ADHIYAMAAN COLLEGE OF ENGINEERING
(An Autonomous Institution, Affiliated to Anna University, Chennai)
(Accredited by NAAC)
Dr.M.G.R Nagar, Hosur-635109,Tamilnadu, India
REGULATION 2018
CHOICE BASED CREDIT SYSTEM

B.E.-COMPUTER SCIENCE AND ENGINEERING

VISION

To mould young and fresh mind into challenging professionals with ethical values and shaping them with contemporary skills to contribute fully in current and future's world demands.

MISSION

To produce competent and quality professionals by imparting computer concepts and techniques to facilitate the students to work with modern tools, inventive technologies, innovative research capabilities and leadership abilities by inculcating the spirit of ethical values.

I. **Programme Educational Objectives(PEOs)**

PEO 1: The graduates of the program will have sound knowledge in Mathematical, Scientific and Engineering concepts necessary to formulate, analyze, design and solve Engineering problems and to prepare them for higher learning, research and industry.

PEO2: The graduates of the program will possess innovative skills to asses and apply the rapid changes in technology and to engage in research leading to novel solutions for human, social and global competency.

PEO3: The graduates of the program will acquire knowledge and grab opportunities to work as teams on multidisciplinary environment, communicate ideas effectively With diverse audiences, leadership qualities with ethical values

II.Programme Outcomes(POs)

PO1 **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2 **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3 **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO 4 **Conduct investigations of complex problems:** Use research-based knowledge and research methods inc of experiments, analysis and interpretation of data, and synthesis of the information to provide valid co

PO 5 **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern en IT tools including prediction and modeling to complex engineering activities with an understa limitations.

PO 6 **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess so safety, legal and cultural issues and the consequent responsibilities relevant to the professiona practice.

PO 7 **Environment and sustainability:** Understand the impact of the professional engineering solutions i environmental contexts, and demonstrate the knowledge of, and need for sustainable developme

PO 8 **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and r engineering practice.

PO 9 **Individual and team work:** Function effectively as an individual, and as a member or leader in diver in multidisciplinary settings.

PO10 **Communication:** Communicate effectively on complex engineering activities with the engineerir and with society at large, such as, being able to comprehend and write effective report documentation, make effective presentations, and give and receive clear instructions.

PO 11 **Project management and finance:** Demonstrate knowledge and understanding of the eng management principles and apply these to one's own work, as a member and leader in a tear projects and in multidisciplinary environments.

PO12 **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in ind life-long learning in the broadest context of technological change.

Programme Specific Outcomes(PSOs)

PSO 1: Professional Skills: An ability to interpret the fundamental concepts and methodology of computer systems. To enhance skills among students to synthesize data and technical ideas for software design and development.

PSO2: Problem Solving Skills: The ability to understand the structure and development methodologies of software systems. Possess knowledge of software design process using open-ended programming environments to deliver a quality product for business success.

PSO3 : Successful career and entrepreneurship: The ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur and a zest for higher studies.

Correlation of PEOs with POs and PSOs

	PO's												PSO's		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
PEO 1	3	2	2	1	2	1	3	2	2	1	3	1	1	1	2
PEO 2	2	1	3	1	3	2	1	2	1	2	1	1	1	2	3
PEO 3	2	2	3	2	3	1	1	3	2	2	3	1	1	2	1

MAPPING MATRIX OF COURSE WITH PROGRAM OUTCOMES

S. NO.	Course Code	Course Name	Category	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
1	118ENT01	Technical English	HS				1	1			1	1	2			3	2	1
2	118MAT02	Engineering Mathematics-I	BS	3	2											3		
3	118PHT03	Engineering Physics	BS	3	2	1	2									3		2
4	118CYT04	Engineering Chemistry	BS	3	1	1		1					1			3	1	3
5	118PPT05	Problem Solving And Python Programming	ES	3	3		2	2	1							1	2	
6	118ESE06	Basic Electrical Electronics and Instrumentation Engineering	ES	3	1		2									1	1	1
7	118PHP07	Engineering Physics Laboratory	BS	3	2	1	1			1	1	1				2	1	1
8	118PPP08	Problem Solving and Python Programming Laboratory	ES	3	3		2	2	1	1			1			1	3	
9	218ENT01	Communicative English	HS	3	1	1				1	1	3	3		2	3	1	

S. NO.	Course Code	Course Name	Category	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
10	218MAT02	Engineering Mathematics-II	BS	**3**	**1**	**1**			**1**	**1**	**1**				**1**	**1**	**1**	
11	218GET03	Environmental Science and Engineering	HS	**2**	**1**	**2**				**1**	**1**	**1**			**1**	**1**		
12	218EMT04	Engineering Mechanics	ES	**3**	**1**	**1**			**1**	**1**						**1**	**1**	**1**
13	218BSE03	Chemistry for Technologists	BS	**3**	**1**	**1**						**1**	**1**	**1**				
14	218PHP07	Engineering Physics Laboratory	BS	**3**	**1**		**1**			**1**	**1**				**1**	**2**	**1**	**1**
15	318MAT01	Engineering Mathematics-III	BS	**3**	**3**	**2**									**1**	**3**	**1**	
16	318CIT02	Digital Electronics	ES	**3**	**2**	**3**	**1**	**1**		**1**					**1**			
17	318CST03	Database Management Systems	HS		**2**	**2**	**2**	**2**							**1**		**2**	**2**
18	318CIT04	Object Oriented Programming in C++	PC		**3**		**2**	**2**							**1**		**2**	**2**
19	318CIT05	Data Structures	PC		**3**	**2**	**1**	**1**							**3**	**1**	**2**	
20	318CIT06	Computer Organization	PC		**2**	**3**		**2**							**2**	**1**	**1**	
21	318CIP07	Digital Electronics Laboratory	ES	**3**	**2**	**3**	**1**	**1**		**1**				**1**		**1**	**1**	
22	318CSP08	Database Management Systems Laboratory	PC		**2**	**1**	**2**	**1**							**2**	**1**	**1**	

S. NO.	Course Code	Course Name	Category	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
23	318CSP09	OOPs and Data Structures Laboratory	PC		**3**	**1**	**1**	**1**							**1**	**1**	**1**	
24	418DMT01	Discrete Mathematics	BS	**3**	**3**	**1**									**1**	**2**	**1**	
25	418CIT02	Design and Analysis of algorithm	PE	**3**	**1**	**1**	**1**	**1**	**1**	**1**		**1**		**1**		**1**	**1**	
26	418CIT03	Java Programming	PC	**1**	**1**	**1**	**1**	**2**				**1**		**1**	**1**	**1**	**2**	**3**
27	418CIT05	Operating Systems	PC		**1**	**1**	**1**	**2**								**1**		
28	418CST05	Computer Networks	PC	**1**			**1**	**1**					**1**	**1**	**1**	**1**	**1**	
29	418CIT06	Software Engineering	PC	**1**	**1**		**1**	**1**	**1**					**1**		**1**	**1**	**1**
30	418CIP07	Java Programming Laboratory	PC	**1**	**1**	**1**	**1**	**1**				**1**			**1**	**1**	**1**	**1**
31	418CIP08	Operating Systems Laboratory	PC		**1**	**1**	**1**	**2**								**1**	**1**	
32	418CSP09	Computer Networks Laboratory	PC	**1**			**1**	**1**					**1**		**1**	**1**	**1**	
33	518PQT01	Probability and Queuing Theory	BS	**3**	**3**	**1**									**1**	**3**	**1**	
34	518CIT02	Micro-Processor and Microcontroller	ES	**3**	**2**	**3**	**1**	**3**						**1**		**1**	**1**	
35	518CIT03	Object Oriented Analysis and Design	PC		**3**	**3**		**2**	**2**	**1**					**2**	**1**	**1**	**1**

S. NO.	Course Code	Course Name	Category	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
36	518CIT04	Theory of Computation	PC		**1**		**2**	**3**							**2**	**2**	**2**	
37	518CIE01	C# and .NET Programming	PE		**2**	**1**	**1**	**1**							**1**		**2**	**2**
38	518CSE02	Scripting Language	PE		**2**	**2**		**1**							**1**		**1**	**1**
39	518CIE03	Advanced Java Programming	PE	**1**	**2**	**1**	**1**	**1**							**1**		**1**	**2**
40	518CSE04	Software Testing	PE		**2**	**2**	**1**	**1**	**1**					**1**	**2**		**2**	**2**
41	518CSE05	Computer Graphics and Multimedia Systems	PE		**3**	**1**	**1**	**3**								**1**	**1**	**1**
42	518CIP06	Micro-Processor and Microcontroller Laboratory	ES	**3**	**2**	**3**	**1**	**3**						**1**		**1**	**1**	
43	518CIP07	Object Oriented Analysis and Design Laboratory	PC		**2**	**2**		**1**	**1**	**1**					**1**		**1**	**1**
44	518CIP08	Employability Skill Laboratory	EEC			**1**			**1**	**1**						**1**	**1**	**1**
45	618CIT01	Mobile Application Development	PC	**1**	**1**	**1**	**1**	**1**	**1**								**2**	**3**
46	618CIT02	Compiler Design	PC	**1**	**1**		**1**		**1**								**1**	
47	618CIT03	Data Warehousing and Data Mining	PC	**1**	**1**		**2**	**1**		**1**						**1**	**1**	**1**
48	618CIT04	Web Programming	PC	**1**	**1**	**2**		**1**		**1**		**1**					**2**	**2**

S. NO.	Course Code	Course Name	Category	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
49	618CST05	Artificial Intelligence	PC	1	1	1	1			1						1	2	2
50	618CSP07	Mobile Application Development Laboratory	PE	1	1	1	1	1	1								2	3
51	618CSP08	Data Mining Laboratory	PC	1	1	1	1	1		1							1	1
52	618CSP09	Web Programming Laboratory	PC	1	1	1	1	1	1								2	2
53	618CSE01	Multi core Architecture	PE	1	1		1	1		1							1	
54	618CSE02	Parallel and Distributed Computing	PE	1	1		1	1		1						1	1	
55	618MAE03	Applied Statistics and Numerical Methods	PE	3	3	2	2								1	2		3
56	618CSE04	Network Design and Management	PE	1	1	1		1		1	1				1	1	1	1
57	618CSE05	Software Project Management	PE	1	1		1	1		1		1				1	2	2
58	618CSE06	Advanced Java scripting Language	PE	2	1		1		1			1					2	2
59	718CIT01	Cryptography and Security in Computing	PC	2	2		1			1				1		1	1	1
60	718CIT02	Machine Learning Techniques	PC			1	1						1			1	2	2
61	718CIT03	Mobile Computing	PC	2	1			1							1	1	1	

S. NO.	Course Code	Course Name	Category	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
62	718CIT04	Cloud Computing	PC	1		2		2		2							2	1
63	718CIP07	Machine Learning Techniques Laboratory	PC	3	1	1		1		1							2	3
64	718CIP08	Cloud Computing Laboratory	PC	1		2		2		1							1	2
65	718CSP09	Mini Project	EEC	1		1		1			1						2	3
66	718CIE01	Internet of Things	PE		1	1	1					1						
67	718CSE02	Building Enterprise Application	PE	2	1	1	1				1						1	3
68	718CIE03	Business Intelligence and its Applications	PE	2	2	1		1									1	3
69	718CSE04	Information Storage Management	PE	1	1		1	1				1					1	
70	718CIE05	Agile Software Development	PE	2	1	1		1				1					2	3
71	718CIE06	Cyber security and Law	PE	1	1		1	1		1	1						2	3
72	818CIT01	Big Data Analytics	PC	2	2	1		1				1				1	1	1
73	818CSP01	Project Work & Viva Voce	EEC	2	1		1				1				1		2	2
74	818CIE01	Software Defined Networks	PE	1	1	1	1		1			1				1	1	
75	818CSE02	Social Network Analysis	PE	1	1		1	1		1		1				1	1	
76	818CIE03	AR and Virtual Reality	PE	1	1		1	1		1		1				1	1	1

S. NO.	Course Code	Course Name	Category	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
77	818CSE05	Ad hoc and Sensor Networks	PE	**1**	**1**		**1**		**1**	**1**						**1**	**1**	**2**
78	818CIE04	Green Computing	PE	**1**	**1**			**1**		**1**						**1**	**1**	
79	818CSE06	Block Chain Technologies	PE		**1**	**1**		**1**	**1**		**1**						**2**	**2**
80	818CIE07	Service Oriented Architecture	PE	**1**	**1**		**1**		**1**		**1**	**1**				**1**	**1**	
81	818CSE08	Digital Forensics	PE	**1**	**1**		**1**	**1**		**1**							**1**	**2**
82	818CSE09	Deep Learning Techniques	PE	**1**	**1**		**1**			**1**	**1**		**1**				**2**	**1**
83	818CSE10	Visualization Techniques	PE	**1**	**1**		**1**			**1**	**1**						**1**	**1**
	818CSE011	Software Quality Assurance	PE	**1**	**1**		**1**		**1**			**1**					**1**	**1**
84	818CSE012	Web Mining	1	**1**		**1**	**1**		**1**								**1**	**1**

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REGULATION 2018

CHOICE BASED CREDIT SYSTEMS

B.E.-COMPUTER SCIENCE AND ENGINEERING

Curricula and Syllabi for Semesters I to VIII

SEMESTER I

S.NO	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	118ENT01	Technical English	HS	2	0	0	2	2
2	118MAT02	Engineering Mathematics-I	BS	3	0	0	3	3
3	118PHT03	Engineering Physics	BS	2	0	0	2	2
4	118CYT04	Engineering Chemistry	BS	3	0	0	3	3
5	118PPT05	Problem Solving And Python Programming	ES	3	0	0	3	3
6	**118ESE0X**	**ELECTIVE (GROUP1)**	**ES**	**3**	**0**	**0**	**3**	**3**
PRACTICALS								
7	118PHP07	Engineering Physics Laboratory	BS	0	0	2	2	1
8	118PPP08	Problem Solving and Python Programming Laboratory	ES	0	0	2	2	1
	TOTAL			16	0	4	4	18

ELECTIVE (GROUP1)

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	118ESE01	Basic Civil and Mechanical Engineering	ES	3	0	0	3	3
2	118ESE05	Basic Mechanical Electrical and Instrumentation Engineering	ES	3	0	0	3	3
3	118ESE06	Basic Electrical Electronics and Instrumentation Engineering	ES	3	0	0	3	3
4	118ESE07	Biology For Engineers	ES	3	0	0	3	3

SEMESTER II

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								

1	218ENT01	Communicative English	HS	2	0	2	3	3
2	218MAT02	Engineering Mathematics-II	BS	3	1	0	4	4
3	218GET03	Environmental Science and Engineering	HS	2	0	0	2	2
4	218EMT04	Engineering Mechanics	ES	3	0	0	3	3
5	218PPT05	Programming in C	ES	3	0	0	3	3
6	**218BSE0X**	**ELECTIVE (GROUP2)**	**BS**	**2**	**0**	**0**	**2**	**2**
PRACTICALS								
7	218PHP07	Engineering Physics Laboratory	BS	0	0	2	1	1
8	218PPP08	Programming in C Laboratory	ES	0	0	2	1	1
	TOTAL			15	1	6	19	19

ELECTIVE (GROUP2)

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	218BSE01	Material Science	BS	2	0	0	2	2
2	218BSE02	Quantum Mechanics for Engineers	BS	2	0	0	2	2
3	218BSE03	Chemistry for Technologists	BS	2	0	0	2	2
4	218BSE04	Energy Storage Devices and Fuel Cells	BS	2	0	0	2	2

SEMESTER – III

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	318MAT01	Engineering Mathematics-III	BS	3	1	0	2	4
2	318CIT02	Digital Electronics	ES	3	0	0	2	3
3	318CST03	Database Management Systems	HS	3	0	0	2	3
4	318CIT04	Object Oriented Programming in C++	PC	3	0	0	2	3
5	318CIT05	Data Structures	PC	3	0	0	3	3
6	318CIT06	Computer Organization	PC	3	0	0	3	3
PRACTICALS								
7	318CIP07	Digital Electronics Laboratory	ES	0	0	2	2	1
8	318CSP08	Database Management Systems Laboratory	PC	0	0	2	2	1
9	318CSP09	OOPs and Data Structures Laboratory	PC	0	0	2	2	1

SEMESTER – IV

S.No	Course Code	Course Title	Category	Periods Per Week			Total Contact Periods	Credits
				L	T	P		
THEORY								
1	418DMT01	Discrete Mathematics	BS	3	1	0	2	4
2	418CIT02	Design and Analysis of algorithm	PE	3	0	0	2	3
3	418CIT03	Java Programming	PC	3	0	0	2	3
4	418CIT05	Operating Systems	PC	3	0	0	2	3
5	418CST05	Computer Networks	PC	3	0	0	3	3
6	418CIT06	Software Engineering	PC	3	0	0	3	3
PRACTICALS								
7	418CIP07	Java Programming Laboratory	ES	0	0	2	2	1
8	418CIP08	Operating Systems Laboratory	PC	0	0	2	2	1
9	418CSP09	Computer Networks Laboratory	PC	0	0	2	2	1

SEMESTER – V

S.No	Course Code	Course Title	Category	Periods Per Week			Total Contact Periods	Credits
				L	T	P		
THEORY								
1	518PQT01	Probability and Queuing Theory	BS	3	1	0	2	4
2	518CIT02	Micro-Processor and Microcontroller	ES	3	0	0	2	3
3	518CIT03	Object Oriented Analysis and Design	PC	3	0	0	2	3
4	518CIT04	Theory of Computation	PC	3	0	0	2	3
5	518CSExx	**Open Elective –I**	OE	3	0	0	3	3
6	518CSExx	**Professional Elective -I**	PE	3	0	2	3	4
PRACTICALS								
7	518CIP06	Micro-Processor and Microcontroller Laboratory	ES	0	0	2	2	1
8	518CIP07	Object Oriented Analysis and Design Laboratory	PC	0	0	2	2	1
9	518CIP08	Employability Skill Laboratory	EEC	0	0	2	2	1

V Semester-Professional Elective-I (Integrated)

S.No	Course Code	Course Title	Category	Periods Per Week			Total Contact Periods	Credits
				L	T	P		

1	518CIE01	C# and .NET Programming	PE	3	0	2	2	4
2	518CSE02	Scripting Language	PE	3	0	2	2	4
3	518CIE03	Advanced Java Programming	PE	3	0	2	2	4
4	518CSE04	Software Testing	PE	3	0	2	2	4
5	518CSE05	Computer Graphics and Multimedia Systems	PE	3	0	2	3	4

SEMESTER – VI

S.No	Course Code	Course Title	Category	Periods Per Week			Total Contact Periods	Credits
				L	T	P		
THEORY								
1	618CIT01	Mobile Application Development	PC	3	0	0	2	3
2	618CIT02	Compiler Design	PC	3	0	0	2	3
3	618CIT03	Data Warehousing and Data Mining	PC	3	0	0	2	3
4	618CIT04	Web Programming	PC	3	0	0	2	3
5	618CST05	Artificial Intelligence	PC	3	0	0	3	3
6	618CSExx	**Professional Elective –II**	PE	3	0	0	3	3
PRACTICALS								
7	618CSP07	Mobile Application Development Laboratory	PC	0	0	2	2	1
8	618CSP08	Data Mining Laboratory	PC	0	0	2	2	1
9	618CSP09	Web Programming Laboratory	PC	0	0	2	2	1

VI Semester – Professional Elective – II

S.No	Course Code	Course Title	Category	Periods Per Week			Total Contact Periods	Credits
				L	T	P		
1	618CSE01	Multi core Architecture	PE	3	0	0	3	3
2	618CSE02	Parallel and Distributed Computing	PE	3	0	0	3	3
3	618CSE03	High Performance Computing	PE	3	0	0	3	3
4	618CSE04	Network Design and Management	PE	3	0	0	3	3
5	618CSE05	Software Project Management	PE	3	0	0	3	3
6	618CSE06	Advanced Java Scripting Language	PE	3	0	0	3	3

SEMESTER – VII

S.No	Course Code	Course Title	Category	Periods Per Week		Credits

				L	T	P	Total Contact Periods	
THEORY								
1	718CIT01	Cryptography and Security in Computing	PC	3	0	0	2	3
2	718CIT02	Machine Learning Techniques	PC	3	0	0	2	3
3	718CIT03	Mobile Computing	PC	3	0	0	2	3
4	718CIT04	Cloud Computing	PC	3	0	0	2	3
5	718CSExx	**Professional Elective- III**	PC	3	0	0	3	3
6	718CSExx	**Open Elective - II**	PE	3	0	0	3	3
PRACTICALS								
7	718CIP07	Machine Learning Laboratory	PC	0	0	2	2	1
8	718CIP08	Cloud Computing Laboratory	PC	0	0	2	2	1
9	718CSP09	Mini Project	EEC	0	0	2	2	1

VII Semester- Professional Elective- III

S.No	Course Code	Course Title	Category	Periods Per Week			Total Contact Periods	Credits
				L	T	P		
1	718CIE01	Internet of Things	PE	3	0	0	3	3
2	718CSE02	Building Enterprise Application	PE	3	0	0	3	3
3	718CSE03	Business Intelligence and its Applications	PE	3	0	0	3	3
4	718CSE04	Information Storage Management	PE	3	0	0	3	3
5	718CIE05	Agile Software Development	PE	3	0	0	3	3
6	718CIE06	Cyber Security and Law	PE	3	0	0	3	3

SEMESTER – VIII

S.No	Course Code	Course Title	Category	Periods Per Week			Total Contact Periods	Credits
				L	T	P		
THEORY								
1	818CIT01	Big Data Analytics	PC	3	0	0	2	3
2	818CSExx	**Professional Elective- IV**	PC	3	0	0	2	3
3	818CSExx	**Professional Elective- V**	PC	3	0	0	2	3
PRACTICALS								
4	818CSP01	Project Work & Viva Voce	PC	0	0	16	8	16

VIII Semester-Professional Elective- IV

S.No	Course Code	Course Title	Category	Periods Per Week			Total Contact Periods	Credits
				L	T	P		
1	818CIE01	Software Defined Networks	PE	3	0	0	3	3
2	818CSE02	Social Network Analysis	PE	3	0	0	3	3
3	818CSE03	Augmented and Virtual Reality	PE	3	0	0	3	3
4	818CIE05	Green Computing	PE	3	0	0	3	3
5	818CIE04	Ad hoc and Sensor Networks	PE	3	0	0	3	3
6	818CSE06	Block Chain Technologies						

VIII Semester- Professional Elective- V

S.No	Course Code	Course Title	Category	Periods Per Week			Total Contact Periods	Credits
				L	T	P		
1	818CSE07	Service Oriented Architecture	PE	3	0	0	3	3
2	818CSE08	Digital Forensics	PE	3	0	0	3	3
3	818CSE09	Deep Learning	PE	3	0	0	3	3
4	818CIE10	Visualization Techniques	PE	3	0	0	3	3
5	818CSE11	Software Quality Assurance	PE	3	0	0	3	3
6	818CSE12	Web Mining	PE	3	0	0	3	3

ALLOCATION OF CREDITS

Semester	I	II	III	IV	V	VI	VII	VII
Credits	18	21	22	22	22	21	21	17
Total	164							

HUMANTICS, SOCIAL SCIENCES AND MANAGEMENT COURSES (HSMC)

S.NO	COURSE CODE	COURSE TITLE	PERIODS PER WEEK			TOTAL CONTACT PERIODS	PREFERRED SEMESTER	CREDITS
			L	T	P			
1	118ENT01	Technical English	2	0	0	2	I	2
2	218ENT01	Communicative English	2	0	2	3	II	3
3	218GET03	Environmental Science and Engineering	2	0	0	2	II	2

BASIC SCIENCE COURSES (BSC)

S.NO	COURSE CODE	COURSE TITLE	PERIODS PER WEEK			TOTAL CONTACT PERIODS	PREFERRED	CREDITS
			L	T	P			

							SEMESTER	
1	118MAT02	Engineering Mathematics-I	3	0	0	3	I	3
2	118PHT03	Engineering Physics	2	0	0	2	I	2
3	118CYT04	Engineering Chemistry	3	0	0	3	I	3
4	118PHP07	Engineering Physics Laboratory	0	0	2	2	1	1
5	218MAT02	Engineering Mathematics-II	3	1	0	4	II	4
6	218PHP07	Engineering Physics Laboratory	0	0	2	1	II	1
7	218BSE01	Material Science	BS	2	0	2	II	2
7	218BSE02	Quantum Mechanics for Engineers	BS	2	0	2	II	2
8	218BSE03	Chemistry for Technologists	BS	2	0	2	II	2
9	218BSE04	Energy Storage Devices and Fuel Cells	BS	2	0	2	II	
10	318MAT01	Engineering Mathematics-III	BS	3	1	2	III	4
11	418DMT01	Discrete Mathematics	BS	3	1	2	IV	4
12	518PQT01	Probability and Queuing Theory	BS	3	1	2	V	4

ENGINEERING SCIENCE COURSES (ES)

S.NO	COURSE CODE	COURSE TITLE	PERIODS PER WEEK			TOTAL CONTACT PERIODS	PREFERRED SEMESTER	CREDITS
			L	T	P			
1	118PPT05	Problem Solving And Python Programming	3	0	0	3	I	3
2	118PPP08	Problem Solving and Python Programming Laboratory	0	0	2	2	I	1
3	118ESE01	Basic Civil and Mechanical Engineering	3	0	0	3	I	3
4	118ESE05	Basic Mechanical Electrical and Instrumentation Engineering	3	0	0	3	I	3
5	118ESE06	Basic Electrical Electronics and Instrumentation Engineering	3	0	0	3	I	3
6	118ESE07	Biology For Engineers	3	0	0	3	I	3
7	218EMT04	Engineering Mechanics	3	0	0	3	II	3
8	218PPT05	C Programming Laboratory	3	0	0	3	II	1
9	318CIT02	Digital Electronics	0	0	2	1	III	1
10	318CIP07	Digital Electronics Laboratory	2	0	0	2	III	1
11	518CIT02	Micro-Processor and Microcontroller	3	0	0	2	V	3
12	518CIP06	Micro-Processor and Microcontroller Laboratory	ES	0	0	2	V	1

