. Web enhanced edition, 639pgs.
13. Mhaskar AK, Matter Hazardous, Techno-Science Publications (TB)
14. Miller TG, Jr. Environmental Science, Wadsworth Publishing CO. (TB)
15. Odum EP, 1971. Fundamentals of Ecology. WB Saunders Co. USA, 574pgs.
16. Rao MN and Datta AK, 1987. Waste Water Treatment. Oxford and IBH Publishing Co. Pvt. Ltd. 345pgs.

**HS 202 COGNITIVE SKILLS****C(L,T,P)=4 (3,1,0)**

Units	Contents of the Subject	Hours
I	Concentration	7
II	Perception: Analyze and Interpret	7
III	Memory: Receptive Memory, Sequential Memory, Rate Memory, Short Term Memory	8
IV	Logical Thinking and arranging Ideas	8
V	Planning and Implementation	8
Total		38

**Reference Books:**

1. Shivani, D.R. (1998): NGO Development Initiative & Policy – Vikas Publications

**HS 301 VERBAL AND NON-VERBAL REASONING****C(L,T,P)=3(3,0,0)**

Units	Course Contents	Total Contact Hrs.
1	Logical Sequence of Words, Blood Relation Test, Syllogism	7
2	Series Completion, Cause and Effect, Dice	7
3	Venn Diagrams, Cube and Cuboids Analogy	7
4	Seating Arrangement, Character Puzzles, Direction Sense Test	7
5	Classification, Data Sufficiency, Arithmetic Reasoning, Verification of Truth	7
Total		35

**Reference Books:**

"Reasoning" By R.S. Aggarwal

**HS 302 TECHNICAL WRITING****C(L,T,P) = 4(3,1,0)**

Units	Course Contents	Total Contact Hrs.
1	Writing Process- Intro of various types of writings, Gathering, Writing, Reviewing, Editing, Indexing, Testing	7
2	Review Writing- Internal, Friendly and Anonymous reviews, Quantity review, Quality review, Precis Writing, Paragraph Writing, Report Writing- Science and research reports, business Reports, Business Report, Business overview	7
3	Letter Writing- Letter of Inquiry, Letter of adjustment, Claim Letter and follow of Letter, Letter of acceptance, Letter of refusal	7
4	Job search correspondence- cover letter, CV and resume	7
5	Writing Mails- User Guides, Reference Guide, Online helps, Website, Technical Proposal Writing.	7
Total		35

**HS 401 TECHNICAL APTITUDE****C(LTP)=3(3,0,0)**

Units	Course Contents	Total Contact Hrs.
1	PPL (Principal of Programming Language, C, C++, Java, Asp.net, DSA	7
2	DBMS, RDBMS	7
3	Networking & Related topics	8
4	Software Engineering and Related topics	7
5	Operating System (Windows, Linux, MS office)	7
Total		36

**Reference Books:**

1. MCQs in Computer Science by Timothy Williams, TMH

**HS 503 EMPLOYABILITY SKILLS – I****C(L,T,P)=4(3,1,0)**

Unit	Course Contents	Total Contact Hrs.
1	Foundation and background of organizational behaviour, contemporary challenges-workforce diversity, cross – cultural dynamics, changing nature of managerial work, ethical issues at work, emotional intelligence in contemporary business. Perception, Personality, Learning, Motivation – Concepts and applications, individual decision making.	7
2	Understanding and managing group processes-interpersonal & group dynamics, Group cohesiveness, Group decision making Emotional Intelligence-concept and applications, Understanding work teams, power & politics, Empowerment, Conflict & Negotiation.	8
3	Purpose and process of communication; myths and realities of communication; paths of communication; oral communication; noise, barriers to communication; listening process, types of listening, deterrents to listening process, essentials of good listening; telephonic communication.	6
4	Non verbal communication; gestures, handshakes, gazes, smiles, hand movements, styles of working, voice modulations, body sport for interviews; business etiquettes; business dining, business manners of people of different cultures, managing customer care.	7
5	Written communication; mechanics of writing, report writing, circulars, notices, memos, agenda and minutes; business correspondence-business letter format, style of letter arrangement, types of letters, telex managers, facsimiles, electronic mail; diary writing; development resume.	7
Total		35