PROFESSIONAL CORE COURSES

S.NO	COURSE CODE	COURSE TITLE	PERIODS PER WEEK			TOTAL CONTACT PERIODS	PREFERRED SEMESTER	CREDITS
			L	T	P			

1	318CIT04	Problem Solving And Python Programming	3	0	0	2	III	3
2	318CIT05	Problem Solving and Python Programming Laboratory	3	0	0	3	III	3
3	318CIT06	Basic Civil and Mechanical Engineering	3	0	0	3	III	3
4	318CSP08	Database Management Systems Laboratory	0	0	2	2	III	1
5	318CSP09	OOPs and Data Structures Laboratory	0	0	2	2	III	1
6	418CIT03	Java Programming	3	0	0	2	IV	3
7	418CIT05	Operating Systems	3	0	0	2	IV	3
8	418CST05	Computer Networks	3	0	0	3	IV	3
9	418CIT06	Software Engineering	3	0	0	3	IV	3
10	418CIP07	Java Programming Laboratory	0	0	2	2	IV	1
11	418CIP08	Operating Systems Laboratory	0	0	2	2	IV	1
12	418CSP09	Computer Networks Laboratory	0	0	2	2	IV	1
13	518CIT03	Object Oriented Analysis and Design	3	0	0	2	V	3
14	518CIT04	Theory of Computation	3	0	0	2	V	3
15	518CIP07	Object Oriented Analysis and Design Laboratory	0	0	2	2	V	1
16	618CIT01	Mobile Application Development	3	0	0	2	VI	3
17	618CIT02	Compiler Design	3	0	0	2	VI	3
18	618CIT03	Data Warehousing and Data Mining	3	0	0	2	VI	3
19	618CIT04	Web Programming	3	0	0	2	VI	3
20	618CST05	Artificial Intelligence	3	0	0	3	VI	3
21	618CSP07	Mobile Application Development Laboratory	0	0	2	2	VI	1
22	618CSP08	Data Mining Laboratory	0	0	2	2	VI	1
23	618CSP09	Web Programming Laboratory	0	0	2	2	VI	1
24	718CIT01	Cryptography and Security in Computing	3	0	0	2	VII	3
25	718CIT02	Machine Learning Techniques	3	0	0	2	VII	3
26	718CIT03	Mobile Computing	3	0	0	2	VII	3
27	718CIT04	Cloud Computing	3	0	0	2	VII	3
28	718CIP07	Machine Learning Laboratory	0	0	2	2	VII	1
29	718CIP08	Cloud Computing Laboratory	0	0	2	2	VII	1
30	818CIT01	Big Data Analytics	3	0	0	2	VIII	3

PROFESSION ELECTIVE COURSES (PC)

S.No	Course Code	Course Title	Periods Per Week		PREFERRED SEMESTER	Credits

			L	T	P	Total Contact Periods		
1	518CIE01	C# and .NET Programming	3	0	2	2	V	3
2	518CSE02	Scripting Language	3	0	2	2	V	4
3	518CIE03	Advanced Java Programming	3	0	2	2	V	3
4	518CSE04	Software Testing	3	0	2	2	V	3
5	518CSE05	Computer Graphics and Multimedia Systems	3	0	2	3	V	3
6	618CSE01	Multi core Architecture	3	0	0	3	VI	3
7	618CSE02	Parallel and Distributed Computing	3	0	0	3	VI	3
8	618CSE03	High Performance Computing	3	0	0	3	VI	3
9	618CSE04	Network Design and Management	3	0	0	3	VI	3
10	618CSE05	Software Project Management	3	0	0	3	VI	3
11	718CIE01	Internet of Things	3	0	0	3	VII	3
12	718CSE02	Building Enterprise Application	3	0	0	3	VII	3
13	718CSE03	Pervasive Computing	3	0	0	3	VII	3
14	718CSE04	Information Storage Management	3	0	0	3	VII	3
15	718CIE05	Agile Software Development	3	0	0	3	VII	3
16	818CIE01	Software Defined Networks	3	0	0	3	VIII	3
17	818CSE02	Social Network Analysis	3	0	0	3	VIII	3
18	818CSE03	Virtual Reality	3	0	0	3	VIII	3
19	818CIE04	Ad hoc and Sensor Networks	3	0	0	3	VIII	3
20	818CIE05	Green Computing	3	0	0	3	VIII	3
21	818CSE06	Software Quality Assurance	3	0	0	3	VIII	3
22	818CSE07	Visualization Techniques	3	0	0	3	VIII	3
23	818CSE08	Web Mining	3	0	0	3	VIII	3
24	818CIE09	Digital Forensics	3	0	0	3	VIII	3
25	818CSE10	Service Oriented Architecture	3	0	0	3	VIII	3

OPEN ELECTIVE COURSES

S.NO	COURSE CODE	COURSE TITLE	PERIODS PER WEEK			TOTAL CONTACT PERIODS	PREFERRED SEMESTER	CREDITS
			L	T	P			
1	X18OE01	PC Hardware and Trouble shooting	3	0	0	3	I	3
2	X18OE02	OOPs in C++	3	0	0	3	I	3
3	X18OE03	Computer organization and Architecture	3	0	0	3	I	3
4	X18OE04	Java Programming	3	0	0	3	II	3

5	X18OE05	Software Project Management	3	0	0	3	III	3
6	X18OE06	Software Quality and Testing	3	0	0	3	IV	3
7	X18OE07	Ad hoc and Sensor Networks	3	0	0	3	IV	3
8	X18OE08	Grid and Cloud Computing	3	0	0	3	V	3
9	X18OE09	Web Programming	3	0	0	3	V	3
10	X18OE10	Internet of Things	3	0	0	3	VI	3
11	X18OE10	Big Data Analytics	3	0	0	3	VII	3

EMPLOABILITY ENHANCEMENT COURSES (EEC)

S.NO	COURSE CODE	COURSE TITLE	PERIODS PER WEEK			TOTAL CONTACT PERIODS	PREFERRED SEMESTER	CREDITS
			L	T	P			
1	518CIP08	Employability Skill Laboratory	0	0	2	2	V	1
2	718CSP09	Mini Project	0	0	2	2	VII	1
3	818CSP01	Project Work & Viva Voce	0	0	16	8	VIII	16

SUMMARY

S.No.	Course Category	Credits per Semester								TOTAL CREDITS	WEIGHTAGE %
		I	II	III	IV	V	VI	VII	VIII		
1	HS	2	5	3						10	6.17284
2	BS	9	7	4	4	4				28	17.28395
3	ES	7	9	4		3				23	12.96296
4	PC			11	18	7	18	14	3	71	43.82716
5	PE					4	3	3	6	16	9.876543
6	OE					3		3		6	3.703704
7	EEC					1		1	8	10	6.17284
Total		18	21	22	22	22	21	21	17	164	100%

118ENT01	TECHNICAL ENGLISH	L	T	P	C
		2	0	0	2

COURSE OBJECTIVES:

The Course prepares first semester Engineering and Technology students to:

- Develop strategies and skills to enhance their ability to read and comprehend engineering and technology texts.
- Foster their ability to write convincing job applications and effective reports.
- Develop their speaking skills to make technical presentations, participate in group discussions.
- Strengthen their listening skill which will help them comprehend lectures and talks in their areas of specialization.

UNIT I **09**

Listening - Ink talks and gap exercises - Speaking – Asking for and giving directions - Reading – short technical texts from journals and newspapers - Writing - definitions – instructions – checklists – recommendations - Vocabulary Development - technical vocabulary - Language Development – parts of speech – articles – word formation.

UNIT II **09**

Listening - longer technical talks - Speaking – process description - Reading – longer technical texts – Writing – graphical representation - Vocabulary Development - vocabulary used in formal letters/emails and reports - Language Development – tenses - voices - numerical adjectives – question tags.

UNIT III **09**

Listening - listening to classroom lectures - Speaking – introduction to technical presentations - Reading – longer texts both general and technical and practice in speed reading – Writing – process description using sequence words and sentences - Vocabulary Development - Misspelled words – one-word substitution - Language Development - embedded sentences – singular and plural nouns - compound nouns - editing

UNIT IV **09**

Listening - Listening to documentaries and making notes - Speaking – mechanics of presentations - Reading – reading comprehension – Writing - email etiquettes - job application – cover letter –Résumé preparation - essay writing - Vocabulary Development – synonyms and antonyms –paraphrasing - Language Development – modals – conditionals.

UNIT V **09**

Listening - TED talks - Speaking – brainstorming and debate – Reading – reading and understanding technical articles – Writing – reports - minutes of a meeting - Vocabulary Development- verbal analogies - phrasal verbs - Language Development - concord - reported speech.

TOTAL HOURS: 45 PERIODS

COURSE OUTCOMES:

At the end of the course learners will be able to:

CO1: Read technical texts and write area- specific texts effortlessly.

CO2: Listen and comprehend lectures and talks in their area of specialization successfully.

CO3: Speak appropriately and effectively in varied formal and informal contexts.

CO4: Understand the basic grammatical structures and its applications.

CO5: Write reports and winning job applications.

TEXT BOOKS

1. Board of editors. Fluency in English A Course book for Engineering and Technology. Orient Blackswan, Hyderabad: 2016.
2. Sudharshana. N. P and Saveetha. C. English for Technical Communication. Cambridge University Press: New Delhi, 2016.
3. Uttham Kumar. N. Technical English I (with work book). Sahana Publications, Coimbatore, 2016.

REFERENCE BOOKS

1. Raman, Meenakshi and Sharma, Sangeetha- Technical Communication Principles and Practice. Oxford University Press: New Delhi,2014.
2. Kumar, Suresh. E. Engineering English. Orient Blackswan: Hyderabad,2015.
3. Booth-L. Diana, Project Work, Oxford University Press, Oxford: 2014.
4. Grussendorf, Marion, English for Presentations, Oxford University Press, Oxford: 2007
5. Means, L. Thomas and Elaine Langlois, English & Communication For Colleges. Cengage Learning, USA: 2007.

Students can be asked to read Tagore and Chetan Bhagat

Course Outcome		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Co1	Read technical texts and write area- specific texts effortlessly.				2				1	1	3	1		1	1	
Co2	Listen and comprehend lectures and talks in their area of specialization successfully.				1	1				2	3	1		1		
Co3	Speak appropriately and effectively in varied formal and informal contexts.									2	3					
Co4	Understand the basic grammatical structures and its applications.										2					
Co5	Write reports and winning job applications.				2					1	2	1		1	1	1

118MAT02	ENGINEERING MATHEMATICS - I	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To understand the eigenvalue problems.
- To understand the concepts of curvatures, evolutes and envelopes.
- To learn the total derivatives and apply the same to find maxima and minima.
- To solve differential equations of certain types, including systems of differential equations that they might encounter in engineering subjects.
- To solve certain linear differential equations using the Laplace transform technique which has applications in control theory and circuit theory.

UNIT I MATRICES **9**

Eigenvalues and eigenvectors of a real symmetric matrix –Properties – Cayley - Hamilton theorem (Statement and applications only) – Orthogonal transformation of a symmetric matrix to diagonal form – Quadratic form –Reduction of quadratic form to canonical form by orthogonal transformation.

UNIT II DIFFERENTIAL CALCULUS **9**

Curvature in Cartesian co-ordinates – Centre and radius of curvature – Circle of curvature – Evolutes – Envelopes – Evolutes as envelope of normals.

UNIT III FUNCTIONS OF SEVERAL VARIABLES **9**

Partial derivatives – Euler's theorem for homogenous functions – Total derivatives – Jacobians – Taylor's expansion– Maxima and Minima – Method of Lagrangian multipliers.

UNIT IV ORDINARY DIFFERENTIAL EQUATIONS **9**

Higher order linear differential equations with constant coefficients – Method of variation of parameters – Cauchy's and Legendre's linear equations – Simultaneous first order linear equations with constant coefficients-Applications to Engineering problems-Electric Circuits, Simple Harmonic Motions and bending of beams.

UNIT V LAPLACE TRANSFORM **9**

Laplace transforms – Conditions for existence –Basic properties (Statement and applications only) – Laplace Transform of elementary functions, derivatives and integrals, unit step function and impulse functions, periodic functions. Definition of Inverse Laplace transform – Convolution theorem (Statement and applications only) – Initial and final value theorems (Statement and applications only) – Solution of linear ordinary differential equations of second order with constant coefficients using Laplace transform techniques.

TOTAL HOURS: 45 PERIODS

COURSE OUTCOMES:

After completing this course, the student will be able to

CO1: Develop the knowledge of linear algebraic concepts.

CO2: Use the differential calculus tools application to seek solutions for many problems in engineering subjects.

CO3: Acquire the knowledge of partial differential concepts and apply to find maxima and minima of a function.

CO4: Determine the solutions of ordinary differential equations by various methods which have an application in their core subjects.

CO5: Apply Laplace transform techniques to solve ordinary differential equations which have an application in many engineering fields.

TEXT BOOKS

1. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley India, 10th edition New Delhi 2016.
2. Grewal. B.S, "Higher Engineering Mathematics", 44th Edition, Khanna Publications, Delhi, 2017.

REFERENCE BOOKS

1. T.Veerarajan, "Engineering Mathematics " Tata McGraw-Hill Publishing company, New Delhi, 2014.
2. Kandasamy.P, Thilagavathy,K., & Gunavathi.K., "Engineering Mathematics for first year "., S.Chand & Company Ltd., New Delhi,2014.
3. Ramana B.V., "Higher Engineering Mathematics", Tata McGraw Hill Co. Ltd., New Delhi, 11th Reprint, 2010.
4. Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 3rd Edition, 2007.
5. V.Prameelakaladharan and G.Balaji, "Engineering Mathematics - I", 3rd Edition, Amrutha marketing, Chennai, 2017.

Course Outcome		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Co1	Develop the knowledge of linear algebraic concepts.	3	2											3		
Co2	Use the differential calculus tools application to seek solutions for many problems in engineering subjects.	3	3											3		
Co3	Acquire the knowledge of partial differential concepts and apply to find maxima and minima of a function.	3	3											3		
Co4	Determine the solutions of ordinary differential equations by various methods which have an application in their core subjects.	3	3											3		
Co5	Apply Laplace transform techniques to solve ordinary differential equations which have an application in many engineering fields.	3	3											3		

118PHT03	ENGINEERING PHYSICS	L	T	P	C
		2	0	0	2

COURSE OBJECTIVES:

- To understand the concept of properties of matter.
- To understand the properties of sound and principles of quantization of energy.
- To understand the properties of coherent light and its importance.

UNIT-I PROPERTIES OF MATTER **9**

Elasticity – Stress – Strain diagram – Factors affecting elasticity – Twisting couple on a wire – Torsion pendulum – Young's modulus - cantilever – Uniform and Non uniform bending (theory and experiment)– Viscosity-Poiseuille's method for Coefficient of Viscosity (Qualitative).

UNIT-II ACOUSTICS AND ULTRASONICS **9**

Classification of sound, loudness, intensity – Decibel – Weber Fechner Law – Reverberation and Reverberation time – derivation of Sabine's formula for Reverberation time (Growth and Decay)– Absorption coefficient and its determination.

Introduction of Ultrasonics – Production – magnetostriction effect – magnetostriction generator – piezoelectric effect – piezoelectric generator – Detection of ultrasonic waves, properties – Cavitation – Applications – Depth of sea – Non Destructive Testing.

UNIT-III QUANTUM PHYSICS **9**

Black body radiation – Planck's theory (derivation) – Deduction of Wien's displacement law and Rayleigh–jeans' Law from Planck's theory – Compton Effect–derivation– Matter waves – Schrödinger's wave equation – Time independent and time dependent equations – Physical significance of wave function – Particle in a one dimensional box – Degeneracy and Non-degeneracy.

UNIT-IV LASER **9**

Introduction – Principle of Spontaneous emission and stimulated emission – Population inversion – pumping – Einstein's A and B coefficients – derivation – Types of lasers – He-Ne, CO_2, Nd-YAG, Semiconductor lasers – homojunction – Applications of Laser.

UNIT-V WAVE OPTICS & FIBRE OPTICS **9**

Interference – Air wedge (theory & experiment) – Polarization– Methods of polarizing light-Theory of plane circularly and elliptically polarized light.

Principle and propagation of light in optical fibers – Numerical aperture and Acceptance angle – Types of optical fibers (material, refractive index, and mode) – Fiber optical communication system (Block diagram) – Fiber optic sensors – Temperature & Displacement sensors (Qualitative).

TOTAL HOURS: 45 PERIODS

COURSE OUTCOMES:

At the end of the course, the student will be able to

CO1: To understand properties of solids with different types of moduli and to gain knowledge about absorption coefficients of solids and different surfaces.
CO2: To understand basic concepts of high frequency sound waves and its applications.
CO3: To understand basic concepts of quantum mechanical behavior of wave and particle along with applications.
CO4: To understand the concepts of production of laser and its behavior with diffraction principle of interference.
CO5: To apply the concept of polarization phenomenon and thereby its applications in fiber optic communication.

TEXT BOOKS

1. R.K. Gaur and S.C. Gupta, 'Engineering Physics' Dhanpat Rai Publications, New Delhi, 2003.
2. Jayaprakash R.N, 'Engineering Physics - I', Dhanam Publications, Chennai, 2007.

REFERENCE BOOKS

1. R. Murugeshan , Kiruthiga Sivaprasath , "Modern Physics", S. Chand Publications, New Delhi, 2016.
2. A. Ghatak, "Optics", The McGraw-Hill Companies, Inc., 1221 Avenue of the Americas, New York, NY 10020.
3. Dr.M.N.Avadhanulu, "Introduction to Lasers: theory and applications", S.Chand publications 2012, New Delhi.

Course Outcome		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Co1	To understand properties of solids with different types of moduli and to gain knowledge about absorption coefficients of solids and different surfaces.	3	2	1	3									3		1
Co2	To understand basic concepts of high frequency sound waves and its applications.	3	2	1	3									3		1
Co3	To understand basic concepts of quantum mechanical behavior of wave and particle along with applications.	3	2		1									3		3
Co4	To understand the concepts of production of laser and its behavior with diffraction principle of interference.	3	2	2	2									3		2
Co5	To apply the concept of polarization phenomenon and thereby its applications in fiber optic communication.	3	2	1	1									3		2

118CYT04	ENGINEERING CHEMISTRY	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To make the students conversant with boiler feed water requirements, related problems and water treatment techniques.
- To recall the terminologies of electrochemistry and explain the function of batteries and fuel cells with its electrochemical reactions.
- To understand the fundamentals of corrosion, its types and polymers with its applications.
- Types of fuels, calorific value calculations, manufacture of solid, liquid and gaseous fuels.

UNIT I WATER AND ITS TREATMENT **9**

Hardness of water - types - expression of hardness - units - estimation of hardness of water by EDTA - numerical problems -Alkalinity-types of alkalinity-determination of alkaninity-boiler troubles (scale and sludge) - treatment of boiler feed water - Internal treatment (carbonate, colloidal, phosphate and calgon conditioning) external treatment Ion exchange process, zeolite process - desalination of brackish water - Reverse Osmosis.

UNIT II ELECTROCHEMISTRY AND ENERGY STORAGE DEVICES **9**

Electrochemical cell-single electrode potential-standard electrode potential-electrochemical series and its significance-EMF of a cell- Nernst equation -Electrodes-Reference electrodes-hydrogen, calomel, quinhydrone and glass electrodes. Determination of pH of a solution using a glass electrode. Batteries - primary and secondary cells, dry cell, alkaline, lead acid storage cell, Ni-Cd battery and lithium nano battery. Clean energy fuel cells - H_2-O_2 fuel cell.

UNIT III CORROSION SCIENCE **9**

Corrosion: definition - types of corrosion: chemical and electrochemical corrosion – Pilling Bedworth ratio - types of oxide layer (stable, unstable, volatile, porous) - hydrogen evolution and oxygen absorption mechanism for electrochemical corrosion - mechanism for rusting of iron. Types of electrochemical corrosion: Galvanic corrosion - differential aeration corrosion (pitting, waterline and pipeline). Galvanic series - applications. Factors influencing corrosion: nature of metal and environment. Corrosion control methods: sacrificial anode method - impressed current Cathodic protection method - electroplating - electroless plating.

UNIT IV POLYMERS AND ITS PROCESSING **9**

Monomers - polymers - polymerization - functionality – degree of polymerization - classification of polymers based on source and applications - Molecular weight determination. Types of polymerization: addition, condensation and copolymerization - mechanism of free radical polymerization. Preparation, properties and applications of PE, PVC, Teflon, terylene, Nylon and Bakelite. Rubber-drawbacks of natural rubber-Vulcanization-Compounding of plastics - injection and blow moulding methods.

UNIT V FUELS AND COMBUSTION **9**

Fuels: Introduction - classification of fuels - coal - analysis of coal (proximate and ultimate) - carbonization - manufacture of metallurgical coke (Otto Hoffmann method) - petroleum - manufacture of synthetic petrol (Bergius process) - knocking - octane number - diesel oil - cetane number - natural gas - compressed natural gas (CNG) - liquefied petroleum gases (LPG) - power alcohol and biodiesel. **Combustion of fuels:** Introduction - calorific value - higher and lower calorific values-theoretical calculation of calorific value - ignition temperature - spontaneous ignition temperature - explosive range - flue gas analysis (ORSAT Method).

TOTAL HOURS: 45 PERIODS

COURSE OUTCOMES

CO1: Attribute the internal and external treatment methods for the removal of hardness in water for domestic and industrial applications.

CO2: Construct an electrochemical cell and Identify the components and processes in batteries and infer the selection criteria for commercial battery systems with respect to different applications.

CO3: Utilize electrochemical data to formulate an electrochemical half-cell and cell reactions for corrosion control processes.

CO4: Differentiate the polymers used in day to day life based on its source, properties and applications.

CO5: Analyse the three types of fuels based on calorific value for selected application.

TEXT BOOKS

1. S. S. Dara and S. S. Umare, "A Textbook of Engineering Chemistry", S. Chand & Company LTD, New Delhi, 2015
2. P. C. Jain and Monika Jain, "Engineering Chemistry" Dhanpat Rai Publishing Company (P) LTD, New Delhi, 2015
3. S. Vairam, P. Kalyani and Suba Ramesh, "Engineering Chemistry", Wiley India PVT, LTD, New Delhi, 2013.

REFERENCE BOOKS

1. Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New Delhi, 2014.
2. Prasanta Rath, "Engineering Chemistry", Cengage Learning India PVT, LTD, Delhi, 2015.
3. Shikha Agarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, 2015.

Course Outcome		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Co1	Attribute the internal and external treatment methods for the removal of hardness in water for domestic and industrial applications.	3			2	2					1			3	2	3
Co2	Construct an electrochemical cell and Identify the components and processes in batteries and infer the selection criteria for commercial battery systems with respect to different applications.	3				2								3	2	3
Co3	Utilize electrochemical data to formulate an electrochemical half-cell and cell reactions for corrosion control processes.	3	1											3	2	3
Co4	Differentiate the polymers used in day to day life based on its source, properties and applications.	3		1	1									3	2	3
Co5	Analyse the three types of fuels based on calorific value for selected application.	3				2					2			3	2	3

118EGT05	ENGINEERING GRAPHICS	L	T	P	C
		2	0	4	4

COURSE OBJECTIVES:

- To understand the graphical skills for drawing the object and the principle of free-hand sketching techniques.
- To understand the principle of orthographic projection of points, lines and plane surfaces.
- To study the principle of simple solids.
- To understand the principle of section and development of solids.
- To understand the principle of Isometric and Perspective projections.

Concepts and conventions (Not for Examination) **03**

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

UNIT I PLANE CURVES AND FREE HAND SKETCHING **15**

Curves used in engineering practices:

Conics – Construction of ellipse, Parabola and hyperbola by Eccentricity method – Construction of cycloid – Construction of involutes of square and circle – Drawing of tangents and normal to the above curves.

Free hand sketching:

Representation of Three Dimensional objects – General principles of orthographic projection – Need for importance of multiple views and their placement – First angle projection – layout views – Developing visualization skills through free hand sketching of multiple views from pictorial views of objects.

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES **15**

Projection of points and straight lines located in the first quadrant – Determination of true lengths and true inclinations – Projection of polygonal surface and circular lamina inclined to both reference planes.

UNIT III PROJECTION OF SOLIDS **15**

Projection of simple solids like prisms, pyramids, cylinders and cones when the axis is inclined to one reference plane by change of position method.

UNIT IV SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES **15**

Sectioning of simple solids like prisms, pyramids, cylinders and cones in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other – Obtaining true shape of section.

Development of lateral surfaces of simple and truncated solids – Prisms, pyramids, cylinders and cones – Development of lateral surfaces of solids with cylindrical cutouts, perpendicular to the axis.

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS **12**

Principles of isometric projection – isometric scale – isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones.

Perspective projection of prisms, pyramids and cylinders by visual ray method.

TOTAL HOURS: 75 PERIODS

COURSE OUTCOMES

The student will be able to

CO1: Recognize the conventions and apply dimensioning concepts while drafting simple objects.
CO2: Draw the orthographic projection of points, line, and plane surfaces.
CO3: Draw the orthographic projection of simple solids.
CO4: Draw the section of solid drawings and development of surfaces of the given objects.
CO5: Apply the concepts of isometric and perspective projection in engineering practice.

TEXT BOOKS

1. Ranganath G, Channankaiah and Halesh Koti, "Engineering Graphics", Second Edition, Sahana Publishers, 2015.
2. Bhatt. N.D., "Engineering Drawing" Charotar Publishing House, 53th Edition, 2014.

REFERENCE BOOKS

1. Dhananjay A.Jolhe, "Engineering Drawing with an introduction to AutoCAD" Tata McGraw Hill Publishing Company Limited, 2017.
2. Gopalakrishnana. K. R, "Engineering Drawing" (Vol. I & II), Subhas Publications, 2014.
3. Basant Agarwal and C.M.Agarwal, "Engineering Drawing", Tata McGraw Hill, 2013.
4. Natrajan K. V, "A Text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2012.
5. M.B.Shaw and B.C.Rana, "Engineering Drawing", Pearson Education India, 2011.

Course Outcome		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Co1	Recognize the conventions and apply dimensioning concepts while drafting simple objects.		2		1								1	1		1
Co2	Draw the orthographic projection of points, line, and plane surfaces.	2	1		1								1		2	
Co3	Draw the orthographic projection of simple solids.	2	2		2								1		3	
Co4	Draw the section of solid drawings and development of surfaces of the given objects.		1		2								2			2
Co5	Apply the concepts of isometric and perspective projection in engineering practice.	1	1	1							2					1

118PPT05 PROBLEM SOLVING AND PYTHON PROGRAMMING **L T P C**
3 0 0 3

COURSE OBJECTIVE(S):

1. To know the basics of algorithmic problem solving
2. To read and write simple Python programs.
3. To develop Python programs with conditionals and loops.
4. To define Python functions and call them.
5. To use Python data structures –- lists, tuples, dictionaries.
6. To do input/output with files in Python.

Prerequisite: Nil

UNIT I ALGORITHMIC PROBLEM SOLVING **9**

Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.

UNIT II DATA, EXPRESSIONS, STATEMENTS **9**

Python interpreter and interactive mode; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNIT III CONTROL FLOW, FUNCTIONS **9**

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

UNIT IV LISTS, TUPLES, DICTIONARIES **9**

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: selection sort, insertion sort, merge sort, histogram.

UNIT V FILES, MODULES, PACKAGES **9**

Files and exception: text files, reading and writing files, format operator; command line arguments, date and time, errors and exceptions, handling exceptions, debugging, modules, packages; Illustrative programs: word count, copy file.

COURSE OUTCOMES:

Upon completion of the course, students will be able to

1. Develop algorithmic solutions to simple computational problems
2. Read, write, execute by hand simple Python programs.
3. Structure simple Python programs for solving problems.
4. Decompose a Python program into functions.
5. Represent compound data using Python lists, tuples, dictionaries.
6. Read and write data from/to files in Python Programs.

TOTAL HOURS: 45 PERIODS

TEXT BOOKS:

1. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist'', 2nd edition,Updated for Python 3, Shroff/O'Reilly Publishers, 2016 (http://greenteapress.com/wp/think-python/)
2. Guido van Rossum and Fred L. Drake Jr, —An Introduction to Python – Revised andupdated for Python 3.2, Network Theory Ltd., 2011.

REFERENCES:

1. John V Guttag, —Introduction to Computation and Programming Using Python'', Revisedand expanded Edition, MIT Press, 2013
2. Robert Sedgewick, Kevin Wayne, Robert Dondero, —Introduction to Programming in Python: An Inter-Disciplinary Approach, Pearson India Education Services Pvt. Ltd.,2016.
3. Timothy A. Budd, —Exploring Python , Mc-Graw Hill Education (India) Private Ltd., 2015.
4. Kenneth A. Lambert, —Fundamentals of Python: First Programs , CENGAGE Learning, 2012.
5. Charles Dierbach, —Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013.
6. Paul Gries, Jennifer Campbell and Jason Montojo, —Practical Programming: AnIntroduction to Computer Science using Python 3 , Second edition, Pragmatic Programmers, LLC, 2013.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Identify the different components of a web page that can be used for mining	3			3	3										
CO2	Apply machine learning concepts to web content mining	3		1		3		3			3					
CO3	Design a system to collect information available on the web to build Recommendersystems	3		1					2		3					
CO4	Analyze social media data using	3	2		3			2	2		1					

	appropriate data/web mining techniques															
CO5	Build a simple search engine using available open source tools	3			3	1			2							

118ESE02	BASIC CIVIL, ELECTRICAL, AND ELECTRONICS ENGINEERING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

1. To gain knowledge about Civil Engineering Materials.
2. To learn about Structural Components of Building.
3. To learn the basics of electrical elements.
4. To introduce the fundamental concepts of DC and AC circuits.
5. To interpret the principle and characteristics of semiconductor devices.

PART-A (CIVIL)

UNIT-I CIVIL ENGINEERING MATERIALS **9**

Civil Engineering Materials: Bricks, Stones, Sand, Cement, Concrete & Steel sections.
M-Sand and their types, Admixtures-Fibers and Fabrics, Superplasticizers - Selection of Materials.

UNIT - II COMPONENTS OF BUILDING **9**

Component parts of the Building -Substructure (Foundation) Types, Bearing capacity, Requirement of Good Foundations.
Superstructure: Brick Masonry, Stone Masonry, Lintels, Roofing, Flooring, Plastering
Typical cross-section showing the Buildings in a Structure, Standard Legends and Insignia

PART-B (ELECTRICAL & ELECTRONICS)

UNIT – III INTRODUCTION TO BASIC ELECTRICAL ELEMENTS **9**

Electrical circuit : passive elements - Resistor, Inductor and Capacitor; active elements- Current, Voltage, Power and Energy – Ohm's Law and limitations - Kirchhoff's Laws – relationship between current, voltage and power – Resistors in series, parallel and series -parallel circuits

UNIT - IV FUNDAMENTALS OF DC AND AC CIRCUITS **9**

DC Circuits: Sources of Electrical Energy - Independent and Dependent Source, Source Conversion - Star –Delta conversion- Mesh and Nodal Analysis.
AC Circuits: Generation of sinusoidal - voltage, average - RMS value, form factor and peak factor- Phasor diagrams of R, L, C, combination of R-L, R-C and R-L-C circuits

UNIT–V SEMICONDUCTOR DEVICES AND SWITCHING THEORY **9**

Semiconductor Devices - Overview of Semiconductors - basic principle, operation and characteristics of PN diode, zener diode, BJT, JFET -Number systems – binary codes - logic gates - Boolean algebra, laws & theorems - simplification of Boolean expression - implementation of Boolean expressions using logic gates.

TOTAL HOURS: 45 PERIODS

COURSE OUTCOMES

Upon Completion of this course, students will be able to:

CO1: Know the usage of surveying and properties of construction materials.
CO2: Understand the stress strain of various building and material such as substructure, road transport and bridge.
CO3: Recognize the different combinations of circuit elements and solving the circuit by applying basic circuital laws.
CO4: Acquire a good understanding of DC and AC circuits.
CO5: Demonstrate the characteristics of semiconductor devices.

TEXT BOOKS

1. Ranganath G and Channankaiah, "Basic Engineering Civil & Mechanical", S.S.Publishers, 2014.
2. Ramamrutham. S, "Basic Civil Engineering", Dhanpat Rai Publishing Co. (P) Ltd, 3rd Edition reprint, 2013.
3. Muthusubramanian R, Salivahanan S, "Basic Electrical and Electronics Engineering", Tata McGraw Hill Education Private Limited, 2010.
4. M. Morris Mano, Digital Design, 3rd Edition, Prentice Hall of India Pvt. Ltd., 2003 / Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003.

REFERENCE BOOKS

1. Shanmugasundaram. S and Mylsamy. K, "Basics of Civil and Mechanical Engineering", Cenage Learning India Pvt.Ltd, New Delhi, 2012.
2. Shanmugam G and Palanichamy M S, "Basic Civil and Mechanical Engineering", Tata McGraw Hill Publishing Co., New Delhi, 3rd Edition, 2012.
3. B.L.Theraja, A.K.Theraja, "A Text Book of Electrical Technology, Volume I ", S.Chand and company Ltd., 2006.
4. Robert L. Boylestad and Louis Nashelsky, Electronic Devices and Circuit Theory, 9th Edition, Pearson Education / PHI, 2007.

Course Outcome		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Co1	Know the usage of surveying and properties of construction materials.	3	1	2	2									3		1
Co2	Understand the stress strain of various building and material such as substructure, road transport and bridge.	1		1			2							3		1
Co3	Recognize the different combinations of circuit elements and solving the circuit by applying basic circuital laws.	3	1		2									3		1
Co4	Acquire a good understanding of DC and AC circuits.	2	1	2										3		
Co5	Demonstrate the characteristics of semiconductor devices.	2	1	2										3		1

118CYP07	ENGINEERING CHEMISTRY LABORATORY	L	T	P	C
		0	0	2	1

COURSE OBJECTIVE:

- Students will be conversant with the estimation of various compounds using volumetric and instrumental analysis.

LIST OF EXPERIMENTS

1. Estimation of Total hardness by EDTA
2. Determination of percentage of calcium in Lime Stone by EDTA
3. Estimation of chloride in water sample
4. Estimation of alkalinity of Water sample
5. Determination of DO in Water (Winkler's Method)
6. Determination of Rate of Corrosion of the given steel specimen by weight loss method (Without inhibitor)
7. Determination of Rate of Corrosion of the given steel specimen by weight loss method (With inhibitor)
8. Conduct metric titration (Simple acid base)
9. Conduct metric titration (Mixture of weak and strong acids)
10. Conduct metric titration using $BaCl_2$vs Na_2 SO_4
11. Potentiometric Titration (Fe^{2+} / $KMnO_4$ or $K_2Cr_2O_7$)
12. PH titration (acid & base)
13. Determination of water of crystallization of a crystalline salt -Copper sulphate
14. Preparation of Bio-Diesel by Trans etherification method.

A minimum of TEN experiments shall be offered.

TOTAL HOURS: 45 PERIODS

COURSE OUTCOMES:

CO1: Carry out the volumetric experiments and improve the analytical skills.
CO2: Understand the maintenance and usage of analytical instruments and thereby develop their skills in the field of engineering.
CO3: Understand the principle and handling of electrochemical instruments and Spectrophotometer
CO4: Apply their knowledge for protection of different metals from corrosion by using different inhibitors

REFERENCE BOOKS:

1. Arthur I. Vogel's, "Quantitative Inorganic Analysis including Elementary Instrumental Analysis", ELBS, Group, 7th Edition, 2000.
2. Dr. K .Sivakumar, "Engineering Chemistry lab manual", S.S publishers, 2016.

Course Outcome		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Co1	Carry out the volumetric experiments and improve the analytical skills.	3	3								2			3		1
Co2	Understand the maintenance and usage of analytical instruments and thereby develop their skills in the field of engineering.	3	3		2									3		1
Co3	Understand the principle and handling of electrochemical instruments and Spectrophotometer	3	3		2	3		2			3			3		1
Co4	Apply their knowledge for protection of different metals from corrosion by using different inhibitors	3	3		3	2								3		1
Co5	Demonstrate the characteristics of semiconductor devices.	3	3								1			3		1

118EPP07 **ENGINEERING PRACTICE LABORATORY**

L	T	P	C
0	0	2	1

COURSE OBJECTIVES:

1. To get the knowledge on welding techniques and its types.
2. To do the fitting operation on a given material. (Specimen)
3. To carry out sheet metal operation.
4. To know the principle involved in plumbing work.
5. To do the carpentry work on a given work piece.

LIST OF EXPERIMENTS

WELDING:

Study of Electric Arc welding and Gas welding tools and equipment's.

Preparation of Arc welding and Gas welding models:

i) Butt joint ii) Lap joint iii) T - joint.

FITTING:

Study of fitting tools and operations.

Preparation of fitting models: i) V-fitting ii) Square fitting

SHEET METAL WORK:

Study of sheet metal tools and operations

Preparation of sheet metal models: i) Rectangular Tray ii) Funnel

PLUMBING WORKS:

Study of pipeline joints and house hold fittings.

Preparation of plumbing models: Basic pipe connections with PVC and GI pipe fittings.

CARPENTRY:

Study of wooden joints and tools used in roofs, doors, windows, furniture.

Preparation of carpentry models:

i) Lap joint ii) Dovetail joint iii) T-Joint

DEMONSTRATION ON:

ELECTRICAL ENGINEERING PRACTICE

Study of Electrical components and equipments

Residential house wiring using switches, fuse, indicator, lamp and energy meter.

ELECTRONICS ENGINEERING PRACTICE

Study of Electronic components –Resistor, color coding, capacitors etc

Soldering practice –components soldering in simple electric circuit & testing continuity

COMPUTER HARDWARE AND SOFTWARE PRACTICE

Study of PC Hardware, Internet & World Wide Web and Productivity tools including Word, Excel, Power Point and Publisher.

TOTAL HOURS: 45 PERIODS

COURSE OUTCOMES

The students will be able to

CO1: Prepare simple Lap, Butt and T- joints using arc welding equipments.
CO2: Prepare the rectangular trays and funnels by conducting sheet metal operation.
CO3: Prepare the pipe connections and identify the various components used in plumbing.
CO4: Prepare simple wooden joints using wood working tools.
CO5: Demonstrate basic electrical, electronic and computer components based on their physical parameters and dimensions.

TEXT BOOKS

1. Ranganath. G & Channankaiah, "Engineering Practices Laboratory Manual", S.S. Publishers, 2014.
2. Jeyapoovan.T & Gowri S "Engineering Practice Lab Manual", Vikas publishing house pvt.ltd, 2016.

REFERENCE BOOKS

1. Kannaiah.P & Narayana.K.L, "Manual on Workshop Practice", Scitech Publications, 2015.
2. Ramesh BabuV, "Engineering Practices Laboratory Manual", VRB Publishers Private Limited, Chennai, Revised Edition, 2014.
3. Peter Norton, "Introduction to Computers", 7th Edition, Mc Graw Hill, 2010.
4. Bawa. H.S, "Workshop Practice", Tata McGraw – Hill Publishing Company Limited, 2009.
5. David Anfinson and Ken Quamme, "IT Essentials PC Hardware and Software Companion Guide", CISCO Press, Pearson Education, Third Edition, 2008.

Course Outcome		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Co1	Prepare simple Lap, Butt and T- joints using arc welding equipments.	1		2	2	1			1	1		1	1	1		2
Co2	Prepare the rectangular trays and funnels by conducting sheet metal operation.	2		2	2	1				1		1	1	1		2
Co3	Prepare the pipe connections and identify the various components used in plumbing.	1		1	2	1				1		1	1	1		2
Co4	Prepare simple wooden joints using wood working tools.	1		1	2	1				1		1	1	1		2
Co5	Demonstrate basic electrical, electronic and computer components based on their physical parameters and dimensions.	1		1	1	2				1		1	1	1		2

118PPP08 PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY L T P C
0 0 2 1

COURSE OBJECTIVE(S):

1. To write, test, and debug simple Python programs.
2. To implement Python programs with conditionals and loops.
3. Use functions for structuring Python programs.
4. Represent compound data using Python lists, tuples, dictionaries.
5. Read and write data from/to files in Python.

LIST OF PROGRAMS:

1. To Implement python scripts using Variables and operators
2. To Demonstrate Operator precedence to evaluate an expression
3. Display grade of a student using elif statement
4. Implement Floyd triangle using for loop
5. Checks the given number is prime or not using while loop
6. Compute the GCD of Numbers using functions
7. Finding factorial of a given number using recursive function.
8. Takes a list of words and returns the length of longest one using strings
9. To perform linear and binary search using strings
10. To implement list as arrays (multiply 2 matrices)
11. To demonstrate use of list & related functions
12. To demonstrate use of tuple, set& related functions
13. To demonstrate use of Dictionary& related functions
14. Finding most frequent words in a text read from a file
15. Programs that take command line arguments (word count)

PLATFORM NEEDED

Python 3 interpreter for Windows/Linux

COURSE OUTCOMES:

Upon completion of the course, students will be able to:

1. Write, test, and debug simple Python programs.
2. Implement Python programs with conditionals and loops.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Identify the different components of a web page that can be used for mining	3			3	3										
CO2	Apply machine learning concepts to web content mining	3		1		3		3			3					
CO3	Design a system to collect information available on the web to build Recommendersystems	3		1					2		3					
CO4	Analyze social media data using appropriate data/web mining techniques	3	2		3			2	2		1					
CO5	Build a simple search engine using available open source tools	3			3	1			2							

218ENT01	COMMUNICATIVE ENGLISH	L T P C 2 0 2 3

COURSE OBJECTIVES:

The Course prepares first semester Engineering and Technology students:

- To help learners develop their listening skills which will enable them listen to lectures and comprehend them by asking questions; seeking clarifications.
- To help learners develop their speaking skills and speak fluently in real contexts.
- To develop the basic reading and writing skills of first year engineering and technology students.
- To help learners develop grammar and vocabulary of a general kind by developing their reading skills

UNIT I **09**

Listening - conversation - Speaking – introducing oneself - exchanging personal information - Reading – comprehension - Writing - paragraph - Vocabulary Development - synonyms and antonyms - Language Development – consonants & vowels - phonetic transcription.

UNIT II **09**

Listening - telephonic conversation - Speaking – sharing information of a personal kind – greeting - taking leave - Reading – short stories – The Gift of the Magi, A Service of Love and The Last Leaf by O. Henry – Writing – developing hints - Vocabulary Development – everyday vocabulary - Language Development – British and American English - infinitive and gerund.

UNIT III **09**

Listening – class memory quiz - Speaking – impromptu - Reading – magazines – Writing – agenda - proposals - Vocabulary Development - important words used in speaking and writing - Language Development – types of sentences - information and emphasis.

UNIT IV **09**

Listening – interviews of famous persons - Speaking – story narration - Reading – case study – Writing – invitation letter - quotation letter - Vocabulary Development – listening and reading vocabulary - Language Development – cause and effect – purpose and function.

UNIT V **09**

Listening - a scene from a film - Speaking - role play - Reading – jigsaw – Writing – essay writing - Vocabulary Development- business vocabulary - Language Development - degrees of comparison – real English phrases.

TOTAL HOURS: 45 PERIODS

COURSE OUTCOMES

At the end of the course learners will be able to:

CO1: Comprehend conversations and talks delivered in English.
CO2: Participate effectively in formal and informal conversations; introduce themselves and their friends and express opinions in English.
CO3: Read short stories, magazines, novels and other printed texts of a general kind.
CO4: Write short paragraphs, essays, letters and develop hints in English.
CO5: Write reports and winning job applications.

TEXT BOOKS

1. Board of Editors. Using English A Coursebook for Undergarduate Engineers and Technologists. Orient BlackSwan Limited, Hyderabad: 2015.
2. Richards, C. Jack. Interchange Students' Book-2, New Delhi: CUP, 2015.
3. Uttham Kumar, N. Communicative English (with work book). Sahana Publications, Coimbatore, 2019.

REFERENCE BOOKS

1. Bailey, Stephen. Academic Writing: A Practical Guide for Students. New York: Rutledge, 2011.
2. Comfort, Jeremy, et al. Speaking Effectively: Developing Speaking Skills for Business English. Cambridge University Press, Cambridge: Reprint 2011.
3. Dutt P. Kiranmai and Rajeevan Geeta. Basic Communication Skills, Foundation Books: 2013.
4. Means, L. Thomas and Elaine Langlois. English & Communication for Colleges. Cengage Learning, USA: 2007.
5. Redston, Chris & Gillies Cunningham. Face2Face (Pre-intermediate Student's Book & Workbook). Cambridge University Press, New Delhi: 2005.

Course Outcome		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Co1	Comprehend conversations and talks delivered in English.				1					2	3	1		1		
Co2	Participate effectively in formal and informal conversations; introduce themselves and their friends and express opinions in English.									1	3	1				
Co3	Read short stories, magazines, novels and other printed texts of a general kind.									1	1	1				
Co4	Write short paragraphs, essays, letters and develop hints in English.									1	3					1
Co5	Write reports and winning job applications.			3					2				1			

218MAT02	ENGINEERING MATHEMATICS-II	L	T	P	C
		3	1	0	4

COURSE OBJECTIVES:

- To revise the concept of integral calculus and introduce Beta and Gamma functions.
- To understand double and triple integration concepts.
- To study vector calculus comprising of surface and volume integrals along with the classical theorems involving them.
- To learn analytic functions and their properties and also conformal mappings with few standard examples those have direct applications.
- To grasp the basics of complex integration and application to contour integration which is important for evaluation of certain integrals encountered in engineering problems.

UNIT-I INTEGRAL CALCULUS 12

Definite and indefinite integrals - Substitution rule – Techniques of integration –Integration by parts – Trignometric integrals - Trigonometric substitutions - Integration of rational functions by partial fractions – Integration irrational functions - Beta and Gamma functions.

UNIT-II MULTIPLE INTEGRALS 12

Double integration – Cartesian and polar co-ordinates – Change of order of integration – Change of variables between Cartesian and polar coordinates –Triple integration in Cartesian co-ordinates – Area as double integral – Volume as triple integral.

UNIT-III VECTOR CALCULUS 12

Gradient, Divergence and Curl – Directional derivative – Irrotational and solenoidal, vector fields – Vector integration – Green's theorem in a plane, Gauss divergence theorem and Stokes' theorem (Statement and applications only) – Simple applications involving cubes and rectangular parallelopipeds.

UNIT-IV ANALYTIC FUNCTIONS 12

Functions of a complex variable – Analytic functions – Necessary conditions, Cauchy– Riemann equation and Sufficient conditions (Statement and applications only) – Harmonic and orthogonal properties of analytic function (Statement and applications only) – Harmonic conjugate – Construction of analytic functions – Conformal mapping: w= z+c, cz, 1/z, and bilinear transformation.

UNIT-V COMPLEX INTEGRATION 12

Complex integration – Statement and applications of Cauchy's integral theorem and Cauchy's integral formula – Taylor and Laurent expansions – Singular points –Residues – Residue theorem – Application of residue theorem to evaluate real integrals – Unit circle and semi-circular contour (excluding poles on boundaries).

TOTAL HOURS: 60 PERIODS

COURSE OUTCOMES:

At the end of the course the student will be able to

CO1: Apply the basic integration concepts and solve problems.
CO2: Determine the area and volume in 2-dimension and 3-dimension respectively using multiple integrals.
CO3: Expertise the concept of vector calculus and apply in core subjects.
CO4: Construct the analytic functions and conformal transformations of complex functions.
CO5: Evaluate the integrals using complex integration.

TEXT BOOK

1. Grewal. B.S., "Higher Engineering Mathematics", 44th Edition, Khanna Publications, Delhi, 2017.

REFERENCE BOOKS

1. James Stewart, "Stewart Calculus", 8th edition, 2015, ISBN: 9781285741550 /1285741552.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", tenth edition, Wiley India, 2011.
3. P.Kandasamy, K.Thilagavathy, K.Gunavathy, "Engineering Mathematics for first year", S.Chand & Company Ltd., 9th Edition, New Delhi, 2014.
4. V.Prameelakaladharan and G.Balaji, "Engineering Mathematics - II", Amrutha marketing, Chennai, 2017.

Course Outcome		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Co1	Apply the basic integration concepts and solve problems.	3	2											3	3	2
Co2	Determine the area and volume in 2-dimension and 3-dimension respectively using multiple integrals.	3	3											3	3	3
Co3	Expertise the concept of vector calculus and apply in core subjects.	3	3											3	3	3
Co4	Construct the analytic functions and conformal transformations of complex functions.	3	2											3	3	2
Co5	Evaluate the integrals using complex integration.	3	3											3	3	3

218GET03	ENVIRONMENTAL SCIENCE AND ENGINEERING	L	T	P	C
		2	0	0	2

COURSE OBJECTIVES:

- To study the nature and facts about environment.
- To finding and implementing scientific, technological, economic and political solutions to environmental problems.
- To study the interrelationship between living organism and environment.
- To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.
- To study the dynamic processes and understand the features of the earth's interior and surface.

UNIT I NATURAL RESOURCES **14**

Definition, scope and importance of environment – need for public awareness - Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over- utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles. Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

UNIT II ECOSYSTEMSAND BIODIVERSITY **8**

Concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers –energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity. Field study of common plants, insects, birds; Field study of simple ecosystems – pond, river, hill slopes.

UNIT III ENVIRONMENTAL POLLUTION **10**

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – solid waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides. Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT **7**

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns, case studies – role of non-governmental organization environmental ethics: Issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. – wasteland reclamation – consumerism and waste products – environment production act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act – enforcement machinery involved in environmental legislation- central and state pollution control boards- Public awareness.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT **6**

Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare – role of information technology in environment and human health – Case studies.

TOTAL HOURS: 45 PERIODS

COURSE OUTCOMES

CO1: Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course.

CO2: Public awareness of environmental is at infant stage.

CO3: Ignorance and incomplete knowledge has led to misconceptions

CO4: Development and improvement in std. of living has led to serious environmental disasters

TEXTBOOKS

1. Benny Joseph, Environmental Science and Engineering ', Tata McGraw-Hill, New Delhi, 2006.
2. Gilbert M. Masters, Introduction to Environmental Engineering and Science ', 2nd edition, Pearson Education, 2004.
3. Dr. G. Ranganath, Environmental Science and Engineering, Sahana Publishers, 2018 edition.

REFERENCE BOOK

1. Dharmendra S. Sengar, Environmental law ', Prentice hall of India PVT LTD, New Delhi, 2007.

Course Outcome		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Co1	Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course.	3			2	2		3			1			3	2	
Co2	Public awareness of environmental is at infant stage.	3				2		3						3	2	
Co3	Ignorance and incomplete knowledge has led to misconceptions	3	1					3						3	2	
Co4	Development and improvement in std. of living has led to serious environmental disasters	3		1	1			3						3	2	
Co5	Evaluate the integrals using complex integration.	3				2		3			2			3	2	

218EMT04 **ENGINEERING MECHANICS**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To understand the vectorial and scalar representation of forces and moments.
- To understand the static equilibrium of particles and rigid bodies both in two dimensions.
- To understand the concepts of centroids and moment of inertia of composite sections.
- To understand the principle of work and energy.
- To enable the students to comprehend the effect of friction on equilibrium.

UNIT I BASICS & STATICS OF PARTICLES **12**

Introduction-Units and Dimensions-Laws of mechanics - Lame's theorem, Parallelogram and Triangular law of forces, Polygon force, Resolution and Composition of forces, Equilibrium of a particle-Forces in space - Equilibrium of a particle in space-Equivalent systems of forces-Principle of transmissibility-Single equivalent force.

UNIT II EQUILIBRIUM OF RIGID BODIES **12**

Free body diagram-Types of supports and their reactions-Requirements of stable equilibrium-Moments and Couples, Moment of a force about a point and about an axis-Vectorial representation of couples-Varignon's theorem-Equilibrium of Rigid bodies in two dimensions- Equilibrium of Rigid bodies in three dimensions – Examples.

UNIT III PROPERTIES OF SURFACES AND SOLIDS **12**

Determination of Areas and Volumes-First moment of area and the centroid of sections - rectangle, circle, triangle from integration - T section, I section, Angle section, Hollow section by using standard formula, Second and product moments of plane area - Rectangle, triangle, circle from integration-T section, I section, Angle section, Hollow section by using standard formula, Parallel axis theorem and perpendicular axis theorem.

UNIT IV DYNAMICS OF PARTICLES **12**

Displacement, Velocity and Acceleration, their relationship, Relative motion- Rectilinear motion-Curvilinear motion, Newton's law-Work Energy Equation of particles-Impulse and Momentum-Impact of elastic bodies.

UNIT V FRICTION **12**

Frictional force - Laws of Coloumb friction - Simple contact friction - Rolling resistance - Belt friction - Ladder friction - wedge friction.