**Reference Books:**

1. Enrich your English – by CIEFL (Academic Skills book)
2. Contemporary English Grammar – Raymond Murphy
3. Organizational Behavior, - Fred Luthans 9th Edition, McGraw-Hill Irwin, 2002.
4. Organizational Behavior, Tenth Edition, TMG, 1998. John W. Newstorm and Keith Davis
5. Business Communication Today – By Bovee, Thill, Schazman
6. G. Business Communication – by Pal and Korlahalli

**HS 504 EMPLOYABILITY SKILLS – II****C(L,T,P)=4(3,1,0)**

Units	Contents of the Subject	Hours
1	Introduction to Mindfulness, Mindfulness Exercise, DBT Life Skills – Distress Tolerance	8
2	Mindfulness Exercise, DBT Life Skills – Emotion Regulation	8
3	Mindfulness Exercise, DBT Life Skills – Interpersonal Effectiveness	7
4	Mindfulness Exercise, Anxiety Disorders, Depression, and Personality Disorders, Acceptance: Living in the Here-and-Now as a Way of Life	7
5	Mindfulness Exercise, Introduction to Dialectical Behavior Therapy (DBT), □ Dialectic Philosophy, □ Wise Mind	7
	Total	37

**Reference Books:**

1. Shivani D.R. (1998): NGO Development Initiative & Policy – Vikas Publications

**HS 603 EMPLOYABILITY SKILLS–III****C(L,T,P)=4(3,1,0)**

Units	Course Contents	Total Contact Hrs.
1	Logical Sequence of Words, Blood Relation Test, Syllogism	7
2	Series Completion, Cause and Effect, Dice	7
3	Venn Diagrams, Cube and Cuboids Analogy	7
4	Seating Arrangement, Character Puzzles, Direction Sense Test	7
5	Classification, Data Sufficiency, Arithmetic Reasoning, Verification of Truth	7
	Total	35

**Reference Books:**

‘Reasoning’ by R.S. Aggarwal

**HS 604 EMPLOYABILITY SKILLS–IV****C(L,T,P) = 4(3,1,0)**

Units	Course Contents	Total Contact Hrs.
1	Writing Process- Intro of various types of writings, Gathering, Writing, Reviewing, Editing, Indexing, Testing	7
2	Review Writing- Internal, Friendly and Anonymous reviews, Quantity review, Quality review, Precis Writing, Paragraph Writing, Report Writing- Science and research reports, business Reports, Business Report, Business overview	7
3	Letter Writing- Letter of Inquiry, Letter of adjustment, Claim Letter and follow of Letter, Letter of acceptance, Letter of refusal	7
4	Job search correspondence- cover letter, CV and resume	7
5	Writing Mails- User Guides, Reference Guide, Online helps, Website, Technical Proposal Writing.	7
	Total	35

**HS 701 EMPLOYABILITY SKILLS–V****C(LTP)=3(3,0,0)**

Units	Course Contents	Total Contact Hrs.
1	PPL (Principal of Programming Language, C, C++, Java, Asp.net, DSA	7
2	DBMS, RDBMS	7
3	Networking & Related topics	8
4	Software Engineering and Related topics	7
5	Operating System (Windows, Linux, MS office)	7
	Total	36

**Reference Books:**

MCQs in Computer Science by Timothy Williams, TMH

Units	Course Contents	Total Contact Hrs.
1	SETS: Sets, subsets, equal sets, null set, universal set, Venn diagrams, Finite & infinite sets, open & closed sets etc., Union, Intersection, Difference and Compliment of sets, Partition of sets, Cartesian product, Inclusion & Exclusion Principle, Induction method.	7
2	LIMITS & CONTINUITY: Limit at a point, properties of limit, computation of limits of various types of functions. Continuity at a point, continuity over an interval, intermediate value theorem. Type of discontinuities.	6
3	DIFFERENTIATION: Derivative, derivatives of sum, differences, product & quotients, chain rule, logarithmic differentiation, Rolle's theorem, mean value theorem, expansion of functions (Taylor's & Maclaurin's theorem.), Indeterminate forms, L'Hospital rule, maxima & minima, successive differentiation & Liebnitz theorem.	8
4	INTEGRATION: Integral as limit of a sum, fundamental theorem of calculus, indefinite & definite integrals, methods of integration: substitution, by parts, partial fractions, integration of algebraic and transcendental functions., reduction formulae for trigonometric functions.	8
5	MATRIX & DETERMINANTS: Introduction, definition of matrix, types of matrices, algebra of matrices, determinants, minors & cofactors, properties of determinants, inverse of a matrix, adjoint of a matrix, rank of a matrix, solution of linear system of equations.	7
Total		36