TOTAL HOURS: 60 PERIODS

COURSE OUTCOMES

The students will be able to

CO1: Explain the differential principle applies to solve engineering problems dealing with force, displacement, velocity and acceleration.

CO2: Find solution for problems related to equilibrium of particles.

CO3: Solve the Moment of inertia for different 2-D plane figures.

CO4: Analyze the forces in any structures.

CO5: Solve rigid body subjected to frictional forces.

TEXT BOOKS

1. Ramamrutham S, "Engineering Mechanics (S.I Units)", Dhanpat Rai Publications, 10th Edition, Reprint 2015.
2. Dr. Gujral I S, "Engineering Mechanics", Lakmi Publications, Second Edition, 2011.

REFERENCE BOOKS

1. Bhavikatti S, "Engineering Mechanics", New Age International Publisher, 4th Edition, 2014.
2. Khurmi R S, "Engineering Mechanics", S Chand Publisher, 20th Edition, 2012.
3. Dr. Bansal R K and Sanjay Bansal, "Engineering Mechanics", Lakshmi Publication, 7th Edition, 2011.
4. Rajput R K, "Engineering Mechanics", Dhanpat Rai Publications, 3rd Edition, 2005.

Course Outcome		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Co1	Explain the differential principle applies to solve engineering problems dealing with force, displacement, velocity and acceleration.		2											1		1
Co2	Find solution for problems related to equilibrium of particles.	1	1											2		
Co3	Solve the Moment of inertia for different 2-D plane figures.	1	2			1							1	1		1
Co4	Analyze the forces in any structures.	1	2	1	1	1							2	1		1
Co5	Solve rigid body subjected to frictional forces.	1	2	1										1		1

218BSE01	MATERIAL SCIENCE	L	T	P	C
		2	0	0	2

COURSE OBJECTIVES:

- To study the basic theory of structure of crystalline materials.
- To understand the essential principles of electrical properties of materials.
- To get the better knowledge of Physics of semiconductor materials.
- Become proficient in dielectric and nano materials.
- To understand the essential concepts of modern engineering materials.

UNIT I CRYSTAL PHYSICS **9**

Introduction and structure of atoms – Crystal structure: The space lattice and Unit Cell - Crystal Systems and Bravais lattice – Calculation of number of atoms per unit cell – Atomic radius – Coordination number – Packing factor for SC, BCC, FCC, HCP and Diamond cubic structure – NaCl, ZnS structures (qualitative).

UNIT II CONDUCTING MATERIALS **9**

Conductors - Classical free electron theory of metals - Expression for electrical conductivity - Expression for Thermal conductivity - Wiedemann-Franz law - Lorentz number - Draw backs of classical theory - Quantum theory - Fermi distribution function - Effect of temperature on Fermi distribution function - Density of energy states - carrier concentration in metals.

UNIT III SEMICONDUCTING MATERIALS **9**

Intrinsic Semiconductors - direct and indirect band gap semiconductors - Carrier concentration in intrinsic semiconductors - Fermi level - Variation of Fermi level with temperature – Electrical conductivity of intrinsic semiconductors – band gap determination - Extrinsic semiconductors - Carrier concentration in N-type & P-type semiconductors (qualitative) - Variation of carrier concentration with temperature – variation of Fermi level with temperature and impurity concentration - Electrical conductivity of extrinsic semiconductors.

UNIT IV DIELECTRIC MATERIALS AND NANOMATERIALS **9**

Dielectric materials: Dielectric constant – Dielectric loss - Electrical susceptibility- Electronic, ionic – orientational and space charge polarization – Frequency and temperature dependence of polarization – internal field – Claussius – Mosotti relation (derivation)

Nano materials: Synthesis-Plasma arcing- – Chemical vapour deposition – Electro deposition – Ball Milling – Properties of nanoparticles and their applications.

UNIT V NUCLEAR PHYSICS AND HEAT TRANSMISSION **9**

Nuclear fission-Nuclear fusion-nuclear reactors-classification-general features-efficiency-coolants moderators thermal reactors.

Heat conduction-Expression for thermal conductivity-Amount of heat flow through a plane wall in one direction-Determine the thermal conductivity –Lee's disc method for bad conductors.

TOTAL HOURS: 45 PERIODS

COURSE OUTCOMES

At the end of the course, the students will able to

CO1: Have the necessary understanding on the functioning of crystalline in solids of materials
CO2: Gain knowledge on classical and quantum electron theories, and energy band structures.
CO3: Acquire knowledge on basics of semiconductor physics and its applications in various devices.
CO4: Get knowledge on dielectric and nano materials and their applications.
CO5: Understand the basics of modern engineering materials.

TEXT BOOKS

1. Jasprit Singh, - Semiconductor Devices: Basic Principles, Wiley 2012.
2. Kasap, S.O. - Principles of Electronic Materials and Devices, McGraw-Hill Education, 2007.
3. Jayaprakash R.N,-Physics for engineers, Dhanam publications, 2018.
4. Kittel, C. - Introduction to Solid State Physics. Wiley, 2005.
5. Theraja B.L - Basic Electronics Solid State, S. Chand & Company Ltd, 2004.

REFERENCE BOOK

1. Garcia, N. & Damask, A. —Physics for Computer Science Students. Springer-Verlag, 2012.

Course Outcome		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Co1	Have the necessary understanding on the functioning of crystalline in solids of materials	3	3	2	1									2		1
Co2	Gain knowledge on classical and quantum electron theories, and energy band structures.	3	3	1	1									3		1
Co3	Acquire knowledge on basics of semiconductor physics and its applications in various devices.	3	3	1	1									3		1
Co4	Get knowledge on dielectric and nano materials and their applications.	3	3	1	1									3		1
Co5	Understand the basics of modern engineering materials.	3	2	1	1									3		1

218PHP07 **ENGINEERING PHYSICS LABORATORY**

L	T	P	C
0	0	2	1

COURSE OBJECTIVES:

- To understand the practical concepts of Interference and diffraction.
- To understand the concept of velocities of sound in different liquids.
- To get better knowledge of modulus of elasticity.
- To understand the concepts of thermal conductivity.
- To understand the concepts of viscosities of liquid

LIST OF EXPERIMENTS

1. (a) Determination of laser parameters – Wavelength.
   (b) Particle size determination using Diode Laser.
2. Determination of thickness of a thin wire-Air wedge method.
3. Determination of velocity of sound and compressibility of liquid- Ultrasonic interferometer.
4. Determination of wavelength of mercury spectrum-Spectrometer grating.
5. Determination of thermal conductivity of a bad conductor-Lee's disc method.
6. Determination of Young's modulus of the material –Non uniform bending.
7. Determination of viscosity of liquid – Poiseuille's method.
8. Spectrometer- Dispersive power of prism.
9. Determination of Young's modulus of the material - Uniform bending.
10. Tensional pendulum- Determination of Rigidity modulus.

TOTAL HOURS: 45 PERIODS

COURSE OUTCOMES

At the end of the course, the student will be able to

CO1: Understanding the moduli of elasticity by determining Young's modulus and Rigidity modulus of a beam and cylinder respectively.

CO2: Understanding the phenomenon of diffraction, dispersion and interference of light using optical component

CO3: Acquiring knowledge of viscosity by determining coefficient of viscosity of a liquid and measuring the parameters of ultrasound propagating through a liquid

CO4: Understanding the phenomenon of heat transfer through conductors and bad conductors by determining thermal conductivity.

Course Outcome		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Co1	Understanding the moduli of elasticity by determining Young's modulus and Rigidity modulus of a beam and cylinder respectively.	3	3	3	3	3								3		3
Co2	Understanding the phenomenon of diffraction, dispersion and interference of light using optical component	3	3	3	3	3								3		3
Co3	Acquiring knowledge of viscosity by determining coefficient of viscosity of a liquid and measuring the parameters of ultrasound propagating through a liquid	3	3	3	3	3								3		3
Co4	Understanding the phenomenon of heat transfer through conductors and bad conductors by determining thermal conductivity.	3	3	3	3	3								3		3

218PPP08 **PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY**

L	T	P	C
0	0	2	1

COURSE OBJECTIVES:

- To write, test, and debug simple Python programs.
- To implement Python programs with conditionals and loops.
- Use functions for structuring Python programs.
- Represent compound data using Python lists, tuples, dictionaries.
- Read and write data from/to files in Python.

LIST OF PROGRAMS

1. To Implement python scripts using Variables and operators
2. To Demonstrate Operator precedence to evaluate an expression
3. Display grade of a student using elif statement
4. Implement Floyd triangle using for loop
5. Checks the given number is prime or not using while loop
6. Compute the GCD of Numbers using functions
7. Finding factorial of a given number using recursive function.
8. Takes a list of words and returns the length of longest one using strings
9. To perform linear and binary search using strings
10. To implement list as arrays (multiply 2 matrices)
11. To demonstrate use of list & related functions
12. To demonstrate use of tuple, set& related functions
13. To demonstrate use of Dictionary& related functions
14. Finding most frequent words in a text read from a file
15. Programs that take command line arguments (word count)

PLATFORM NEEDED

Python 3 interpreter for Windows/Linux

TOTAL HOURS: 45 PERIODS

COURSE OUTCOMES

Upon completion of the course, students will be able to:

CO1: Write, test, and debug simple Python programs.

CO2: Implement Python programs with conditionals and loops.

CO3: Develop Python programs step-wise by defining functions and calling them.

CO4: Use Python lists, tuples, dictionaries for representing compound data.

CO5: Read and write data from/to files in Python.

Course Outcome		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Co1	Write, test, and debug simple Python programs.	3	3	3												
Co2	Implement Python programs with conditionals and loops.	3	3	3				1				1				
Co3	Develop Python programs step-wise by defining functions and calling them.	3	3	3						1				1		
Co4	Use Python lists, tuples, dictionaries for representing compound data.	3	3	3	1											
Co5	Read and write data from/to files in Python.	3	3	3												

318MAT01 ENGINEERING MATHEMATICS - III L T P C
3 1 0 4

COURSE OBJECTIVES

- To learn various methods to solve the partial differential equations.
- To introduce Fourier series analysis which plays a vital role in many applications in engineering.
- To understand the boundary value problems and to obtain the solution using partial differential equations.
- To acquaint the student with Fourier transform techniques used in wide variety of situations.
- To develop z-transform techniques which analyze the discrete time signals.

UNIT I PARTIAL DIFFERENTIAL EQUATIONS 9+3

Solutions of first order partial differential equations-Standard types-Singular solutions-Lagrange's Linear equation-Method of grouping and Method of multipliers-Solution of homogeneous and non-homogenous linear equations of second and higher order with constant coefficients.

UNIT II FOURIER SERIES 9+3

Dirichlet's conditions – General Fourier series – Change of scale - Odd and even functions – Half-range Sine and Cosine series – Parseval's identity applications – Harmonic Analysis.

UNIT III BOUNDARY VALUE PROBLEMS 9+3

Classification of Partial Differential Equations – Method of separation of Variables – Solutions of one dimensional wave equations and One-dimensional heat equations –Applications using Fourier series solutions in Cartesian coordinates - Steady state solution of two-dimensional heat equation.

UNIT IV FOURIER TRANSFORM 9+3

Fourier integral theorem – Fourier transform pair - Sine and Cosine transforms – Properties – Fourier Transform ofsimple functions – Convolution theorem (statement and applications only) – Parseval's identity (statement and applications only).

UNIT V Z – TRANSFORM 9+3

Z-Transform - Elementary properties and applications – Initial and final value theorems (Statement and applications only) - Inverse Z-Transform – Partial fractions method, Residue theorem method and Convolution theorem (statement and applications only) - Solution of difference equations by applying Z-transforms.

TOTAL: 45+15=60 PERIODS

Course Outcomes

After completing this course, the student will be able to

CO 1: Know the methods to solve partial differential equations occurring in various physical and engineeringproblems.

CO 2: Describe an oscillating function which appear in a variety of physical problems by Fourier series helps themto understand its basic nature deeply.

CO 3: Acquire the knowledge to construct partial differential equations with initial and boundary conditions for various physical and engineering real time problems and obtaining solution using Fourier series methods.

CO 4: Understand the effect of Fourier transform techniques and their applications.

CO 5: Gain the concept of analysis of linear discrete system using Z-transform approach.

TEXT BOOK

1. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publications, 43rd edition, 2015.

REFERENCES

- Andrews L.C and Shivamoggi. B.K., "Integral Transforms for Engineers", SPIE Press Book, 1999
- Wylie C R and Barrett L C, "Advanced Engineering Mathematics", 6th Edition, McGraw-Hill Co., New Delhi, 1995.
- Erwin Kreyszig, "Advanced Engineering Mathematics", 10th Edition Wiley India, 2016.
- V.Prameelakaladharan and G.Balaji ,"Engineering Mathematics-III", Amrutha marketing, Chennai,2016.
- T.Veerarajan,"Engineering Mathematics-III", Tata McGraw-Hill Publishing company, New Delhi,2015.
- P.Kandasamy, K.Thilagavathy, K.Gunavathy, " Engineering Mathematics-III", S.Chand Publishers,2015.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Know the methods to solve partial differential equations occurring in various physical and engineering problems.	3		1	3	3										1
CO2	Describe an oscillating function which appear in a variety of physical problems by Fourier series helps themto understand its basic nature deeply	3			3	3										1
CO3	**:** Acquire the knowledge to construct partial differential equations with initial and boundary conditions for various physical and engineering real time problems and obtaining solution using Fourier series methods.	3		1	3	3	2									2
CO4	Understand the effect of Fourier transform techniques and their applications	3			3	3										1
CO5	Understand the effect of Fourier transform techniques and their applications	3	2		3	3										1

318CIT02 DIGITAL ELECTRONICS L T P C

3 0 0 3

COURSE OBJECTIVE(S):

At the end of the course ,the students should be able to:

- Introduce basic postulates of Boolean algebra and shows the correlation betweenBoolean expressions
- Outline the formal procedures for the analysis and design of combinational circuitsand sequential circuits
- Discuss the concept of memories and programmable logic devices.
- Illustrate the concept of synchronous and asynchronous sequential circuits.
- Interpolate the concept of Programming inVHDL.

Prerequisites:Nil

UNIT – I BOOLEAN ALGEBRA AND LOGIC GATES

Review of binary number systems - Binary arithmetic – Binary codes – Boolean algebra and theorems - Boolean functions – Simplifications of Boolean functions using Karnaugh map and tabulation methods –Logic gates.

UNIT – II COMBINATIONAL LOGIC

Combinational circuits – Analysis and design procedures - Circuits for arithmetic operations – Codeconversion - Decoders and encoders - Multiplexers and demultiplexers–Comparator.

UNIT – III SYNCHRONOUS AND ASYNCHRONOUS SEQUENTIAL LOGIC

Sequential circuits – Flip flops – Analysis and design procedures - State reduction and state assignment -Shift registers – Counters Analysis and design of asynchronous sequential circuits - Reduction of state and flow tables – Hazards-Hazard free realizations.

UNIT – IV PROGRAMMABLE LOGIC DEVICES, MEMORY ANDLOGIC FAMILIES

Memories: ROM, PROM, EPROM, PLA, PLD, FPGA, Introduction to Flash Memory. Digital LogicFamilies: TTL, ECL, CMOS.

UNIT – V PROGRAMMING WITH VHDL

VHDL program structure-operators-Data flow modeling-Design of combinational and sequential circuits-examples:Adders,subtractors,multiplexers/Demultiplexers,Encoder/Decoder,FF's,Counters).

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

Upon Completion of this course, students will be able to :

- Solve the Postulates of Boolean algebra using different techniques
- Design the Combinational and sequential circuits
- Apply the concept of synchronous and asynchronous circuit
- Summarize the concept of memories and programmable logic devices.Knowledge in VHDL for VLSI Design

TEXT BOOK (S) :

1. M.Morris Mano, "Digital Design", 3rd edition, Pearson Education, 2007.

REFERENCE(S) :

1. Charles H.Roth, Jr. "Fundamentals of Logic Design", 4th Edition, Jaico Publishing House, Latest Edition.
2. Donald D.Givone, "Digital Principles and Design", Tata McGraw-Hill, 2007
3. Charles H.Roth,Lizy Kurian John,"Digital System Design using VHDL"2nd edition PWS PublishingCompany,2008

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Solve the Postulates of Boolean algebra using different techniques	3		1	3	2	3	1	1		1				1	
CO2	Design the Combinational and sequential circuits	3			3	2	3	1	1		1				1	
CO3	Apply the concept of synchronous and asynchronous circuit	3		1	3	2	3	1	1		1				1	
CO4	Summarize the concept of memories and programmable logic devices.Knowledge in VHDL for VLSI Design	3	2		3	2	3	1	1		1				1	

318CST03 DATABASE MANAGEMENT SYSTEM

L T P C

3 0 0 3

OBJECTIVE(S):

- Learn the fundamentals of data models and conceptualize and depict a database system using ERdiagram.
- Make a study of SQL and relational database design.
- Know the fundamental concepts of transaction processing, concurrency control techniques and recovery procedure.
- To know the internal storage structures, indexing and advanced database concepts.

Prerequisites: Nil

UNIT-I INTRODUCTION **7**

Purpose of Database System – Views of data - Database Languages – Data Models – Database SystemArchitecture – Database users and Administrator – Entity Relationship model (E-R Model) – E-R Diagrams.

UNIT-II RELATIONAL MODEL 9

The relational Model – The catalog - Types of Keys - Relational Algebra – Domain Relational Calculus –Tuple Relational Calculus - SQL fundamentals – Additional Basic Operations – **Set Operations –Join Operations - Aggregate Functions** – **Nested Sub Queries** - Integrity – Triggers - Security & Authorization – Embedded SQL– Dynamic SQL - Views.

UNIT-III DATABASE DESIGN 9

Functional Dependencies – Non-loss Decomposition– First, Second, Third Normal Forms & Dependency Preservation – Boyce / Codd Normal Form - Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form.

UNIT-IV TRANSACTION MANAGEMENT 9

Transaction Concepts - Transaction Recovery – ACID Properties – System Recovery – Two Phase Commit – Save Points – Concurrency Control – Locking Based Protocols – Deadlock Handling – **TimestampBased Protocols** - Serializability – **Transaction as SQL statements.**

UNIT-V STORAGE STRUCTURES 11

Overview of Physical Storage Media – Tertiary storage – RAID - File Organization – Organization of Records in Files – Indexing and Hashing – Ordered Indices – B tree - B+ tree Index Files – Static Hashing – Dynamic Hashing – Query Processing Overview – Measures of query cost – Database Tuning - OODB & XML Databases – **Introduction to Distributed Databases.**

TOTAL HOURS: 45 PERIODS

COURSE OUTCOMES:

At the end of the course student should be able to

CO1: Gain and design extensive knowledge on various data models and ER diagram.

CO2: Recognize and develop sophisticated queries and authorization techniques to extract information .from database

CO3: Analyze and eliminate all kind of dependency in a database schema via normalization .techniques.

CO4: Apply concurrency control and recovery mechanism.

CO5: Understand the internal storage structures using different file and indexing techniques& advanced database concepts

TEXT BOOKS:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, 7th Edition, TataMcGraw Hill, 2019.
2. C.J.Date, A.Kannan, S.Swamynathan, “An Introduction to Database Systems”, 8th Edition, Pearson Education, 2012.

REFERENCE BOOKS:

1. Ramez Elmasri, Shamkant B. Navathe, “Database Systems”, 6th Edition, Pearson, 2014.
2. Raghu Ramakrishnan, J.Gehrke, “Database Management Systems”, 3rd Edition, McGraw Hill, 2014.
3. Shio Kumar Singh, “Database Systems Concepts, Design and Applications”, 2nd Edition, Pearson, 2011.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Gain and design extensive knowledge on various data models and ER diagram.	3				2		3	3							
CO2	Recognize and develop sophisticated queries and authorization techniques to extract information from database	3		1		2		3	2							
CO3	Analyze and eliminate all kind of dependency in a database schema via normalization techniques.	3				3		3	2							3
CO4	Apply concurrency control and recovery mechanism.	3	2			3		2	3							2
CO5	Understand the internal storage structures using different file and indexing techniques & advanced database concepts	3				2		3	2							

318CIT04 OBJECT ORIENTED PROGRAMMING IN C++ **L T P C**
3 0 0 3

OBJECTIVES:

- Demonstrate a thorough understanding of the object-oriented programming paradigms.
- Build C++ classes using appropriate encapsulation and design principles.
- Learn to use several oops concepts to create, debug and run simple C++ programs.
- To impart hands on experience to solve different problems using C++.

PREREQUISITE: Programming in C

UNIT-I INTRODUCTION **9**

Object-Oriented Paradigm - Merits and Demerits of OO Methodology – Object-Oriented Programming Concepts: Classes – Objects – Data abstraction and encapsulation – Inheritance – Polymorphism – Dynamic binding – Message Passing – C++ Fundamentals: Tokens – Expressions – Control Structures - Functions.

UNIT-II CLASSES AND OBJECTS **9**

Classes and Objects – Passing objects as arguments – returning objects – Friend functions – Inline function – Static data and member functions - Constructors - Parameterized constructor – Copy constructor – Destructor - Array of Objects – pointer to object members.

UNIT-III POLYMORPHISM AND INHERITANCE **9**

Polymorphism – Function overloading – Unary operator overloading – binary operator overloading – Data Conversion - Overloading with Friend Functions. Inheritance – Constructor in Derived class – Abstract Classes - Types of Inheritance.

UNIT-IV VIRTUAL FUNCTIONS, TEMPLATES AND STANDARD TEMPLATE LIBRARY **9**

Virtual functions – Need - Pure Virtual Functions – Virtual Destructors. Template – Class template, Function Template. **STL: Introduction algorithms – Sequence Containers – Iterators – Specialized Iterators – Associative Containers – Strong user-defined object – Function objects.**

UNIT-V FILES AND EXCEPTION HANDLING **9**

C++ streams – console streams – console stream classes - formatted and unformatted console I/O operations – Manipulators. File streams classes - File modes - File pointers and Manipulations - File I/O

– Exception handling - Exception handling Model – List of Exceptions – catch all Exception –uncaught Exceptions – **User Defined Exceptions**.

TOTAL HOURS: 45 PERIODS

COURSE OUTCOMES:

At the end of the course student should be able to

CO1: Describe the important concepts of Object Oriented Programming.

CO2: Identify the relationship between the classes and link them using appropriate concepts.

CO3: Develop solutions for given problems using Polymorphism and Inheritance concepts tosolve real world problems.

CO4: Devise generic classes capable of manipulating primitive and user defined data types.

CO5: Develop and implement File I/O operations and Exception handling mechanisms.

TEXT BOOK:

1. Robert Lafore, "Object Oriented programming in C++", 4th Edition, Techmedia Publication,2013.

REFERENCE BOOKS:

- Bjarne Stroustrup, "The C++ programming language", Addison Wesley, fourth edition, 2013.
- K R Venugopal, Rajkumar Buyya, "Mastering C++", 2nd Edition, McGraw Hill Education (India)Pvt. Ltd., 2013.
- Herbert Schildt, "The Complete Reference,C++"4th Edition, 2011.
- Paul J Deitel, Harvey M Deitel: "C++ for Programmers", Pearson Education, 2009.
- Stanley B.Lippmann, Josee Lajoie: "C++ Primer", 4th Edition, Addison Wesley, 2012.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Describe the important concepts of Object Oriented Programming	3				3		2	2							
CO2	Identify the relationship between the classes and link them using appropriate concepts	3		1		3		2	2							
CO3	Develop solutions for given problems using Polymorphism and Inheritance concepts tosolve real world problems.	3				3		2	2							3
CO4	Devise generic classes capable of manipulating primitive and user defined data types.	3	2			3		2	2							
CO5	Develop and implement File I/O operations and Exception handling mechanisms.	3		1		3		2	2							2

318CIT05 DATA STRUCTURES **L T P C**

3 0 0 3

COURSE OBJECTIVES

- Understand the need and fundamental concepts of List ADT.
- Acquire knowledge in Stack and Queue data structures.
- Explore Comprehensive knowledge of Trees and their implementations.
- Learn graph data structure to solve problems.
- Familiar with Sorting, Searching and Hashing algorithms.

PREREQUISITES: Programming in C

UNIT I LINEAR DATA STRUCTURES – LIST 6

Abstract Data Types - The List ADT - Array based Implementation - Linked list Implementation - Doubly Linked List - Circular Linked List - Applications of Linked List - Polynomial Operations

UNIT II LINEAR DATA STRUCTURES – STACKS AND QUEUES 9

The Stack ADT - Array Implementation - Linked List Implementation - Applications of Stack - Balancing Symbols - Postfix Expressions - Infix to Postfix Conversion - The Queue ADT - Array Implementation - Linked List Implementation - Circular Queue - Application of Queues.

UNIT III NON LINEAR DATA STRUCTURES – TREES 10

Preliminaries - Binary Trees - Array Implementation - Linked List Implementation - Tree Traversals - Expression Trees - Binary Search Tree - Operations on Binary Search Tree – AVL Trees - Heaps - Binary Heaps - Operations of Heaps -Binomial Queues - B-Tree -B^+ Trees.

UNIT IV NON LINEAR DATA STRUCTURES -GRAPHS 10

Representation of Graphs –BreadthFirst Traversal- Depth First Traversal - **Bi-connectivity – Cut vertex – Euler circuits**– Topological Sorting– Application of Graphs - Shortest Path Algorithm: Floyd Warshall - Bellman Ford - Dijkstra'sAlgorithm -Minimum Spanning Trees: Prim's Algorithm - Kruskal's Algorithm.

UNITV SEARCHING, SORTING AND HASH TECHNIQUES 10

Searching: Linear Search - Binary Search. **Sorting** : Insertion Sort - Selection Sort - Shell Sort - Bubble Sort - Quick Sort - Merge Sort - Radix Sort. **Hashing**: Hash Functions - Separate Chaining -Open Addressing - Rehashing - Extendible Hashing.

TOTAL HOURS: 45 PERIODS

COURSE OUTCOMES:

At the end of the course the students will be able to

CO1: Implement List ADT to solve real time problems.
CO2: Develop applications using Stack and Queues data structures.
CO3: Design and Implement applications on trees.
CO4: Implement graph data structure for solving problems.
CO5: Develop various Sorting, Searching and Hashing algorithms to small and large data sets.

TEXT BOOKS:

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Fourth Edition,Pearson Education, 2016.
2. Debasis Samanta, "CLASSIC DATA STRUCTURES", Second Edition, PHI LearningPrivate Limited Publishers, 2011

REFERENCES BOOKS:

1. Michael T.Goodrich ,Roberto Tamassia , David Mount,"Data Structures and Algorithms in C++", Second Edition, 2016.
2. Wisnu Anggoro ,"C++ Data Structures and Algorithms: Learn how to write efficient codeto build

scalable and robust applications in C++", 2018
3. Ellis Horowitz, Sartaj Sahani,Dinesh Mehta, "Fundamentals of Data Structures in C++",Second Edition,2008

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Implement List ADT to solve real time problems.	3				3	3		2							3
CO2	Develop applications using Stack and Queues data structures	3				3	3		2							3
CO3	Design and Implement applications on trees	3		1		3	3	1	2							3
CO4	Implement graph data structure for solving problems.	3				3	2	2	1							3
CO5	Develop various Sorting, Searching and Hashing algorithms to small and large data sets.	3	2			3	2	2	1							3

318CIT06 COMPUTER ORGANIZATION **L T P C**
3 0 0 3

COURSE OBJECTIVES:

- To have insight into the basic structure of computers.
- To understand the design and implementation of ALU.
- To comprehend the importance of the memory and I/O communication.
- To familiarize basic concepts of Parallelism.

PREREQUISITES: NIL

UNIT-I BASIC STRUCTURE OF COMPUTER SYSTEM **9**

Functional units – Basic operational concepts – Bus structures – Memory Locations and Addresses – Instructions and instruction sequencing - Addressing modes –**RISC and CISC -** Basic I / O Operations.

UNIT-II COMPUTER ARITHMETIC AND CONTROL UNIT **9**

Number Representation and Arithmetic Operations - Addition and Subtraction of Signed Numbers – Multiplication of Positive Numbers – Signed Operand Multiplication– Integer Division - Floating point Numbers and operations - Control Units - Fundamental concepts – Instruction Execution– Hardwired control – Micro programmed control.

UNIT-III PIPELINING **9**

Basic concepts – Data hazards – Instruction hazards - Unconditional branches – Conditional branches –Branch Prediction – Influence on instruction sets – Data path and control considerations - Super scalar operations – Performance considerations.

UNIT-IV MEMORY & I/O ORGANIZATION **9**

Basic concepts – Semiconductor RAM – ROM – Speed – Size and cost – Cache memories – **Performance Considerations of Cache memory - Virtual memory** - Accessing I/O devices – Interrupts – Direct Memory Access – Interface circuits – Standard I/O Interfaces: USB**, Firewire**.

UNIT-V PARALLELISM **9**

ILP – Concepts & Challenges – Compiler Techniques – Reducing branch costs – Dynamic scheduling - Parallel Processing and Performance- Hardware Multithreading – Flynn's Classification (SISD, MIMD, SIMD, SPMD) - Vector (SIMD) Processing - Shared-Memory Multiprocessors -Cache Coherence - Message-Passing Multi computers - Parallel Programming for Multiprocessors - Performance Modeling.

TOTAL HOURS: 45 PERIODS

COURSE OUTCOMES:

On completion of the course, the students will be able to:

CO1: Understand basic operational concepts of computers, ALU and Instructions.
CO2: Know the computer arithmetic and control unit operations.
CO3: Comprehend and analyze the Pipelined Execution.
CO4: Know the various Memory Systems and I/O Organization.
CO5: Understand Parallelism and Multiprocessor architectures.

TEXT BOOKS:

1. Carl Hamacher, ZvonkoVranesic and SafwatZaky&NaraigManjikian-"Computer Organizationand Embedded Systems", Sixth Edition, Tata McGraw Hill, 2012.
2. John L. Hennessey and David A. Patterson, - "Computer Architecture – A QuantitativeApproach", Morgan Kaufmann / Elsevier Publishers, Sixth Edition, 2017.

REFERENCE BOOKS:

- David A. Patterson and John L. Hennessy, -"Computer Organization and Design: The Hardware /Software interface", Fourth Edition, Elsevier, 2012.
- William Stallings, - "Computer Organization and Architecture – Designing for Performance",Tenth Edition, Pearson Education, 2016.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Understand basic operational concepts of computers, ALU and Instructions	3				2	3		2							2
CO2	Know the computer arithmetic and control unit operations.	3				2	3		2							2
CO3	Comprehend and analyze the Pipelined Execution.	3		1		2	3		2							2
CO4	Know the various Memory Systems and I/O Organization.	3				2	3		2							2
CO5	Understand Parallelism and Multiprocessor architectures	3	2			2	3		2							2

318CIP07 DIGITAL ELECTRONICS LABORATORY **L T P C**
0 0 2 1

COURSE OBJECTIVE(S):

At the end of the course ,the students should be able to:

- Identify the various functions of digital IC's.

- Demonstrate the various combinational circuits using logic gates.
- Design and Implement various sequential circuits using logic gates
- Develop VHDL code for various combinational
- Generate VHDL code for various sequential circuits.

LIST OF EXPERIMENTS

1. Verification of Boolean theorems using digital logic gates
2. Design and implementation of Adder/Subtractor, Encoders/Decoders,Code Converters usingbasic gates.
3. Design and implementation of 4-bit binary adder / subtractor using MSI Circuits.
4. Design and implementation of parity generator / checker using basic gates and MSI Circuits
5. Design and implementation of Magnitude Comparator
6. Design and implementation of Multiplexers/Demultiplexers
7. Design and implementation of Shift registers
8. Design and implementation of Synchronous and Asynchronous counters

VHDL PROGRAMMING

9. Simulation of Adder/Subtractor.
10. Simulation of Encoders/Decoders.
11. Simulation of Shift Registers.
12. Simulation of Counters.

COURSE OUTCOMES

Upon Completion of this course, students will be able to :

- Apply Digital ICs for various applications.
- Analyze the various combinational circuits using logic gates.
- Implement various sequential circuits using logic gates
- Write VHDL code for various combinational circuits
- Write VHDL code for various sequential circuits

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Apply Digital ICs for various applications.	3			3	2	3	1	1		1				1	
CO2	Analyze the various combinational circuits using logic gate	3			3	2	3	1	1		1				1	
CO3	Implement various sequential circuits using logic gates	3		1	3	2	3	1	1		1				1	
CO4	Write VHDL code for various combinational circuits	3			3	2	3	1	1		1				1	
CO5	Understand the internal storage structures using different file and indexing techniques & advanced database concepts	3	2		3	2	3	1	1		1				1	

318CSP08 DATABASE MANAGEMENT SYSTEMS LABORATORY **L T P C**
0 0 2 1

COURSE OBJECTIVE(S):

- Create database with different types of integrity constraints and use the SQL commandssuch as DDL, DML & DCL to access data from database.
- Learn to implement SQL join operations & functions, Views
- To know the fundamental concepts of procedures & reports
- To design a database using different tools

Pre requisites: NIL

LIST OF EXPERIMENTS:

OBJECTIVE(S):

- Create database with different types of integrity constraints and use the SQL commands such as DDL, DML & DCL to access data from database.
- Learn to implement SQL join operations & functions, Views
- To know the fundamental concepts of procedures & reports
- To design a database using different tools

Pre requisites: NIL

LIST OF EXPERIMENTS:

1. Create table for any schema & perform following operations
    1. Add new fields, modify table & fields, remove any record & empty using DDL Commands
    2. Add new record, remove old record & update fields using DML Commands
    3. Apply following constraints: Check, Default, Null, Primary & Foreign key
2. Create tables for any schema & perform Undo, Redo operations, User permission using DCL Commands
3. Create any two tables & convert into normalized form using
    1. Nested Queries
    2. Join queries
    3. Set Operations
4. Implement SQL functions such as Date, Character, general, Aggregate & number functions, etc…
5. Create trigger for update & modify database.
6. Implement PL/SQL Programs with Embedded SQL form
    1. Control structures using Loop, if-else, While & for loop
    2. Procedures to update & reflect in related tables
    3. Using Functions
7. Create Horizontal view, Vertical view & perform following operations add, remove, join, check view updates
8. Design any simple program using VB / VC++.
9. Develop menu design for any schema using VB.
10. Display database details with oracle reports using manual & design wizard option.
11. Design & develop any schema with front-end tools using VB/VC++ with Database connection.
12. **Study on Mongo DB.**

Total Hours: 30

COURSE OUTCOMES:

At the end of the course student should be able to

CO 1: Design and implement database schema for a given problem domain.

CO 2: Populate and query a database using SQL operations.

CO 3: Prepare reports.

CO 4: Design & develop an application using advanced databases.

LAB REQUIREMENTS:

HARDWARE AND SOFTWARE REQUIRED FOR A BATCH OF 30 STUDENTS:

Hardware:

30 Personal Computers

Software:

Front end : VB / VC ++

Back end : MySQL, Oracle 11g, MongoDB

Platform : Windows 2000 Professional/XP or higher

Oracle server could be loaded and can be connected from individual PCs

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Design and implement database schema for a given problem domain.	3				3	1	3	2							3
CO2	Populate and query a database using SQL operations.	3				3	2	2	2							2
CO3	Prepare reports.	3		1		3	2	2	2							2
CO4	Apply concurrency control and recovery mechanism.	3				3		3	2							3
CO5	Design & develop an application using advanced databases	3	2													

318CSP09 OOPS AND DATA STRUCTURES LABORATORY **L T P C**
0 0 2 1

COURSE OBJECTIVES:

- To learn object oriented programming concepts using C++ to solve problem.
- To implement various concepts of OOP using C++.
- Efficiently implement the different Linear Data Structures using C++
- Build knowledge on Application of Trees and Graphs
- Learn to implement Searching, Sorting and hashing Algorithms.

PREREQUISITES : Nil LIST OF

EXPERIMENTS:

Implement the following concept using C++ **14 Hours**

1. Simple C++ programs using control structures, arrays, class and objects.
2. Constructors, Destructors.

3. Method and Operator Overloading
4. Inheritance, Data conversions.
5. Virtual function and virtual base class.
6. Templates(Function and Class) and **STL**
7. File operations and Exception handling

Implement the following Data Structure Programs using C++` **16 Hours**

8. Linked List Implementation of Singly and Doubly Linked list.
9. Linked List Implementation of Stack and Queue
10. **Tree Traversal.**
11. Operation of Binary Search Tree.
12. **Graph Traversal.**
13. Applications of Graph (Dijikstras, Prims, Kruskal)
14. Searching and Sorting Algorithms
15. Hashing Techniques

Total Hours : 30

COURSE OUTCOMES:

At the end of the course student should be able to

CO1: Implement object oriented programming concepts.
CO2: Implement various file concepts, exception handling in object orientedProgramming
CO3: Implement programs for manipulating List, Stack and Queue ADT with itsApplications
CO4: Ability to apply and implement Tree and Graph Data Structures for Real TimeApplications.
CO5: Implement various Searching Sorting and Hashing Algorithms

LAB REQUIREMENTS:

HARDWARE AND SOFTWARE FOR A BATCH OF 30 STUDENTS

Hardware:

LAN System with 30 Nodes (OR) Stand-alone PCs -30 No's.Printer
– 3 No's.

Software:

OS: Windows / LinuxTurbo
C / C++.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Implement object oriented programming concepts.	3				3		2	2							
CO2	Implement various file concepts, exception handling in object oriented Programming	3				3		2	2							
CO3	Implement programs for manipulating List, Stack and Queue ADT with its Applications	3		1		3	3		2							3
CO4	Ability to apply and implement Tree and Graph Data Structures for Real Time Applications.	3	2			3	3	2	2							3
CO5	Implement various Searching Sorting and Hashing Algorithms	3				3	2	2	1							3

418DMT01 **DISCRETE MATHEMATICS**

L	T	P	C
3	0	0	4

Course Objectives:

- To master combinatorics which deals with the counting principles.
- To identify the basic properties of graph and model simple applications.
- To understand the concept of logic and hence to construct valid mathematical arguments.
- To expose the basic properties and concepts of algebraic structures.
- To introduce the concept of Lattices and Boolean algebra.

UNIT I COMBINATORICS 9+3

Mathematical Induction – The basics of Counting Principle - The Pigeonhole principle -Permutations and Combinations – Recurrence relations- Solving linear recurrence relations - Generating functions – Inclusion and exclusion principle.

UNIT II GRAPHS 9+3

Graphs – preliminaries - Types of graphs – properties – walks, trials and paths – Isomorphism of graphs – Matrix representations of graphs - Connectivity of a graph – Bipartitegraphs - Euler and Hamilton graphs - Colouring of graphs - Chromatic number of a graph.

UNIT III LOGICS AND PROOFS 9+3

Propositional Logic – Propositional equivalences - Predicates and quantifiers – Nested Quantifiers – Rules of inference - introduction to proofs – proof methods and strategy.

UNIT IV ALGEBRAIC STRUCTURES 9+3

Algebraic systems – Semi groups and monoids – Groups-Subgroups and homomorphisms – Cosets and Lagrange's theorem – Rings & Fields.

UNIT V LATTICES AND BOOLEAN ALGEBRA 9+3

Partial ordering – Posets – Lattices as Posets – Properties of lattices-Lattices as algebraicsystems – Sub lattices – direct product and Homomorphism – Some special lattices – Boolean algebra.

TOTAL HOURS =60 PERIODS

COURSE OUTCOMES

At the end of the course the student will be able to

CO 1: Understand and demonstrate the applications of basic concepts of an algorithm and counting principles in combinatorial mathematics.

CO 2: Acquaint the graph theory concepts which serves as the base for the real time applications in network analysis.

CO 3: Expertise the knowledge of logics helps to verify the correctness of computer programs and to draw conclusions from scientific experiments.

CO 4: Internalize the abstract algebraic structures which provides the ability to deal the theory of sequential machines, formal languages and syntactic analysis.

CO 5: Imbibe the concept of Lattices and Boolean algebra.

TEXT BOOKS:

1. T.Veerarajan, "Discrete Mathematics with Graph Theory and Combinatorics", TataMcGraw–Hill Pub. Co. Ltd, New Delhi.

REFERENCE BOOKS:

1. Kenneth H.Rosen, "Discrete Mathematics and its Applications", Seventh edition, SpecialIndian edition , Tata McGraw – Hill Pub. Co. Ltd., New Delhi, 2011.

2. Trembly J.P. and Manohar R, “Discrete Mathematical Structures with Applications toComputer Science”, Tata McGraw–Hill Pub. Co. Ltd, New Delhi, thirtieth re-print 2007.
3. Ralph. P. Grimaldi, “Discrete and Combinatorial Mathematics: An Applied Introduction”, Fourth Edition, Pearson Education Asia, Delhi, 2007.
4. Thomas Koshy, ``Discrete Mathematics with Applications”, Elsevier Publications, 2006.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	understand and demonstrate the applications of basic concepts of an algorithm and counting principles in combinatorial mathematics	3			3	3										1
CO2	acquaint the graph theory concepts which serves as the base for the real timeapplications in network analysis	3		1	3	3	2									1
CO3	Expertise the knowledge of logics helps to verify the correctness of computer Programs and to draw conclusions from scientific experiments.	3			3	3										1
CO4	Internalize the abstract algebraic structures which provides the ability to deal thetheory of sequential machines, formal languages and syntactic analysis.	3	2	1	3	3	1									1
CO5	Imbibe the concept of Lattices and Boolean algebra.	3			3	3										1

418CIT02 DESIGN AND ANALYSIS OF ALGORITHM

L	T	P	C
3	0	0	3

OBJECTIVE(S):

- Learn about Asymptotic Notations to solve Recurrence Equations.
- Understand various Algorithm Design Techniques like Divide and Conquer, Greedy Method, Dynamic Programming, Backtracking, Branch and Bound.
- Critically analyze the Efficiency of alternative Algorithm Solutions for Real World Problems.
- Learn about NP Class of Problems and their Variations.

Pre-requisites: Data Structures and Algorithms

UNIT-I INTRODUCTION TO ALGORITHM ANALYSIS **9**

Algorithm - Fundamentals of Algorithmic Problem Solving: Algorithm Design and Analysis Process - Algorithm Design Techniques - Methods of Specifying an Algorithm - Algorithm Analysis - Important Problem Types - Asymptotic Notations - Properties of Big-Oh Notation - Recurrence Equations - Solving Recurrence Equations: Substitution Method, Iteration Method - Master’s Method.

UNIT-II DIVIDE AND CONQUER AND GREEDY ALGORITHMS **10**

Divide and Conquer: General Method **-** Binary Search - Finding Maximum and Minimum - Merge Sort - **Quick Sort** - Greedy Algorithms: General Method - Single Source Shortest Path Problem - Container Loading - Knapsack Problem - Huffman Codes.

UNIT-III DYNAMIC PROGRAMMING AND ITERATIVE IMPROVEMENT **10**

Dynamic Programming: General Method - Multistage Graphs - All Pair Shortest Paths - Optimal Binary Search Trees - 0/1 Knapsack - Travelling Sales Person Problem. Iterative Improvement: The Maximum Flow Problem -

Maximum Matching in Bipartite Graphs - The Stable Marriage Problem.

UNIT-IV BACKTRACKING AND BRANCH AND BOUND 9

Backtracking: General Method - 8 Queens Problem - Sum of Subsets - Graph Coloring - Hamiltonian Circuit Problem - Knapsack Problem. Branch and Bound: Least Cost Search - The 15 Puzzle Problems - FIBO Branch and Bound - LC Branch and Bound - 0/1 Knapsack Problem - **Assignment Problem.**

UNIT-V NP-HARD AND NP-COMPLETE PROBLEMS 8

Basic Concepts: The Class NP-Hard and NP-Complete - **NP Hard Graph Problems - Clique Decision Problem - Node Cover Decision Problem - Chromatic Number Decision Problem - NP Hard Scheduling Problem - Flow Shop Scheduling - Job Shop Scheduling.**

TOTAL HOURS: 45 PERIODS

COURSE OUTCOMES:

At the end of the course the students are able to:

CO1: Design Algorithms for various Computing Problems.

CO2: Design and analyze algorithm using Divide and Conquer, Greedy Techniques

CO3: Solve and analyze problems using Dynamic programming and iterative improvement

CO4: Analyze back tracking and Branch and Bound algorithm

CO5: Identify any Problem as belonging to the Class of P and NP.

TEXT BOOKS:

1. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, Computer Algorithms /C++, Second Edition, Universities Press, 2007.
2. Anany Levitin, "Introduction to the Design and Analysis of Algorithms", Third Edition,Pearson Education, 2012.

REFERENCE BOOKS:

1. Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", Third Edition, PHI Learning Private Limited, 2012.
2. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, "Data Structures and Algorithms", Pearson Education, Reprint 2006.
3. Harsh Bhasin, "Algorithms: Design and Analysis", Oxford University Press, 2015.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Design Algorithms for various Computing Problems	3				2	2		1	2			1		1	
CO2	Design and analyze algorithm using Divide and Conquer, Greedy Techniques	3		1			2	2		1	2				2	
CO3	Solve and analyze problems using Dynamic programming and iterative improvement	3				2		2	2		2		2		1	
CO4	**A**nalyze back tracking and Branch and Bound algorithm	3		1			1			1	2		2			
CO5	Identify any Problem as belonging to the Class of P and NP.	3	2			2		1	2	1	2				1	

418CIT03 JAVA PROGRAMMING **L T P C**
3 0 0 3

OBJECTIVE(S):

- To learn the basic syntax and semantics of the Java language and programming environment.
- To understand error handling and multithreading concepts in java.
- Have the ability to write a simple GUI programs with Applet & Swing.
- Be aware of the importance of Utility Classes & Generic Classes.

Pre-requisites: Object Oriented Programming

UNIT -I INTRODUCTION TO JAVA **9**

Basic Concepts of Java- Features of Java - Difference between C++ and Java - Class fundamentals - Declaring Objects- Object Reference Variables - Introducing methods - Constructors – Input & Output - Type Conversions and Casting –**Introduction to Wrapper classes**- Arrays - Command line arguments - This keyword – static variables and methods. Polymorphism- Inheritance –Final class and Methods

UNIT-II PACKAGES & EXCEPTION HANDLING **9**

Abstract class and methods - Nested classes - Inner classes. **Interfaces**-Packages - Importing a Packages - Exception Handling: Exception Types - Uncaught Exceptions - Using Try Catch - Multiple Catch - Nested Try– Built in Exceptions - User defined Exceptions.

UNIT – III MULTITHREADING&STRING HANDLING **9**

Adapter classes - Thread Model - Synchronization – Interthread communication – String Handling: String functions - String class methods - Special String Operations - Character Extraction - String Comparison - Modifying a String - String Buffer –**String Builder**- Introduction to Collection Framework: **ArrayList – Map – Set**.

UNIT-IV DATABASE CONNECTIVITY, APPLET & SWING **9**

Accessing database using JDBC - Applet Architecture- Applet Lifecycle-Simple Applet - Introduction to Swings – JFrame – JLabels - JButtons – JComboBox - Event Handling: Event Delegation Model - Event Classes – Event Listener Interface.

UNIT-V UTILITY CLASSES & GENERIC CLASSES **9**

Utility Classes: String Tokenizer – BitSet – Date - Calendar - Gregorian – Random- Streams and Files –Byte stream - Character Streams - Stream I/O -**Scanner Class**– Serialization - Generic Class- Generic Method - Generic Interface.

TOTAL HOURS: 45 PERIODS

COURSE OUTCOMES:

At the end of this course, students are able to:

CO1: Develop Java Programs using OOPs Principles

CO2: Create a real-world application by applying the user defined packages, interfaces.

CO3: Implement multithreading concepts in real time scenarios.

CO4: Design a GUI-based application using Applets &Swings.

CO5: Understand the usage of Utility & Generic Classes.

TEXT BOOKS:

1. R.NageswaraRao, "Core Java An Integrated Approach(Includes all versions JAVA 8)",Dream tech Press, ISBN:978-8177228366,2013
2. C.Xavier, "Java Programming", 1st Edition, McGraw Hill Education, 2011.

REFERENCE BOOKS:

1. ShirishChavan, "Java for Beginners", 2nd Edition, Shroff Publishers and Distributors Pvt. Ltd,ISBN: 9789350237557, 2012
2. Kathy Sierra, Bert Bates, "Head First Java", 2nd Edition, O'Reilly Media, 2005.
3. H. Schildt, "Java: The complete Reference", 9th Edition, TataMcGrawHill, 2014.
4. Paul Deitel, Harvey Deitel, "Java How to Program",10th Edition, Pearson Education, 2016.
5. Cay S. Horstmann, "Core Java: Volume I- Fundamentals", 10thEdition, Prentice Hall, 2015.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Develop Java Programs using OOPs Principles	3			2	2	2	2	2				2			1
CO2	Create a real-world application by applying the user defined packages, interfaces	3			2	2	3	2	2						1	1
CO3	Implement multithreading concepts in real time scenerios	3				1		3	3							
CO4	Design a GUI-based application using Applets & Swings	3		1	1	1							3		2	2
CO5	Understand the usage of Utility & Generic Classes	3	2						3						2	2

418CIT04 OPERATING SYSTEM **L T P C**
3 0 0 3

OBJECTIVE(S):

- Acquire basic Knowledge on computer operating system structures andfunctioning
- Impart knowledge on scheduling, process synchronization anddeadlocks
- Be familiar with different memory management techniques and storagemanagement
- Understand I/O concepts and protection mechanisms in operatingsystems.

Pre-requisites: Nil

UNIT-I PROCESSESAND THREADS **9**

Introduction to Operating Systems – Computer System Organization – Computer System Architecture - Operating System Structures**:**OS Services - System Calls –**Types of System Calls** –SystemPrograms– SystemStructure.Processes:ProcessConcept–ProcessScheduling – Operations on Processes – Interprocess Communication – Communication in Client-Server Systems. Case study: IPC in Linux. Threads: Multi-threading models – Threading issues.

UNIT-II CPU SCHEDULING ANDPROCESS SYNCHRONIZATION **10**

CPU Scheduling: Scheduling criteria – Scheduling algorithms – Multiple-Processor Scheduling – Real Time Scheduling – Algorithm Evaluation. Case study: **CPU** Scheduling in Linux. Process Synchronization**:** The Critical-Section Problem –Synchronization Hardware – Semaphores – Classic Problems of Synchronization. Deadlock: System Model – Deadlock characterization – Methods for Handling Deadlocks – Deadlock Prevention – Deadlock Avoidance – Deadlock Detection – Recovery from Deadlock.

UNIT-III MEMORYMANAGEMENT **9**

Memory Management: **Basic Hardware-Address Binding-Logical Versus Physical Address Space** – Swapping – Contiguous Memory Allocation– Paging – Segmentation – Segmentation with Paging. Virtual Memory: Introduction – Demand Paging –– Copy on Write Page Replacement – Allocation of Frames – Thrashing. Case Study: Memory management in Linux.

UNIT-IV STORAGEMANAGEMENT 9

Mass-Storage Structure: Introduction– Disk Structure - Disk Attachment - Disk Scheduling – Disk Management – Swap-Space Management – RAID– Stable Storage. File-System Interface: File Concept – Access Methods – Directory and Disk Structure – File-System Mounting – File Sharing - Protection. File-System Implementation: Files- System Structure – Directoryimplementation – Allocation Methods – Free-Space Management – Efficiency and Performance – Recovery. Case Studies: File System inLinux

UNIT-V I/O SYSTEMSAND PROTECTION 8

I/O System Overview -I/O Hardware-Application I/O Interface –Kernel I/O Subsystem- Transforming I/O Requests to Hardware Operations-Streams-Performance. Protection: Goals of Protection – Principles of Protection – Domain of Protection – Access Matrix – Implementation of the Access Matrix – Access Control-Revocation of Access Rights – Capability Based Systems – Language Based Protection.

TOTAL HOURS: 45 PERIODS

COURSE OUTCOMES:

At the end of the course student should be able to:

CO1: Gain extensive knowledge and apply the concepts of process management**CO2:** Evaluate various **s**cheduling algorithms and methods of dead lock handling **CO3:** Compare variousmemory management and paging techniques.

CO4: Illustrate disk management functionalities and file systems.

CO5: Be familiar with I/O systems access methods and protection mechanism.