**Reference Books:**

1. Shanti Narayan: Integral Calculus, S.Chand & Co.
2. Sharma, Gokhroo, Saini: Elements of matrices and Determinants, Jaipur Publishing House
3. Schum Series: Discrete mathematics, Tata Mac-Graw Hill

**PE 204 MINOR PROJECT**

C(LTP) = 2(0,0,4)

Units	Course Contents	Total Contact Hrs.
1	Software application design	4 hrs weekly

**PE 305 DISSERTATION**

C(L,T,P) = 2(0,0,3)

Units	Course Contents	Total Contact Hrs.
1	Analysis and designing for proposed research work	3 hrs weekly

**PE 307 MAJOR PROJECT**

C(LTP) = 3(0,0,6)

Units	Course Contents	Total Contact Hrs.
1	Development of projects discussed in minor projects	6 hrs weekly

**PE 652 MINOR PROJECT**

C(L,T,P) = 3(0,0,6)

Units	Course Contents	Total Contact Hrs.
1	Software application design	6 hrs weekly

**PE 701 MAJOR PROJECT**

C(L,T,P) = 3(0,0,6)

Units	Course Contents	Total Contact Hrs.
1	Development of projects discussed in minor projects	6 hrs weekly

**PE 703 DISSERTATION****C(L,T,P) = 2(0,0,3)**

<b>Units</b>	<b>Course Contents</b>	<b>Total Contact Hrs.</b>
1	Analysis and designing for proposed research work	3 hrs weekly

**PT 304 INDUSTRIAL TRAINING****C(L,T,P) = 18(0,0,36)**

<b>Units</b>	<b>Course Contents</b>	<b>Total Contact Hrs.</b>
1	<p>Students have to be complete technical training as per the industrial requirements. Mode of the training may be In-house or from the industry specific. Before going for the training outside from the University campus, it is expected that student have to submit all written communication received from the Industry. During the tenure of the project, industry must send a progress report of the student in every 15 days to the University. After successful completion of the training student must submit a report (as per specifications and format provided by the University) to the department and will present his/her project in-front-of the team of domain experts/examiners. The project report should contain the following.</p> <ol style="list-style-type: none"> <li>1) Three copies of the Project Report in the format provided by the University and duly signed by the Project Guide.</li> <li>2) Softcopy of the Project Report, Presentation (PPT and Flash), Executable copy of the project.</li> </ol>	36 hrs week

**PT 702 INDUSTRIAL TRAINING****C(L,T,P) = 18(0,0,36)**

<b>Units</b>	<b>Course Contents</b>	<b>Total Contact Hrs.</b>
1	<p>Students have to be complete technical training as per the industrial requirements. Mode of the training may be In-house or from the industry specific. Before going for the training outside from the University campus, it is expected that student have to submit all written communication received from the Industry. During the tenure of the project, industry must send a progress report of the student in every 15 days to the University. After successful completion of the training student must submit a report (as per specifications and format provided by the University) to the department and will present his/her project in-front-of the team of domain experts/examiners. The project report should contain the following.</p> <ol style="list-style-type: none"> <li>3) Three copies of the Project Report in the format provided by the University and duly signed by the Project Guide.</li> <li>4) Softcopy of the Project Report, Presentation (PPT and Flash), Executable copy of the project.</li> </ol>	36 hrs week

**SM 303 SEMINAR****C(LTP)=1(0,0,2)**

<b>Units</b>	<b>List of Experiments</b>	<b>Total Contact Hrs.</b>
1	Presentations on topics of Computer Application / Science / Information Technology.	2 hrs weekly

**SM 701 SEMINAR****C(L,T,P) = 2(0,0,2)**

<b>Units</b>	<b>Course Contents</b>	<b>Total Contact Hrs.</b>
1	<ul style="list-style-type: none"> <li>• Student presentations on various topics.</li> <li>• Atleast one technical paper presentation in National/International Conference/Seminar by the student.</li> <li>• Atleast one technical paper publication by the student in research journal/magazine of National/International repute</li> </ul>	2 hrs weekly