TEXT BOOK:

1. Silberschatz, Galvin, and Gagne, "Operating System Concepts", Ninth Edition,Wiley India Pvt. Ltd.,2013.

REFERENCE BOOKS:

1. Andrew S. Tanenbaum, "Modern Operating Systems", Fourth Edition, Pearson Education/PHI 2014.
2. Harvey M. Deital, Operating Systems", Third Edition, Pearson Education,2011.
3. D.M.Dhamdhere,"Operating System –A Concept Based Approach",ThirdEdition,TMH 2012.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Gain extensive knowledge and apply the concepts of process management	3				2	2	1	3							
CO2	Evaluate various **s**cheduling algorithms and methods of dead lock handling	3				2	2	2	3							
CO3	Compare variousmemory management and paging techniques.	3		1		2	2	1	3							
CO4	Illustrate disk management functionalities and file systems.	3	2			2	2	1	3							
CO5	Be familiar with I/O systems access methods and protection mechanism.	3							2							

418CST05 COMPUTER NETWORKS L T P C

3 0 0 3

OBJECTIVES:

- Grasp the principles of data communication and to learn various mediums used in Physical layer
- Understand the functions of Data link layers.
- Understand the networking concepts and different routing protocol
- Get familiarized with different Transport and application layer protocols.

Pre-requisites: Computer Architecture

-

UNIT I DATA COMMUNICATIONS &PHYSICAL LAYER 8

Introduction: Components –Data representation –Direction of Data flow – Networks: criteria and physical structure – **Network Types** –Protocols and Standards – Layered Tasks–ISO / OSI model and layers in the OSI model – Addressing. **Performance Metrics** - Transmission Media: Guided Transmission Media –Twisted pair – Coaxial Cable – Fiber Optics – Unguided Media – Radio waves – Microwaves–Infrared. Network Components: Connectors – Transceivers – Media converters –Network Interface card – PCcards.

UNIT II DATA LINKLAYER 10

Error Detection and Correction: Types of Errors–Redundancy– LRC – CRC –**Checksum**- Data Link Control: Flow and Error control Protocols: Stop and wait – **Stop and wait ARQ** - Go back-N ARQ – Selective repeat ARQ- Sliding window – HDLC. Media Access Control (MAC) – CSMA / CD - Wired LAN: Ethernet IEEE 802.3 –IEEE 802.4 – IEEE 802.5 – **Virtual LAN.**

UNIT III NETWORKLAYER 10

Logical Addressing: IPv4 Addresses – Ipv6 Addresses - Connecting Devices: Repeaters – Hubs – Bridges – Switches – Routers – Modems – Gateways - **Switching: Circuit Switching -** Packet Switching– Logical Addressing: IPv4 Addresses – Ipv6 Addresses - Internet Protocols: IPV4 – IPV6 - Unicast Routing Protocols: Distance Vector Routing – Link State Routing –Address Mapping: ARP, **RARP**- ICMP.

UNIT IV TRANSPORTLAYER 9

Process to process delivery –User Datagram Protocol (UDP) – Transmission Control Protocol (TCP) – Congestion Control Techniques– Congestion Prevention Policies - Quality of services (QoS) – **Techniques to improve QoS** - Integrated Services - **Differentiated Services**.

UNIT V APPLICATIONLAYER 8

Domain Name Space (DNS) – SMTP – POP3 – WWW - FTP – HTTP – SNMP – **SSO**

TOTAL HOURS: 45 PERIODS

COURSE OUTCOMES:

At the end of the course, the students are able to

CO1: Understand the fundamentals of data communication and networking
CO2: Explore various flow and error control protocols in data link layer.
CO3: Understand and evaluate the performance of various routing algorithms.
CO4: Analyze flow control and congestion control algorithm for QoS at end to end level.
CO5: Explore the features and operations of various application layer protocols.

TEXT BOOK:

1. Behrouz A. Forouzan, “Data communication and Networking”, Fifth Edition, Tata McGraw-Hill Publishing Co. Pvt., Ltd., New Delhi, 2013.

REFERENCE BOOKS:

1. Andrew S. Tanenbaum, “Computer Networks”, Fifth Edition PHI Learning, NewDelhi, 2016.
2. William Stallings, “Data and Computer Communication”, Tenth Edition, Pearson Education, New Delhi 2014.
3. Alberto Leon Garcia and IndraWidjaja, “Communication Networks Fundamental Concepts and key Architectures”, Second Edition, Tata McGraw-Hill Publishing Co. Pvt., Ltd., New Delhi,2009.
4. James F. Kurose and Keith W. Ross, “Computer Networking: A Top-Down Approach Featuring the Internet”, Fifth Edition, Pearson Education, New Delhi2012.
5. Larry L.Peterson and Peter S. Davie, “Computer Networks”, Fifth Edition Harcourt Asia Pvt. Ltd.,USA, 2011.
6. Prakash C Gupta, “Data Communications and Computer Networks”, Second Edition, PHI Learning Pvt. Ltd., New Delhi,2009.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Understand the fundamentals of data communication and networking	3			2				2					1	2	1
CO2	Explore various flow and error control protocols in data link layer	3		1	1			2						1	2	
CO3	Understand and evaluate the performance of various routing algorithms.	3			1			2	2					2	1	2
CO4	Analyze flow control and congestion control algorithm for QoS at end to end level	3	2		1			2						1		
CO5	Explore the features and operations of various application layer protocols.	3			1			2	2							2

418CIT06 SOFTWARE ENGINEERING **L T P C**
3 0 0 3

OBJECTIVE(S):

- Provide an overview of software engineering and software processmodels.
- Comprehend fundamental concepts of requirements engineering and requirements specification.
- Understand the different design techniques and software architecturalstyles.
- LearnVarious testing strategies and maintance measures

Pre-requisites:Nil

UNIT-I SOFTWARE PROCESS MODELS AND AGILEDEVELOPMENT 9

Introduction–The Nature of Software–The Changing Nature of Software -The Software Process- Process Models: The waterfall model –Incremental - Spiral - WINWIN Spiral -Evolutionary model – Prototyping - Object oriented - The Concurrent Development Model - Specialized ProcessModels - The Unified Process - **Introduction to Agility-Agile process- Extreme Programming - XP Process.**

UNIT-II REQUIREMENTSENGINEERING 8

Functional and Non-Functional Requirements - User requirements, System requirements, SoftwareRequirements

Document – Requirement Engineering Process**:** Feasibility Studies, Requirements Elicitation and Analysis - Requirements Validation - RequirementsManagement.

UNIT-III ANALYSIS AND DESIGNMODELING 10

The Analysis Concepts - Design Process and Concepts - Design Model - Design Heuristic - Architectural Design - Software Architectural - Architectural Styles - **Architectural Design for Web Apps and Mobile Apps** - User Interface Design - **User Interface Analysis and Design - WebApp and MobileApp Interface Design** - **Design Evaluation.**

UNIT-IV IMPLEMENTATION &TESTING 10

Programming Standards and Procedures - Programming Guidelines - Documentation- **Software Testing Strategies - Test Strategies for Conventional Software - Object Oriented Software -** Web App - Mobile App - Software Testing Fundamentals - Internal and External Views of Testing - White box Testing- Basis Path Testing-Control Structure Testing-Black Box Testing - Regression Testing -Unit Testing - Integration Testing - User Acceptance Testing - Validation Testing - System Testing and The Art of Debugging- Case Study**:** Software testing tool – Selenium.

UNIT-V SOFTWAREMAINTENANCE 8

Verification and Validation - Metrics for Process, Project and Product - ProcessImprovement- Risk Management - Software Maintenance - Business Process Reengineering - Software Reengineering - Reverse Engineering - Restructuring.

TOTAL HOURS: 45 PERIODS

COURSE OUTCOMES:

At the end of the course the students are able to

CO1: Compare and analyze the various life cycle models of software process.

CO2: Describe the process of requirement engineering and Feasibility Studies.

CO3: Prepare Software Requirement document and build requirement model then design themethods for software architecture.

CO4: Formulate various implementation and testing strategies in a system.

CO5: Familiarize various measurements for a software system and Software maintenance.

TEXT BOOKS

1. Roger S. Pressman, "Software Engineering: A Practitioner's Approach", 8th Edition,McGraw Hill International Edition, 2015Reprint
2. Ian Sommerville, "Software Engineering", 10th Edition, Pearson EducationAsia,2015.

REFERENCE BOOKS:

1. Shari Lawrence Pfleeger and Joanne M. Atlee, "Software Engineering: Theory andPractice", 4th Edition, Pearson Education,2010.
2. Watts S.Humphrey,"A Discipline for Software Engineering", Pearson Education,2007.
3. James F. Peters and WitoldPedrycz," Software Engineering, An EngineeringApproach", Wiley-India, 2007.
4. Stephen R.Schach, "Software Engineering", Tata McGraw-Hill Publishing CompanyLimited, 2007.
5. S.A.Kelkar,"Software Engineering", Prentice Hall of India Pvt,2007.
6. Zaigham Mahmood, Saqib Saeed: Software Engineering framework for the cloudcomputing Paradigms, Springer,2013.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Compare and analyze the various life cycle models of software process.	3			2	1			1	2					1	
CO2	Describe the process of requirement engineering and Feasibility Studies	3			2	1		1		2					1	
CO3	Prepare Software Requirement document and build requirement model then design themethods for software architecture.	3		1	2			1	1						1	
CO4	Formulate various implementation and testing strategies in a system.	3			1	2		1	1	1					2	
CO5	Familiarize various measurements for a software system and Software maintenance	3	2			1		2	2							

418CIP07 JAVA PROGRAMMING LABORATORY

L T P C
0 0 2 1

OBJECTIVE(S):

- To create Java programs that leverage the object-oriented features such as Abstraction, Inheritance and Interfaces.
- To implement error-handling techniques using exception handling.
- To create an event-driven GUI Applications using Swing components.
- To implement I/O functionality to read and write the files.

Pre-requisite: Object Oriented Programming

LIST OF EXPERIMENTS:

Solving Simple problems using

1. Class, Methods- use type casting and Static Members Concepts
2. Polymorphism: Method overloading & Constructor overloading
3. Inheritance (overriding)
4. Implement Packages – Use Abstract class and Final Keyword
5. Threads (single and multithreads) – Use Exception Handling Concepts
6. String Handling functions
7. **Collection Classes any one (ArrayList, Map and Set)**
8. File handling and I/O handling
9. Develop an application using Applet
10. Application Development using Swing, JDBC and Event handling techniques

TOTAL: 30 Hours

COURSE OUTCOMES:

Upon successful completion of this course, students should be able to:

CO1: Write a programs that use the fundamental program constructs, including packages & Interfaces.

CO2: Create &access database connection and handling exceptions.

CO3: Design a GUI-based event handling application using Applets &Swings.

CO4: Understand the I/O functionality to read & write in the files.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Write a programs that use the fundamental program constructs, including packages & Interfaces	3		1	2	2		2	2							
CO2	Create &access database connection and handling exceptions.	3			2	2	3	2	2							
CO3	Design a GUI-based event handling application using Applets &Swings.	3	2				2	3	3				2			1
CO4	Understand the I/O functionality to read & write in the files.	3			1								3			2

418CIP08 OPERATING SYSTEM LABORATORY **L T P C**
0 0 2 1

OBJECTIVE(S):

- Learn shell programming and the use of various system calls in the UNIX environment.
- Expose to process creation, scheduling and inter process communication.
- Be familiar with implementation of page replacement algorithms file allocations, memorymanagement and deadlock avoidance

Pre-requisites: Programming in C

LIST OF EXPERIMENTS:

(Implement the following on LINUX or other UNIX like platform. Use C for high level language implementation)

1. Basic Shell commands**.**
2. Write programs to implement File management and Directory management system calls of UNIX operating system (open (), close (), lseek(), read(), write(),mount, umount, link, unlink, mkdir, rmdir).
3. Write programs to implement Process management system calls of UNIX operating system (fork (), wait(), execlp(), exit(), signal(sig, handler), kill(sig, pid)).
4. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for CPU scheduling algorithms (preemptive and non preemptive). For each of the Scheduling policies, compute and print the average waiting time and average turnaround time.
5. Implementation of Inter Process Communication (using pipes/ shared memory/ message queues).
6. Implement the producer consumer problem using semaphores.
7. Implementation of deadlock avoidance & prevention algorithms.
8. Implementation of Memory management algorithms**.**
9. Implementation of page replacement algorithms.

10. Implementation of file allocation methods (linked/indexed/contiguous).
11. Implementation of disk scheduling algorithms.
12. Implementation of file organization techniques.

TOTAL: 30 Hours

COURSE OUTCOMES:

At the end of the course student should be able to

CO1: Implement basic services and functionalities of operating system using system call.

CO2: Implement various CPU scheduling algorithm and inter process communication andSemaphores.

CO3: Simulate Producer Consumer problem for process synchronization

CO4: Implement memory management and file allocation techniques algorithms.

CO5: Illustrate disk scheduling algorithms.

HARDWARE AND SOFTWARE REQUIRED FOR A BATCH OF 30 STUDENTS:

Hardware:

30 Personal Computers

Software:

Linux (Ubuntu/OpenSUSE/Fedora/Red Had /Debian/Mind OS) Linux could be loaded inindividual PCs (or)

Single server could be loaded with Linux and can be connected from individual PCs

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Implement basic services and functionalities of operating system using system call.	3				2	2	1	3							
CO2	Implement various CPU scheduling algorithm and inter process communication andSemaphores	3				2	2	1	3							
CO3	Simulate Producer Consumer problem for process synchronization	3		1		2	2	1	3							
CO4	Implement memory management and file allocation techniques algorithms.	3				2	2	1	3							
CO5	Illustrate disk scheduling algorithms.	3	2					1	2							

418CSP09 COMPUTER NETWOKS LABORATORY **L T P C**
0 0 2 1

OBJECTIVE(S):

- Get familiarized with socket programming
- Understand the basic networking commands
- Analyze the performance of protocols in different layers using simulation tools.

Prerequisite: Programming in C, Object Oriented Programming

LIST OF EXPERIMENTS:

1. Basic network command line utilities such as ping, netstat, tracert, nslookup, port scan, ARP, ipconfig.

Implement the following experiments in C/C++/Java:

2. Generate Hamming code for error detection and correction
3. Implement Error Detection code using CRC
4. Implementation of stop and wait protocol
5. Implementation of sliding window protocol
6. Implementation of UDP
7. Implementation of TCP

Implement the following experiments using simulator:

8. Study of Basic concepts of Network Simulator (NS2), its installation and working environment.
9. Using NS2 Network Simulation,
   i) Initialize & Network simulator object.
   ii) Group of Nodes to form a LAN
   iii) Delay of Link
   iv) Bandwidth of Link.

10. Simulate a four Duplex network and apply TCP agent between two nodes and UDP agents between other two nodes and by changing the parameters, determine the number of packets sent and dropped byTCP/UDP.
11. Simulate a wired network and measure the following performance metrics

    i) Throughput ii)Delay iii) PacketLoss

12. Implement Link State routing and Distance Vector routing measure the following performance metrics

    i) Throughput ii) Delay iii) PacketLoss

13. **Experiment on packet capture and network traffic using wire sharktool**.

TOTAL: 30 Hours

COURSE OUTCOMES:

At the end of the course student should be able to

CO1: Gain knowledge on the basic concepts of open source network simulator.

CO2: Analyze and implement various routing algorithms. **CO3:**
Simulate networks and analyze traffic using various tools.

CO4: Analyze the performance of protocols in different layers.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Gain knowledge on the basic concepts of open source network simulator	3			2				2					1		1
CO2	Analyze and implement various routing algorithms.	3		1	1			2						1		2
CO3	: Simulate networks and analyze traffic using various tools.	3	2		1			2	2					2		
CO4	Analyze the performance of protocols in different layers.	3			1			2	1					1		2

618CST01 **MOBILE APPLICATION DEVELOPMENT** **L T P C**
3 0 0 3

Prerequisites: Java Programming

OBJECTIVE(S):

- To learn the characteristics of mobile applications.
- To learn about the intricacies of UI required by mobile applications.
- To study about the design aspects of mobile application.
- To learn development of mobile applications.

UNIT –I GETTING STARTED WITH MOBILITY 9

Mobility landscape, Mobile platforms – Apple iPhone Platform- Google Android Platform – Eclipse Simulator, Mobile apps development, setting up the mobile app development environment along with an emulator - Case Study on Mobile App development.

UNIT-II BUILDING BLOCKS OF MOBILE APPS – I 9

App user interface designing – mobile UI resources (Layout, UI elements, Drawable Menu), Activity- states and life cycle, interaction amongst activities. App functionality beyond user interface - Threads, A Sync task, Services – states and lifecycle, Notifications.

UNIT-III BUILDING BLOCKS OF MOBILE APPS – II 9

Broadcast receivers, Telephony and SMS APIs , Native data handling – on-device file I/O, shared preferences, mobile databases such as SQLite, and enterprise data access (via Internet/Intranet)

UNIT-IV SPRUCING UP MOBILE APPS 9

Graphics and animation – custom views, canvas, animation APIs, multimedia –
Audio/video playback and record, location awareness, and native hardware access (sensors such as accelerometer and gyroscope)

UNIT-V TESTING MOBILE APPS AND TAKING APPS TO MARKET 9

Debugging mobile apps, White box testing, Black box testing, and test automation of mobile apps, JUnit for Android, Robotium, MonkeyTalk, Versioning, signing and packaging mobile apps, distributing apps on mobile market place.

TOTAL: 45

COURSE OUTCOMES:

At the end of the course students should be able to

CO1: Familiarize with Mobile apps development aspects.
CO2: Design and implement the user interfaces for mobile applications
CO3: Develop useful mobile applications using Google Android and Eclipse simulator.
CO4: Develop mobile applications using graphics and animation
CO5: Perform testing, signing, packaging and distribution of mobile apps

TEXT BOOK:

1. Anubhav Pradhan, Anil V Deshpande, "Mobile Apps Development", First Edition,Wiley India, (2013)

REFERENCE BOOKS:

1. Barry Burd , "Android Application Development All in one for Dummies", FirstEdition , Wiley India ,(2011)
2. Lauren Darcey , Shane Conder, "Teach Yourself Android Application Development In 24 Hours", Second Edition, Wiley India , (2012)

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Familiarize with Mobile apps development aspects .	3			3	1	3	2	3	2						
CO2	Design and implement the user interfaces for mobile applications	3		1		1		2		2						
CO3	Develop useful mobile applications using Google Android and Eclipse simulator	3	2		3	1	2	2	1							
CO4	Develop mobile applications using graphics and animation	3			2	1	3	2								
CO5	Perform testing, signing, packaging and distribution of mobile apps	3				1				1						

618CST02 COMPILER DESIGN L T P C
3 0 0 3

PREREQUISITES: Object Oriented Programming, Theory of Computation.

OBJECTIVES

- Understand the phases of compiler**.**
- Learn the role of a parser and different ways of recognizing and parsing of tokens.
- Perceive the various storage allocation techniques.
- Acquaint how to generate and optimize the code.

UNIT I INTRODUCTION TO COMPILER 9

Compilers - Structure of a Compiler - Role of lexical analyzer - Input Buffering - Specification of Tokens - Recognition of Tokens – Lexical-Analyzer Generator-**Finite Automata-Regular Expression to FA-Optimization of DFA.**

UNIT II SYNTAX ANALYSIS AND SYNTAX DIRECTED TRANSLATION 11

Role of the parser - Top Down parsing - Recursive Descent Parser - Predictive Parser - LL(1) Parser -Shift Reduce Parser - LR Parser – Operator Precedence - Construction of SLR Parsing table - LALR Parser – **Syntax Directed Definitions – Construction of Syntax Trees – S-AttributedDefinitions – L-Attributed Definitions**

UNIT III INTERMEDIATE CODE GENERATION 9

Intermediate Languages - Variants of syntax Tree-Generation of Three Address Code – Types and Declarations -Assignment Statements - Arrays - Boolean Expressions - Back patching - Case Statements - Procedure Calls.

UNIT IV RUN-TIME ENVIRONMENT AND CODE GENERATION 8

Storage Organization - Storage Allocation - Access to Non-Local Names –**Heap Management** -Issues in design of a code generator – The target machine – Instruction costs – Basic Blocks and Flow Graphs - A simple code generator

UNIT V CODE OPTIMIZATION 8

Introduction to optimization – Peephole Optimization-Principal Sources of Optimization – Optimization of Basic Blocks –. Global Data Flow analysis**-Constant Propagation-Partial Redundancy Elimination-loops in Flow Graphs**

TOTAL HOURS: 45

COURSE OUTCOMES

At the end of the course, the student should be able to:

CO 1: Understand the phases of compiler and recognize tokens from language specifications.
CO2: Create framework for syntax directed translation schemes, and parse the generated tokens.
CO3: Construct the intermediate code representation and generation
CO4: Develop a simple compiler by using different compiler construction tools
CO5: Apply the optimization technique to generated optimized code

TEXT BOOK

1. Alfred V. Aho, Monica S.Lam, Ravi Sethi, Jeffrey D.Ullman, —Compilers: Principles, Techniques and Tools, Second Edition, Pearson Education, 2014(reprint).

REFERENCES

1. Dhamdhere D M, “Compiler Construction Principles and Practice" second edition, MacmillanIndia Ltd., New Delhi, 2005.
2. Jean Paul Tremblay, Paul G Serenson, "The Theory and Practice of Compiler Writing",McGraw Hill, New Delhi, 2007.

3. Dick Grone, Henri E Bal, Ceriel J H Jacobs and Keen Gangendoen, Modern Compiler Design", John Wiley, New Delhi, 2009.

4. Steven S. Muchnick, "Advanced Compiler Design Implementation", First Edition Elsevier Science India, Morgan Kaufmann Publishers, 2008

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Understand the phases of compiler and recognize tokens from language specifications	3			1	3										
CO2	Create framework for syntax directed translation schemes, and parse the generated tokens.	3		1	1		2				3					
CO3	Construct the intermediate code representation and generation	3			1		2		3		2					
CO4	Develop a simple compiler by using different compiler construction tools	3	2	1	1	3	2		2		2					
CO5	Apply the optimization technique to generated optimized code	3			1	3	2									

618CIT03 DATA WAREHOUSING ANA DATA MINING L T P C
3 0 0 3

Perquisite : Database Management System

OBJECTIVE(S):

- To make familiar with the various concepts of data warehouse architecture, Online Analytical Processing (OLAP), Meta data, Data mart, and multidimensional data models.
- To sail along with the various approaches in data mining.
- To familiarize with data mining algorithms and its application in various fields.

UNIT-I DATA WAREHOUSE & OLAP TECHNOLOGY 8

Data Warehouse Overview - Multidimensional Data Model - Data Warehouse Architecture - Data Warehouse Implementation - Data Warehousing to Data Mining.

UNIT-II DATA MINING 9

Introduction - Kinds of data - Data Mining Functionalities - Interestingness of Patterns - Classification of Data Mining Systems - Data Mining Task Primitives - Integration of a Data Mining System with a Data Warehouse - Issues - Data Preprocessing.

UNIT-III ASSOCIATION RULE MINING 9

Mining Frequent Patterns- Associations and Correlations - Frequent item set Mining Methods – Mining Various Kinds of Association Rules - Correlation Analysis - Constraint Based Association Mining – Evolution Analysis

UNIT- IV CLASSIFICATION 9

Basic Concepts - Classification and Prediction - Issues - Decision Tree Induction – Bayesian Classification - Rule Based Classification - Classification by Back propagation - Support Vector Machines – Associative Classification - Prediction.

UNIT-V CLUSTERING AND APPLICATIONS AND TRENDS IN DATA MINING 10

Cluster Analysis - Types of Data - Categorization of Major Clustering Methods – k-Means - Partitioning Methods - Hierarchical Methods - Density-Based Methods - Grid Based Methods - Clustering High Dimensional Data - Outlier Analysis - Data Mining Applications – **Data mining and society** -Trends in Data Mining - Case study : WEKA Tool, Python Libraries.

TOTAL: 45

COURSE OUTCOMES:

At the end of the course, the student should be able to:

CO1: Have an extensive knowledge on concepts of data warehousing and differentiate OLTP and OLAP.

CO2: Discover and measure interesting patterns from different kinds of databases.

CO3: Apply the technique of association mining to solve real life problems.

CO4: Compare and contrast the various classifiers.

CO5: Explore recent trends in data mining and its applications.

TEXT BOOKS:

1. Jiawei Han and Micheline Kamber, “Data Mining Concepts and Techniques”, Third Edition,Elsevier, 2011.

REFERENCES BOOKS:

1. Alex Berson and Stephen J. Smith, “Data Warehousing, Data Mining & OLAP”, Tata McGraw –Hill
2. Edition, Tenth Reprint 2007.
3. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, “Introduction To Data Mining”, Pearson Education, 2007.
4. K.P. Soman, Shyam Diwakar and V. Ajay, “Insight into Data mining Theory and Practice”, Easter Economy Edition, Prentice Hall of India, 2006.
5. G. K. Gupta, “Introduction to Data Mining with Case Studies”, Easter Economy Edition, PrenticeHall of India, 2006.

Daniel T.Larose, “Data Mining Methods and Models”, Wile-Interscience, 2006

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Have an extensive knowledge on concepts of data warehousing and differentiate OLTP and OLAP.	3		1	1	2		2	3		1					
CO2	Discover and measure interesting patterns from different kinds of databases.	3			2	3		2			1					
CO3	Apply the technique of association mining to solve real life problems.	3	2	1				2			1					
CO4	Compare and contrast the various classifiers.	3			3			2	3		1					
CO5	Explore recent trends in data mining and its applications.	3				2		2	3		1					

618CST04 WEB PROGRAMMING L T P C
3 0 0 3

PREREQUISITES: Object Oriented Programming, Java Programming,

OBJECTIVES

- To provide an overview of working principles of internet, web related functionalities.
- To understand and practice embedded dynamic scripting on client side Internet Programming.
- To understand and apply the fundamentals core java, packages, database connectivity for computing.
- To acquire the knowledge on server side programming.
- To develop web services using AJAX.

UNIT I INTRODUCTION 9

Internet Standards – Introduction to WWW – WWW Architecture - Overview of HTTP, HTTP request – response – Generation of dynamic web pages.

Web 2.0: Basics, Rich Internet Applications, Collaboration tools.

UI DESIGN: Markup Language (HTML): Introduction to HTML and HTML5 - Formatting and Fonts –Commenting Code – Anchors – Backgrounds – Images – Hyperlinks – Lists – Tables – Frames - HTML Forms.

Cascading Style Sheet (CSS): The need for CSS, Introduction to CSS – Basic syntax and structure - Inline Styles – Embedding Style Sheets - Linking External Style Sheets – Backgrounds – Manipulating text - Margins and Padding - Positioning using CSS

UNIT II JAVASCRIPT, JQUERY 9

Introduction to JavaScript - Syntax - Variables and data types - JavaScript Control Statements - Operators - Literals - Functions - Objects - Arrays - Built in objects - Event handling - Fundamentals of JQuery - JQuery selectors - JQuery methods to access HTML attributes - Traversing - Manipulators - Events – Effects.

UNIT III DOM,XML 9

Introduction to the Document Object Model - DOM History and Levels - Intrinsic Event Handling - Modifying Element Style - The Document Tree - Properties of window - DOM Collections - Using Timer and Dynamic Styles to Create Animated Effects.XML – Introduction-Form Navigation-XML Documents-XSL – XSLT.

UNIT-IV SERVER SIDE PROGRAMMING 9

Servlets: Java Servlet Architecture- Servlet Life Cycle- Form GET and POST actions- Session Handling- Understanding Cookies- Multi– tire application Installing and Configuring Apache Tomcat Web Server DATABASE CONNECTIVITY: JDBC perspectives, JDBC program example - JSP: Understanding Java Server Pages-JSP Standard Tag Library(JSTL)-Creating HTML forms by embedding JSP code.

UNIT V INTRODUCTION TO AJAX AND WEB SERVICES 9

AJAX**:** Client Server Architecture-XML Http Request Object-Call Back Methods. Introduction to Web Services: UDDI, SOAP, WSDL, Service Provider, Service Consumer, Web Service Architecture,Case Study: Developing and deploying web services.

TOTAL HOURS: 45

COURSE OUTCOMES

At the end of the course, the student should be able to:

CO1: Acquire knowledge about functionalities of World Wide Web.
CO2: Explore markup languages features and create interactive web pages using them.
CO3: Design Client side validation using scripting languages.
CO4: Design web page and connect to the databases.
CO5: Create, describe, publish and consume the Web Services.

TEXT BOOKS

1. Harvey M. Deitel and Paul J.Deitel, Internet & World Wide Web How to Program, Pearson Education, 2018.
2. Jeffrey C. Jackson, "Web Technologies - A Computer Science Perspective", Pearson Education, 2008.

REFERENCE BOOKS

1. Robert. W. Sebesta, "Programming the World Wide Web", Pearson Education, Fourth Edition, 2007.
2. Kogent Learning Solutions Inc., “Html5 Black Book: Covers CSS3, JavaScript, XKL,XHTML, AJAX,PHP and jQuery”, Dreamtech Press, 2011.
3. Joe Fawcett, Danny Ayers, Liam R. E. Quin, “Beginning XML”, John Wiley & Sons Publisher, FifthEdition, 2012
4. Achyut S Godbole and AtulKahate, “Web Technologies”, Second Edition, Tata McGraw Hill,2012.
5. Bates, “Developing Web Applications”, Wiley, 2006.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Acquire knowledge about functionalities of World Wide Web.	3		1	2	2	3									
CO2	Explore markup languages features and create interactive web pages using them.	3				2	2				3					
CO3	Design Client side validation using scripting languages.	3		1		1					2		3			
CO4	Design web page and connect to the databases.	3	2		2	2	1						2			
CO5	Create, describe, publish and consume the Web Services.	3			2	2										

618CST05 ARTIFICIAL INTELLIGENCE L T P C
3 0 0 3

PREREQUISITES: NIL

OBJECTIVE(S):

- Understand the Characteristics of Intelligent Agents
- Solve problems using various Search Strategies & Knowledge Representation Scheme
- Realize the various applications of AI

UNIT– I INTRODUCTION 8

Introduction – Definition - Future of Artificial Intelligence – Characteristics of Intelligent Agents – Typical Intelligent Agents – Problem Solving Approach to Typical AI problems

UNIT– II PROBLEM SOLVING METHODS 10

Problem solving Methods - Search Strategies: Uninformed - Informed - Heuristics- Local Search Algorithms and Optimization Problems - Searching with Partial Observations - Constraint Satisfaction Problems – Constraint Propagation -Backtracking Search - Game Playing -Optimal Decisions in Games - Alpha—Beta Pruning -Stochastic Games

UNIT– III KNOWLEDGE REPRESENTATION 10

Propositional Logic - First Order Logic: Syntax and Semantics – Extensions & Notational variations –Using First Order Logic – Logical agents of Wumpus world - Knowledge Engineering – General ontology

– Inference in First order Logic: Inference Rules involving quantifiers – Forward and Backward Chaining

– Resolution – Completeness of Resolution.

UNIT– IV PLANNING & LEARNING 9

Planning: A simple Planning Agent – Basic Representations for Planning – Partial Order planning Example – Partial Order Planning Algorithm. Learning: Inductive Learning – Learning Decision Trees – Learning in Neural and Belief Networks: Neural networks – Perceptrons – Multilayer Feed-Forward networks.

UNIT– V AI APPLICATIONS 8

AI Applications – Language models – Information Retrieval – Information Extraction – Natural Language Processing – Machine Translation – Robot – Hardware Perception – Planning – Moving. **CASE STUDY: Speech Recognition.**

TOTAL: 45 HOURS

COURSE OUTCOMES:

At the end of the course student should be able to

CO1: Understand various problem solving approaches for AI problems.

CO2: Apply different search strategies and heuristics in problem solving.

CO3: Utilize various Knowledge Representation Techniques in solving complex real-life problems.

CO4: Understand the concepts of Planning and Learning Techniques.

CO5: Build new applications for real-world scenarios.

TEXT BOOKS:

1. Stuart J Russell and Peter Norvig," Artificial Intelligence - A Modern Approach", ThirdEdition, Prentice Hall of India/ Pearson Education, New Delhi, 2015.

REFERENCE BOOKS:

1. M. Tim Jones, "Artificial Intelligence: A Systems Approach (Computer Science)", Jones andBarlett Publishers, Inc., First Edition 2008.
2. Nils J. Nilsson, "The Quest for Artificial Intelligence", Cambridge University Press, 2009.
3. William F. Clocksin and Christopher S. Mellish, "Programming in Prolog: Using the ISOStandard", Fifth edition, Springer, 2003.
4. Eaine Rich, Kevin Knight, Shivashankar B. Nair, "Artificial Intelligence", Third Edition,Tata McGraw-Hill Education, 2008.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Understand various problem solving approaches for AI problems.	3			1	2	3	2								
CO2	Apply different search strategies and heuristics in problem solving.	3		1	1											
CO3	Utilize various Knowledge Representation Techniques in solving complex real-life problems.	3	2		1						3					
CO4	Understand the concepts of Planning and Learning Techniques.	3			1	2		2			2					
CO5	Build new applications for real-world scenarios.	3			1	2	2	2			2					

618CSP07 **MOBILE APPLICATION DEVELOPMENT LABORATORY** **L T P C**
0 0 2 1

OBJECTIVE(S):

The student should be made to:

- Know the components and structure of mobile application development frameworks for Android and windows OS based mobiles.
- Understand how to work with various mobile application development frameworks.
- Can able to draw basic graphical primitive on the mobile application and GPS location tracking information.

LIST OF EXPERIMENTS:

1. Develop an application that uses GUI components, Font and Colours
2. Develop an application that uses Layout Managers and event listeners.
3. Develop a native calculator application.
4. Write an application that draws basic graphical primitives on the screen.
5. Develop an application that makes use of database.
6. Develop an application that makes use of RSS Feed.
7. Implement an application that implements Multithreading
8. Develop a native application that uses GPS location information.
9. Implement an application that creates an alert upon receiving a message.
10. Write a mobile application that creates alarm clock

TOTAL: 45 HOURS

COURSE OUTCOMES:

At the end of the course, the student should be able to:

CO1: Design and Implement various mobile applications using emulators.

CO2: Deploy applications to hand-held devices

CO3: Develop an application using basic graphical primitives and databases.

CO4: Construct an application using multi threading and RSS feed and Make useof location identification using GPS in an application.

LIST OF EQUIPMENTS:

- Standalone desktops with Windows or Android or iOS or Equivalent Mobile Application Development
- Tools with appropriate emulators and debuggers.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Design and Implement various mobile applications using emulators	3		1	3	1	3	2	3	2						
CO2	Deploy applications to hand-held devices	3				1		2	2	2						
CO3	Develop an application using basic graphical primitives and databases.	3	2		3	1	2	2	1							
CO4	Construct an application using multi threading and RSS feed and Make useof location identification using GPS in an application.	3			2	1	3	2		1						

618CSP08 **DATA MINING LABORATORY** **L T P C**

0 0 2 1

OBJECTIVES:

1. Learn how to build a data warehouse and query it.
2. Understand the data sets and data pre-processing.
3. Demonstrate the working of algorithms for data mining tasks such association rule mining, Classification, clustering and regression.
4. To obtain Practical experience with all real data sets.

LIST OF EXPERIMENTS:

1. Build Data Warehouse and Explore WEKA
2. Implement preprocessing on dataset student.arff
3. Implement association rule mining on data sets
4. Implement Association rule process on dataset test.arff using apriori algorithm
5. Implement classification rule process on dataset employee.arff using naïve Bayes algorithm
6. Implement clustering rule process on dataset student.arff using simple k-means
7. Implement classification on data sets
8. Implement clustering on data sets
9. Implement Regression on data sets
10. Credit Risk Assessment using German Credit Data
11. Implementation of ERP.

COURSE OUTCOMES:

At the end of the course students can able to;

CO1: Understand and create data

CO2: Implement the association rule, classification and clustering in large data sets.

CO3: Add mining algorithms as a component to the exiting tools.

CO4: Apply mining techniques for realistic data.

CO5: Apply data mining techniques in real world data analysis.

LAB REQUIREMENTS:

SOFTWARE : WEKA, Python Libraries
HARDWARE : Standalone desktops

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	: Understand and create data	3			1	3	1		2		1					
CO2	Implement the association rule, classification and clustering in large data sets.	3		1	1	1	1				1					
CO3	Add mining algorithms as a component to the exiting tools.	3	2		1	2					1					
CO4	Apply mining techniques for realistic data..	3			1	2			3		1					
CO5	Apply data mining techniques in real world data analysis.	3			1	2	3				1					

618CSP09 WEB PROGRAMMING LABORATORY L T P C
0 0 2 1

OBJECTIVES

- Be familiar with Web page design using HTML / DHTML and style sheets
- Use JavaScript to access and use web services for dynamic content
- Learn to create dynamic web pages using server side scripting.

LIST OF EXPERIMENTS

1. a)Design a web pages for your college containing a description of the courses, departments, faculties, library, etc (use href, list, frame tags)

   b)Create your class timetable using table tag.
2. Design a web page of your home town with an attractive background color, textcolor, animage, font.(use External, Internal, and Inline CSS to format)
3. Create a Student registration form for job application and validate the form fields using JavaScript.
4. Create a Quiz program with adaptive questions using JavaScript.
5. Create an online Event Registration form and validate using Jquery.
6. With the help of JDBC Connectivity to get details of bank customers transactions (credits and debits).Write a JSP to calculate the current balance, cumulative total of credits and debits of the individual customer.
7. Create an Extensible mark up language to represent the students mark information of a class. Create a webpage to display all the students consolidated mark statement with pass (green color)or fail (red color)using XSLT
8. Develop a web service for an airline management and implement the following scenario using database

   (a) Check ticket availability.

   (b) Check air services through travel agent.

   (c) Search a passenger whether he / she travelled in a particular date ornot.

9. Create a program to change the content of the web page using AJAX.

TOTAL HOURS: 45

COURSE OUTCOMES

At the end of the course, the student should be able to:

CO1: Design Web pages using HTML/DHTML and style sheets
CO2: Create dynamic web pages using server side scripting.
CO3: Design and Implement database applications.
CO4: Develop the simple GUI interfaces to interact with users and real time applications.

SOFTWARE REQUIREMENTS

Operating System: Linux / Windows
Programming Language & IDE: HTML 5, JDK 1.7, Coffee Cup Editor, PHP, Notepad++.Server: Apache Tomcat Server / XAMP / LAMP

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Design Web pages using HTML/DHTML and style sheets	3		1	3	1	3	2	3	2						
CO2	Create dynamic web pages using server side scripting.	3	2			1		2	2	2						
CO3	Design and Implement database applications.	3		1	3	1	2	2	1							
CO4	Develop the simple GUI interfaces to interact with users and real time applications	3			2	1	3	2		1						

618CIE01 MULTICORE ARCHITECTURE L T P C
3 0 0 3

PREREQUISITES: Computer Architecture

OBJECTIVE

- To understand the recent trends in the field of Computer Architecture and identifyperformance related parameters

- To appreciate the need for parallel processing
- To expose the students to the problems related to multiprocessing
- To understand the different types of multicore architectures
- To expose the students to warehouse-scale and embedded architectures

UNIT I FUNDAMENTALS OF QUANTITATIVE DESIGN AND ANALYSIS 9

Classes of Computers – Trends in Technology, Power, Energy and Cost – Dependability – Measuring, Reporting and Summarizing Performance – Quantitative Principles of ComputerDesign – Classes of Parallelism - ILP, DLP, TLP and RLP - Multithreading - SMT and CMPArchitectures – Limitations of Single Core Processors - The Multicore era – Case Studies of Multicore Architectures.

UNIT II DLP IN VECTOR, SIMD AND GPU ARCHITECTURES 9

Vector Architecture - SIMD Instruction Set Extensions for Multimedia – Graphics ProcessingUnits- Detecting and Enhancing Loop Level Parallelism - Case Studies.

UNIT III TLP AND MULTIPROCESSORS 9

Symmetric and Distributed Shared Memory Architectures – Cache Coherence Issues - Performance Issues – Synchronization Issues – Models of Memory Consistency – Interconnection Networks – Buses, Crossbar and Multi-stage Interconnection Networks.

UNIT IV RLP AND DLP IN WAREHOUSE-SCALE ARCHITECTURES 9

Programming Models and Workloads for Warehouse-Scale Computers – Architectures for Warehouse-Scale Computing – Physical Infrastructure and Costs – Cloud Computing – Case Studies.

UNIT V ARCHITECTURES FOR EMBEDDED SYSTEMS 9

Features and Requirements of Embedded Systems – Signal Processing and Embedded Applications – The Digital Signal Processor – Embedded Multiprocessors - Case Studies.

TOTAL HOURS: 45 HOURS

COURSE OUTCOMES

At the end of the course the students should be able to

CO1: Identify the limitations of ILP and the need for multicore architectures
CO2 Discuss the issues related to multiprocessing and suggest solutions
CO3: Understand the salient features of different multicore architectures and how they exploit parallelism
CO4: Critically analyze the different types of inter connection networks
CO5: Understand the architecture of GPUs, warehouse-scale computers and embedded processors

TEXT BOOK

1. John L. Hennessey and David A. Patterson, "Computer Architecture – A Quantitative Approach", Morgan Kaufmann / Elsevier, 5th edition, 2012.

REFERENCES

1. Kai Hwang, "Advanced Computer Architecture", Tata McGraw-Hill Education, 2003
2. Richard Y. Kain, "Advanced Computer Architecture a Systems Design Approach", PrenticeHall, 2011.
3. David E. Culler, Jaswinder Pal Singh, "Parallel Computing Architecture : A Hardware/ SoftwareApproach" , Morgan Kaufmann / Elsevier, 1997.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Identify the limitations of ILP and the need for multicore architectures	3			3	3										
CO2	Discuss the issues related to multiprocessing and suggest solutions	3			3	2					3					
CO3	Understand the salient features of different multicore architectures and how they exploit parallelism	3		1	2			3	1		3					
CO4	Critically analyze the different types of inter connection networks	3	2					2	3		2					
CO5	Understand the architecture of GPUs, warehouse-scale computers and embedded processors	3		1					2							

618CSE02 PARALLEL AND DIATRIBUTED COMPUTING L T P C

3 0 0 3

PREREQUISITES: Design and Analysis of Algorithm, ComputerNetworks, Operating System, Computer Organization and Architecture

OBJECTIVES

- To understand the need and fundamentals of parallel and distributed computing paradigms.
- To learn the about the scheduling, decomposition techniques and its mapping.
- To build application using remote procedure call
- To utilize and manage the resources in a distributed computing environment
- To explore knowledge in distributed file systems.

UNIT I INTRODUCTION TO PARALLEL COMPUTING 9

Parallel Processing Terminology - Scope of Parallel Computing-**Parallel Computer Memory Architectures** -The PRAM model of Parallel Computation - PRAM Algorithms - Parallel reduction - Prefix Sum - List Ranking - Preorder Tree Traversal - Merging Two Sorted List - Graph Coloring.- **Nvidia CUDA programming model**

UNIT II DESIGNING PARALLEL PROGRAMS AND MAPPING 9

Decomposition Techniques - Characteristics of Tasks and Interactions- Mapping Techniques for Load Balancing-collective communication-synchronization- OpenMP: a Standard for Directive Based Parallel Programming- Sorting Networks - Bubble Sort Variations – Discrete Optimization Problems:Parallel Depth First Search

UNIT III DISTRIBUTED COMPUTING PARADIGM 9

Introduction to Distributed Computing System - Distributed Computing System Models - Distributed Operating System - Issues in Designing a Distributed Operating System - Introduction to Distributed Computing Environment(DCE) - Network Types - Communication Protocols – Internetworking- **Election Algorithms: The Bully Algorithm- The Ring Algorithm-Case Study:RAY-Distributed Computing Framework**

UNIT IV MESSAGE PASSING AND RESOURCE MANAGEMENT 9

Issues in IPC by message passing - Multi Datagram Messages - Encoding and Decoding of Message Data - Group Communication - The RPC Model - Transparency of RPC - Implementing RPC mechanism - Stub Generation - RPC Messages - Communication Protocols for RPCs - Client-Server Binding **–Resource Management:Features of a good scheduling algorithm-Task assignment approach-Load balancing-load sharing approach- Case study:MPI Remote Method Invocation And Object**

UNIT V DISTRIBUTED FILE SYSTEM 9

Distributed File Systems-Desirable Features of a Good Distributed File System -File Models -File Replication -Fault Tolerance -Transactions - Nested Transactions - Locks - Optimistic Concurrency Control - Timestamp Ordering - Comparison - Flat and Nested Distributed Transactions - Atomic Commit protocols - Concurrency Control in Distributed Transactions**-- Case Study:Open Source Distributed File Systems**

TOTAL HOURS: 45 HOURS

COURSE OUTCOMES

Upon completion of the course, the students will be able to

CO1: Apply parallel programming algorithms for real world problems.
CO2: Acquire knowledge on different scheduling, decomposition techniques and itsmapping.
CO3: Develop applications by incorporating distributed computing architectures.
CO4: Build remote procedure calls and manage resources
CO5: Implement and deploy the application using distributed file systems

TEXT BOOK

1. Michael Quinn, "Parallel Computing - Theory and Practice", Second Edition, Tata McGraw Hill, 2012.
2. Distributed Operating System: Concepts and Design, Pradeep K. Sinha, PHI , 2012.

REFERENCES

1. Ananth Grama, Anshul Gupta, George Karypis andVipin Kumar, "Introduction to Parallel Computing", Second Edition, Pearson Education, 2009.
2. George Coulouris, Jean Dollimore and Tim Kindberg, Distributed Systems, Conceptsand Design, Perason Education, 3rd Edition 2011.
3. Haggit Attiya and Jennifer Welch, "Distributed Computing - Fundamentals, Simulations and Advanced Topics", Second Edition, Wiley, 2012.
4. Norman Matloff, "Parallel Computing for Data Science -With Examples in R, C++and CUDA", Chapman and Hall/CRC, 2015.
5. Wan Fokkink, "Distributed Algorithms: An Intuitive Approach", MIT Press, 2013.
6. M.L. Liu, "Distributed Computing -Principles and Applications", First Edition, Pearson Education, 2011.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Apply parallel programming algorithms for real world problems..	3			3	3										
CO2	Acquire knowledge on different scheduling, decomposition techniques and its mapping.	3		1	3	2					3					
CO3	Develop applications by incorporating distributed computing architectures	3			2			3	1		3					
CO4	Build remote procedure calls and manage resources	3	2					2	3		2					
CO5	Implement and deploy the application using distributed file systems	3		1		3			2							

618MAE03/618MA0O1 APPLIED STATISTICS AND NUMERICAL METHODS L T P C

3 1 0 4

(Professional Elective for Computer Science and Engineering and Open Elective Information Technology– Regulation 2018)

Course Objectives

- To learn the basic concepts of statistics.
- To introduce the notion of sampling distributions and acquire the knowledge of statistical techniquesuseful in decision making.
- To expose the statistical methods for analysis of variance and control limits.
- To solve equations using direct and iterative methods.
- To introduce interpolation techniques and to study the principles of numerical differentiation andnumerical integration.

UNIT I DESCRIPTIVE STATISTICS 9 + 3

Measures of Central tendency - Arthimetic Mean, Median, Mode - Measures of dispersion- Standard deviation and Variance – Graphical representation of data- Pie chart, Bar graph, Histogram and Ogives. Curve fitting by the Principle of least squares.

UNIT II TESTING OF HYPOTHESIS 9 + 3

Sampling distributions – Testing of hypothesis for large samples by Z-test and small samples by Student's t-test for single Mean, Proportion, equality of means and equality of proportions – F-test for single variance and equality of variances – Chi-square test for Goodness of fit and Independence of attributes.

UNIT III DESIGN OF EXPERIMENTS 9 + 3

ANOVA(Analysis of variance) – Completely Randomized Design(CRD-one way classification) – Randomised Block Design (RBD-two way classification) - Latin Square Design (LSD-Three way classification)- Control charts for measurements - $\overline{x}$ chart, R-chart

UNIT IV NUMERICAL SOLUTION OF EQUATIONS 9 + 3

Solution of algebraic and transcendental equations : Fixed point iteration - Newton-Raphson method- Solution of system of equations - Direct Methods: Gauss Elimination method, Gauss-Jordan method, LU decomposition method and Cholesky decomposition method – Iterative methods: Gauss- Jacobi method and Gauss-Seidel method.

UNIT V INTERPOLATION, NUMERICAL DIFFERENTIATION AND INTEGRATION 9 + 3

Interpolation: Newton's forward and backward differences interpolation - Lagrange's and Newton's divided difference interpolation - Numerical differentiation using Newton's forward and backward difference interpolation - Numerical integration using Trapezoidal and Simpson's $1/3^{rd}$ and $3/8^{th}$ rules.

Total no. of periods: 45 + 15 = 60

Note: Use of approved statistical table is permitted in the examination.

COURSE OUTCOMES

At the end of the course the student will be able to

CO 1: Apply the basic Statistical measures of Central Tendency and Dispersion and represent statisticaldata graphically for analysis.

CO 2: Draw conclusions through hypothesis testing.

CO 3: Acquaint with the knowledge of analysis of variance for decision making and analyse the controllimits of a sample.

CO 4: Apply numerical methods for solving algebraic ,transcendental equations and system of equationsby direct and iterative methods.

CO 5: Appreciate numerical techniques such as interpolation applied to find derivatives and numericalintegration.

TEXT BOOKS

1. Gupta.S.C., & Kapoor,V.K., "Fundamentals of mathematical statistics", 11^{th} edition, SultanChand & Sons publishers, New Delhi, 2013.
2. Grewal, B.S. and Grewal,J.S., " Numerical methods in Engineering and Science", 6th Edition,Khanna Publishers, New Delhi, 2004.

REFERENCES

1. Veerarajan.T., "Probability, Statistics and Random Processes", Tata McGraw-Hill publishingcompany Limited, New Delhi, 2014.
2. R.E. Walpole, R.H. Myers, S.L. Myers, and K Ye, "Probability and Statistics for Engineers andScientists", Pearson Education, Asia , 8th edition, 2007.
3. Miller and Freund., "Probability and Statistics for Engineers", Pearson Education, Asia, 7thedition, 2012.
4. Kandasamy.P, Thilagavathy,K. & Gunavathi.K., "Numerical Methods"., S.Chand & CompanyLtd., New Delhi, 2014.

S.S.Sastry, "Introductory Methods of Numerical Analysis", 5th Edition, Prentice Hall of IndiaPrivate Ltd., New Delhi, 2012.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Apply the basic Statistical measures of Central Tendency and Dispersion and represent statisticaldata graphically for analysis.	3			3	3										1
CO2	Draw conclusions through hypothesis testing.	3			3	3	2	3								2
CO3	Acquaint with the knowledge of analysis of variance for decision making and analyse the controllimits of a sample.	3		1	3	3	2	3								2
CO4	Apply numerical methods for solving algebraic ,transcendental equations and system of equationsby direct and iterative methods.	3			3	3	2	2								2
CO5	Appreciate numerical techniques such as interpolation applied to find derivatives and numerical integration.	3	2		3	3	2	2								

618CSE04 NETWORK DESIGN AND MANAGEMENT L T P C
3 0 0 3

Prerequisite: Computer Networks

OBJECTIVE(S):

- To understand the concepts and terminology associated with SNMP and TMN
- To learn to the concepts and architecture behind standards based network management
- To understand the need for interoperable network management
- To understand network management as a typical distributed application
- To studythe current trends in network management technologies

UNIT I - PHYSICAL NETWORK DESIGN 9

LAN cabling topologies – Ethernet Switches – High speed and Gigabit and 10Gbps – Building cabling topologies and Campus cabling topologies – Routers, Firewalls and L3 switches –Remote Access Technologies and Devices – Modems and DSLs – SLIP and PPP - WAN Design and Enterprise Networks – Core networks, distribution networks and access networks

UNIT II - OSI NETWORK MANAGEMENT **9**

Network Management: Goals, Organization, and Functions, Network and System Management, Network Management System Platform, Current Status and future of Network. OSI Network management model - Organizational model - Information model, communication model. Abstract Syntax Notation - Encoding structure, Macros Functional model CMIP/CMIS

UNIT III - INTERNET MANAGEMENT(SNMP) **9**

SNMP (V1 and V2) - Organizational model - System Overview, The information model, communication model - Functional model, SNMP proxy server, Management information, protocol remote monitoring - RMON SMI and MIB, RMON1, RMON2 - A Case Study of Internet Traffic Using RMON.

UNIT IV - BROADBAND NETWORK MANAGEMENT **9**

Broadband networks and services, ATM Technology - VP,VC, ATM Packet, Integrated service, ATMLAN emulation, Virtual LAN. ATM Network Management - ATM Network reference model, integrated local management Interface. ATM Management Information base, Role of SNMD and ILMI in ATM Management, M1, M2, M3, M4 Interface. ATM Digital Exchange Interface Management - TMN conceptual Model - TMN Architecture, TMN Management Service Architecture

UNIT V - NETWORK MANAGEMENT APPLICATIONS **9**

Configuration management, Fault management, performance management, Event Correlation Techniques security Management, Accounting management, Report Management, Policy Based Management Service Level Management - Network Management Tools, Network Statistics Measurement Systems – Web Based Management, XML Based Network Management - : Future Directions.

TOTAL: 45 HOURS

COURSE OUTCOMES:

At the end of the course, the student should be able to:

CO1: Apply the networking principles to design a network

CO2: Formulate possible approaches for managing OSI network model.

CO3: Use on SNMP for managing the network & RMON for monitoring the behavior of the Network

CO4: Explore the possibilities of improving the speed of the network and managing them

CO5: Identify the various components of network and formulate the scheme for themanaging them

TEXT BOOKS:

1. Mani Subramanian, “Network Management Principles and practice ", Pearson Education, New Delhi, 2010.
2. STALLINGS, WILLIAM, “SNMP, SNMPv2, SNMPv3, and RMON 1 and 2,” Pearson Education, 2012

REFERENCE BOOKS:

1. Salah Aiidarous, Thomas Plevayk, “Telecommunications Network Management Technologies and Implementations ", eastern Economy Edition IEEE press, New Delhi, 1998.
2. Lakshmi G. Raman, “Fundamentals of Telecommunication Network Management", Eastern Economy Edition IEEE Press, New Delhi, 1999.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Apply the networking principles to design a network	3			3	3										
CO2	Formulate possible approaches for managing OSI network model.	3		1	3	3					2					
CO3	Use on SNMP for managing the network & RMON for monitoring the behavior of the Network	3	2				3				2	1				
CO4	Explore the possibilities of improving the speed of the network and managing them .	3		1			3		3		2	2				
CO5	Identify the various components of network and formulate the scheme for the managing them	3			3	1			2			3				

618CSE05 SOFTWARE PROJECT MANAGEMENT L T P C
3 0 0 3

PREREQUISITE: Software Engineering

OBJECTIVE(S):

- To develop an awareness of the need for Project Planning and Management
- To know about Software Effort Estimation, Activity Planning and Risk Management
- To learn about Project Monitoring, People Management and SPM tools

UNIT I INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT 9

Project – Software Projects versus other types of Project - Contract Management and Technical Project Management – Activities covered by Software Project Management – Plans, Methods and Methodologies – Requirement Specification – Management Control – Overview of Project Planning – Stepwise Project Planning – Project Evaluation

UNIT-II SOFTWARE EFFORT ESTIMATION AND ACTIVITY PLANNING 9

Basics for Effort Estimation - Techniques - Expert judgment - Estimation by Analogy - Albrecht Function Point Analysis - COCOMO Cost Estimation Model – Activity planning –Objectives - Project schedules-Network Planning Models-Forward and Backward Pass – Identifying the Critical Path

UNIT-III SOFTWARE RISK MANAGEMENT 9

Introduction - Categories - Risk Identification - Risk Assessment - Risk Planning - Risk Management – Evaluating Risk – Agile Project Management – Scrum Case Study - Tools for Agile Project Management – Rally & Jira

UNIT IV MONITORING AND CONTROL 9

Resource allocation - Identifying and Scheduling Resources – Publishing Resource and Cost Schedule – Scheduling Sequence - Creating Framework – Collecting the Data – Visualizing Progress – Cost Monitoring – Earned Value – Prioritizing Monitoring – Getting Project back to target – Change Control – Managing Contracts – Introduction – Types of Contract – Stages in Contract Placement – Typical Terms of a Contract – Contract Management – Acceptance

UNIT V MANAGING PEOPLE AND ORGANIZING TEAMS 9

Introduction – Understanding Behavior – Organizational Behavior - Selecting the Right Person for the Job – Instruction in the Best Methods – Motivation – The Oldman – Hackman Job Characteristics Model – Working in Groups – Becoming a Team – Decision Making – Leadership
– Organizational Structures – SPM Tools

Total 45 Hrs

COURSE OUTCOMES:

At the end of the course, the students should be able to:

CO1: Understand Project Management and the roles of the Project Manager
CO2: Evaluate a project and provide accurate cost estimates and to plan various activities
CO3: Develop knowledge in Risk Evaluation and Agile methodologies
CO4: Apply best practices to develop skills in Monitoring and Controlling of Software Projects
CO5: Identify suitable Project management tools and techniques

TEXT BOOKS:

1. Bob Hughes, Mike Cotterell, ”Software Project Management”, Fifth Edition, Tata McGrawHill, 2011.
2. Walker Royce,” Software Project Management A Unified Framework”, Pearson Education,2004.Ken Schawber, MikerBeedle, “Agile Software Development with Scrum”, Pearson Education,2008.

REFERENCE BOOKS:

1. RishabhAnand ,"Software Project Management" S.K. Kataria& Sons- 2013 .
2. S.A. Kelkar, "Software Project Management: A Concise Study Paperback ", Phi 2013.
3. Ramesh Gopalaswamy, - "Managing Global Software Projects", Tata McGraw Hill, 2001.
4. Humphrey Watts, "Managing the software process", Addison Wesley, 1989.
5. Ashfaque Ahmed "Software Project Management Process Driven Approach", Auerbach Publications, 2011.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Understand Project Management and the roles of the Project Manager	3		3												
CO2	Evaluate a project and provide accurate cost estimates and to plan various activities	3		2												
CO3	Develop knowledge in Risk Evaluation and Agile methodologies	3						3	3		3					
CO4	Apply best practices to develop skills in Monitoring and Controlling of Software	3						2	2		3		3			
CO5	Identify suitable Project management tools and techniques	3	1		3	3			2				3			

618CSE06 ADVANCED JAVASCRIPT LANGUAGE L T P C
3 0 0 3

PREREQUISITE: Web Programming

OBJECTIVES:

- To learn designing a webpage in a structured way by using advanced java script.
- To learn the design of AJAX & JSON.
- To understand ANGULAR JS, NODE JS, REACT JS.

UNIT –I JAVASCRIPT OBJECT 9

Introduction to JavaScript Object – Array- String – date – math – Number – Boolean –RegExp – DOM – Error and Exception Handling – Animation – Multimedia.

UNIT –II AJAX and JSON **9**

Introduction to AJAX – Evolution of AJAX – AJAX Framework – Web applications withAJAX – AJAX with Databases.

Introduction to JSON – JSON syntax – Need of JSON in real web sites – JSON object – JSON array – Complex JSON objects – Reading JSON objects using jQuery.

UNIT –III ANGULAR JS **9**

Introduction to Angular JS – Directive and Expression – MVC- Filter: Create Filter – Built in Filter – Custom Filter – Module – Directives: Built in Directives – Custom Directives – Custom Directives – Service – Server Communication – Organizing View

UNIT IV – NODE JS **9**

Setting up Node JS- Understanding of Node JS – Core Node.JS – Node.JS Packages – Events and Stream – Getting Started with Http – Introducing Express- Persisting Data – Front End Basics

UNIT V – REACT JS **9**

Introduction to React JS – The Core of React – React – Discovery of React Component – Understanding of Components – Component Properties and Methods – Component Lifecycle and Redundancy- JSX- JSX Fundamental – Built a React web application

Total Hrs : 45

COURSE OUTCOMES

At the end of the course, the student should be able to:

CO1: Understand about javascript objects.

CO2: Design Database access with AJAX & JSON.

CO3: Build real world applications using Angular JS.

CO4: Develop a dynamic website using advanced features of Node JS.

CO5: Develop a dynamic website using advanced features of React JS.

REFERENCES

1. Thomas Powell, Fritz Schneider, “The Javascript Completer Reference”, ThirdEdition, Mc GrawHill Publication, 2015
2. Andrew Grant, “Beginning Angular JS”, Apress publication, 2014.
3. Basarat Ali Syed, Beginning of Node JS”, Apress Publication, 2014.
4. Cory Gackenheimer, “Introduction to React”, Apress Publication, 2014.
5. Alex Banks and Eve Porcello, “Learning React Functional Web development withReact”, SPD Publication, 2017.
6. Alex Young, Bradley Meck, Mike Cantelon, Tim Oxley, Marc Harter, T.J. Holowaychuk, Nathan Rajlich, “Node.js in Action”, second edition,2017
7. Nishu Goel, “Step-by-Step Angular Routing”, BPB Publication,2019

8. Deitel, Deitel, Goldberg, “Internet & World Wide Web How to Program”, ThirdEdition, Pearson Education, 2006.
9. Introduction to JavaScript Object Notation: A To-the-Point Guide to JSON, Kindle Edition,by Lindsay Bassett,O'Reilly Media,2015
10. Ajax: The Complete Reference Paperback – Illustrated, by Thomas Powell, McGraw-Hill Education ,2008

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Understand about javascript objects	3			3	3		3								
CO2	Design Database access with AJAX & JSON.	3			2					3						
CO3	Build real world applications using Angular JS.	3		1	2					1						
CO4	Develop a dynamic website using advanced features of Node JS.	3		1	2			2					3			
CO5	Develop a dynamic website using advanced features of React JS.	3	2		1	3				1			2			

518PQT01 PROBABILITY AND QUEUING THEORY L T P C
3 0 0 3

COURSE OBJECTIVES

- To impart the knowledge of basic probabilistic theory.
- To learn one dimensional discrete and continuous probability distributions occurring in naturalphenomena.
- To extend the probability theory to two dimensional random variable and to study the statisticalmeasures.
- To study the classification and analysis of few random process.
- To acquire the skills to analyze queueing models.

UNIT I PROBABILITY AND RANDOM VARIABLE

Axioms of probability - Conditional probability - Total probability –Baye's theorem- Random variable - Probability mass function - Probability density function - Properties - Moments - Moment generating functions and their properties, Applications of mgf.

UNIT II PROBABILITY DISTRIBUTIONS 9+3

Binomial, Poisson, Geometric, Uniform, Exponential, and Normal distributions and their properties - Functions of a random variable-simple applications.

UNIT III TWO-DIMENSIONAL RANDOM VARIABLES 9+3

Joint distributions – Marginal and Conditional distributions –Covariance–Correlation and Linear regression – Central limit theorem (Statement and applications only for independent and identically distributed random variables).

UNIT IV RANDOM PROCESSES 9+3

Classification – Stationary process – Poisson process - Markov process – Discrete parameter Markov chain – Chapman Kolmogorov equations-Application problems for each process.

UNIT V QUEUEING THEORY 9 + 3

Markovian queues – Little's formula –Models: **(M/M/1): (□/FIFO), (M/M/s): (□/FIFO) ,(M/M/1):(k/FIFO),(M/M/s):(k/FIFO)**–Non-MarkovianQueues:Pollaczek-Khinchin formula(statement and applications only) - **(M/G/1): (□/GD).**

TOTAL:45+15=60PERIODS

COURSE OUTCOMES

At the end of the course the student will be able to

CO 1: Imbibe the knowledge of basic probability.

CO 2: Improve the quality of interpretation and decision making in real time problems of probability distributions.

CO 3: Learn the concept of two dimensional random variables which helps to understand and analyse the statistical measures which describes the outcome of a random experiment.

CO 4: Understand and characterize the random variable phenomenon which evolve with respect to timein a probabilistic approach.

TEXT BOOKS

1.Ibe, O.C. "Fundamentals of Applied Probability and Random Processes", Elsevier, U.P., 1st Indian Reprint, 2007.

2.Gross, D., Shortle, J.F., Thompson, J.M. and Harris, C.M., Fundamentals of Queuing Theory, 4th Edition, John Wiley and Sons, New York, 2016.

REFERENCES

1.HweiHsu, "Schaum's Outline of Theory and Problems of Probability, Random Variables and Random Processes", Tata McGraw Hill, New Delhi, 9th Reprint, 2010.

2.Veerarajan.T., "Probability, Statistics and Random Processes", Tata McGraw-Hill publishingcompany Limited, New Delhi, 2014.

3.Kandasamy.P,Thilagavathy,K.,&Gunavathi.K., "Probability, Statistics and Queueing Theory"., S.Chand& Company Ltd., New Delhi, 2014.

CO1	Imbibe the knowledge of basic probability.	3			3	3										1
CO2	Improve the quality of interpretation and decision making in real time problems of probability distributions.	3			3	3	2									1
CO3	Learn the concept of two dimensional random variables which helps to understand and analyse the statistical measures which describes the outcome of a random experiment.	3		1	3	3	1									1
CO4	Understand and characterize the random variable phenomenon which evolve with respect to time in a probabilistic approach	3			3	3	2									1
CO5	Construct and solve queuing models that are suitable for practical problems encountered in daily life	3	2		3	3	2									1

518CIT02 MICROPROCESSORS AND MICROCONTROLLER L T P C

0 0 2 1

COURSE OBJECTIVES:

At the end of the course ,the students should be able to:

- Summarize the architecture and assembly language programming ofmicroprocessors
- Defend the architecture and assembly language programming ofmicrocontrollers
- Demonstrate the concept of interrupts and interfacing with various peripherals.
- Integrate the features of a microcontroller and its timer applications.
  Justify the architectural features of 801XX with 8086 processor.

UNIT I 8086 MICROPROCESSOR 9

Intel 8086 microprocessor – Architecture - Minimum and Maximum mode Configuration – Signals (Pin Configuration)- Instruction Set-Addressing Modes-Assembly Language Programming-Assembler Directives- Interrupts And Interrupt Service Routines.

UNIT II MEMORY AND I/O INTERFACING 9

Memory interfacing and I/O interfacing with(8086) – parallel communication interface – serial communication interface – timer-keyboard/display controller – interrupt controller – DMA controller**(8257).**

UNIT III 8051 MICROCONTROLLERS 9

Architecture of 8051 Microcontroller(Pin Configuration) – I/O ports – memory – counters and timers-serial data I/O – interrupts

UNIT IV INTERFACING WITH 8051 9

Interfacing with keyboards, LEDs, 7 segment LEDs, LCDs, Interfacing with ADCs. Interfacing with DACs- Stepper Motor.

UNIT V MICROPROCESSOR TECHNOLOGY 9

Architecture of Intel 80286,80386,80486 –Features of Pentium I and II processors

COURSE OUTCOMES:

Upon Completion of this course, students will be able to :

- Recognize the basic Microprocessor architecture and its concepts.
- Outline the concepts of peripheral interfacing mechanisms.
- Design various assembly language programming using microprocessors andmicrocontroller.
- Extend the real world interfacing with microcontroller
- Extrapolate the architectural features of 801XX with 8086 processor.

TEXT BOOKS

1 Yn-cheng Liu,Glenn A.Gibson, “Microcomputer systems: The 8086 / 8088 Family architecture,
Programming and Design”, second edition, Prentice Hall of India , 2006

2 Kenneth J. Ayala, ’The 8051 microcontroller Architecture, Programming and applications’ secondedition , Penram international.

3 Mohamed Ali Mazidi, Janice Gillispie Mazidi,” The 8051 microcontroller and embedded systems
using Assembly and C”, second edition, Pearson education /Prentice hall of India , 2007.

4 The Intel Microprocessor Architecture, Programming and Interfacing, Barry B. Brey ,6th edition,
Pearson education, 2002.

REFERENCE BOOKS

1 Douglas V.Hall, “Microprocessors and Interfacing: Programming and Hardware”, second edition,Tata Mc Graw Hill, 2006.

2 A.K.Ray & K.M Bhurchandi, "Advanced Microprocessor and Peripherals – Architecture, Programming and Interfacing", Tata Mc Graw Hill, 2006.

3 Peter Abel, "IBM PC Assembly language and programming", fifth edition, Pearson education / Prentice Hall of India Pvt.Ltd, 2007.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Recognize the basic Microprocessor architecture and its concepts.	3			3	2	3	1	3						1	
CO2	Recognize and develop sophisticated queries and authorization techniques to extract information from database	3		1	3	2	3	1	3						1	
CO3	Design various assembly language programming using microprocessors and microcontroller	3			3	2	3	1	3						1	
CO4	Extend the real world interfacing with microcontroller.	3			3	2	3	1	3						1	
CO5	Extrapolate the architectural features of 801XX with 8086 processor	3	2		3	2	3	1	3						1	

518CST03 OBJECT ORIENTED ANALYSIS AND DESIGN L T P C

3 0 0 3

OBJECTIVE(S):

- To understand and differentiate Unified Process from other approaches
- To study the concepts of modeling in object oriented concepts
- To learn about Unified Modeling Language
- To design with the UML static, dynamic and implementation diagrams
- To learn design techniques and methodologies.

Prerequisite: Software Engineering and Object Oriented Programming

UNIT- I INTRODUCTION 10

An Overview of Object Oriented Systems Development - Object Basics – Objects and Classes- Abstraction- Encapsulation- Inheritance- Polymorphism Object Oriented Systems Development Life Cycle **OOAD Methodologies -** Rumbaugh Methodology - Booch Methodology – Jacobson Methodology - Patterns – Frameworks – Unified Approach

UNIT- II SYSTEM MODELLING 11

Introduction to Unified Modeling Language – Usage of UML - Types of UML Diagrams

USE CASE MODELING - Understanding Use cases-Identifying Use cases-Association between use cases (uses and Extends)-Describing use cases-Dividing Use cases into packages- Naming a Use case - Use case Diagram

OBJECT MODELING: Class diagrams, associations, generalization, composition, object diagrams, associations, aggregation and composition

DYNAMIC MODELING: Interaction diagrams, sequence diagrams, collaboration diagrams, state diagrams, activity diagrams.

IMPLEMENTATION MODELING: Package diagrams, deployment diagrams, component diagrams, combining component and deployment diagrams.

UNIT- III OBJECT ORIENTED ANALYSIS 8

Object Analysis - Classification – Identifying Object relationships - Attributes and Methods

UNIT- IV OBJECT ORIENTED DESIGN 8

Design axioms - Designing Classes – Access Layer - Object Storage - Object Interoperability.

UNIT-V USER INTERFACE DESIGN 8

Designing Interface Objects – Designing View layer classes – Macro-Level Process - Micro- Level Process – Purpose of a View Layer Interface – Prototyping the User Interface - Case study: Designing user Interface for the Vianet Bank ATM.

COURSE OUTCOMES:

At the end of the course student should be able to

CO1: Apply Object Oriented Methodologies and Unified Modeling Approach to develop a system model.

CO2: Analyze, identify object relationship, attributes and methods to build a class.

CO3: Use the UML analysis and design diagrams.

CO4: Create UML for requirements, designs and component interfaces

CO5: Design classes, user interface and to have wide knowledge on object storage and interoperability to develop an effective model.

TEXT BOOK:

1. Ali Bahrami, "Object Oriented Systems Development", Tata Mc Graw-Hill, New Delhi, 1st Edition, 2008.

REFERENCE BOOKS:

1. James Rumbaugh, Ivar Jacobson, Grady Booch, "The Unified Modeling Language User Guide", Pearson Education, 3rd Edition, 2012.
2. Hans-Erik Eriksson, Magnus Penker, Brain Lyons, David Fado, "UML 2 Toolkit", OMG Press Wiley Publishing Inc., New Delhi, 2011.
3. Craig Larman, "Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development", Pearson Education, 3rd Edition, 2012.
4. Mahesh P Matha, "Object Oriented Analysis and Design using UML", PHI Learning, New Delhi, 2008.
5. Martin Fowler, "UML Distilled", 3rd Edition, PHI Learning, New Delhi, 2015.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Apply Object Oriented Methodologies and Unified Modeling Approach to develop a system model	3		1		3	3		2	2	1					2
CO2	Analyze, identify object relationship, attributes and methods to build a class.	3				3	3		2	2	1					2
CO3	Use the UML analysis and design diagrams	3				3	3		2	2	1					2
CO4	Create UML for requirements, designs and component interfaces	3	2			3	3		2	2	1					2
CO5	Design classes, user interface and to have wide knowledge on object storage andinteroperability to develop an effective model.	3				3	3		2	2	1					2

518CIT04 THEORY OF COMPUTATION L T P C

3 0 0 3

OBJECTIVE(S):

- Design a deterministic and non-deterministic finite automata.
- Construct automata for anygiven pattern and find its equivalent regular expressions
- Design a Pushdown Automata and Context free language.
- Understand the Turing machines and computing with Turing machines.
- Understand the fundamentals of decidability and Reducibility.

UNIT– I INTRODUCTION TO AUTOMATA 9

Sets – functions – relations – Languages– Basic Machines - Finite Automata – Basic definitions– DeterministicFinite Automata (DFA), Non-Deterministic Finite Automata (NFA) – Finite automata with Epsilon transitions–Equivalence of DFA`s and NFA`s - Applications of finite state automata.

UNIT– II REGULAR EXPRESSIONS AND LANGUAGE 9

Regular languages - Regular Expressions – Finite automata and regular expressions – Properties of regular sets–Properties of Regular Language: Proving languages not to be Regular (Pumping Lemma for Regular Language), Closure pro

UNIT– III CONTEXT FREE LANGUAGES AND PUSH DOWN AUTOMATA 9

Context Free Grammar (CFG) – Derivation trees – Ambiguity-Normal Forms, Chomsky NormalForm (CNF) and Griebach Normal Form (GNF)– Introduction to Push Down Automata (PDA) – PDA definition – Equivalence of PDA and Context Free Grammar –Deterministic pushdown automata – Properties of Context Free Languages. perties of Regular Language, Equivalence and Minimization of Automa

UNIT– IV TURING MACHINES 9

Church-Turing thesis: Turing machines - Language of a TM, TM as accepters and deciders. Programming techniques for TM -Storage in state, multiple tracks, and subroutines. Variants of Turing Machines-**Encoding of a TM**-Universal Turing machine.

UNIT– V DECIDABILITY AND REDUCIBILITY 9

Decidability: Decidable languages Halting problem: Diagonalization Method-Halting Problem is Undecidable- Reducibility: Undecidable problems from Language theory –Rice theorem and **Properties of RE Languages** - A simple Undecidable problem: Post's Correspondence Problem (PCP) –**Modified PCP-MPCP to PCP**- Undecidability of PCP.

TOTAL: 45

COURSE OUTCOMES:

At the end of the course student should be able to

CO1: Construct automata, regular expression for any pattern.
CO2: Design grammars and Automata (recognizers) for different language classes.
CO3: Write Context free grammar for any construct
CO4: Design Turing machines for any language and propose computation solutions using Turing Machines
CO5: Derive whether a problem is decidable or not

TEXT BOOKS:

1.John E. Hopcroft and Rajeev Motwani and Jeffrey D. Ullman, "Introduction to AutomataTheory, Languages and Computation", third edition, Pearson Education, New Delhi, 2014.

2.John C. Martin, "Introduction to Languages and the Theory of Computation", Fourth Edition, Tata McGraw-Hill Education Pvt. Ltd., New Delhi, 2011.

3. Rajendra Kumar, "Theory of Automata Languages and Computation", first edition Tata McGrawHill Education Pvt. Ltd., New Delhi, 2010.

REFERENCE BOOKS:

1. S.N.Sivanadam , M.Janaki Meena, " Theory of Computation" , I.K.International Publishing HousePvt. Ltd, ISBN: 9789380026206, 2009.

2. Michael Sipser , "Introduction to the Theory of Computation", third edition, PWS Publications, Boston, 2013.

3. Harry R. Lewis, Chris H Papadimitriou, "Elements of the Theory of Computation", Second Edition,

PHI / Pearson Education, New Delhi, 1997.

4. Peter Linz, "An Introduction to Formal Language and Automata", fifth edition, Narosa Publishers, New Delhi, 2011.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Construct automata, regular expression for any pattern	3				1		2	3					1		2
CO2	Design grammars and Automata (recognizers) for different language classes	3		1		1		2	3							2
CO3	Write Context free grammar for any construct	3				1		2	3							2
CO4	Design Turing machines for any language and propose computation solutions using Turing Machines	3	2			1		2	3							2
CO5	Derive whether a problem is decidable or not	3				1		2	3							2

518CIP06 MICROPROCESSOR AND MICRICONTROLLER LABORATORY L T P C
0 0 2 1

COURSE OBJECTIVES:

At the end of the course ,the students should be able to:

- Develop the code in assembly language programming.
- Test the developed code using 8086 processors and 8051 controllers.
- Demonstrate the interface peripherals with microprocessor andmicrocontroller
- Integrate the peripherals for real world applications.
  Design the various ALU for analysis of microprocessor and microcontroller

LIST OF EXPERIMENTS

I. 8086 BASED EXPERIMENTS

1. 16 bit arithmetic operation using 8086.
2. Generate a Fibonacci series using 8086.
3. Searching Largest Number and Smallest Number in an array using 8086.
4. To generate factorial of number using 8086.
5. String manipulation using 8086.

II. 8051 BASED EXPERIMENTS

6. 8-bit arithmetic operations using 8051 microcontroller
7. Design of simple ALU using 8051 microcontroller.
8. Searching Largest Number and smallest number in an array using 8051.
9. 9.Solve the logic equations using 8051 microcontroller.

III. INTERFACING EXPERIMENTS WITH 8086/8051

10.Traffic light controller

11.Stepper motor interfacing

12. 12.8279 keyboard/display controller

13.ADC and DAC interfacing

COURSE OUTCOMES:

Upon Completion of this course, students will be able to :

- Generate the code for arithmetic operations in assembly language
- Generalize the developed code using 8086 processors and 8051 controllers
- Generalize the developed code using 8086 processors and 8051 controllers.
- Reorganize the Interfacing peripherals with microprocessor and microcontroller
- Interpolate the peripherals for real world applications.
- Propose the various ALU for analysis of microprocessor and microcontroller

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Generate the code for arithmetic operations in assembly language	3			3	2	3	1	3						1	
CO2	Generalize the developed code using 8086 processors and 8051 controllers	3		1	3	2	3	1	3						1	
CO3	Reorganize the Interfacing peripherals with microprocessor and microcontroller	3			3	2	3	1	3						1	
CO4	Interpolate the peripherals for real world applications.	3	2		3	2	3	1	3						1	
CO5	Propose the various ALU for analysis of microprocessor and microcontroller	3			3	2	3	1	3						1	

518CSP07 OBJECT ORIENTED ANALYSIS AND DESIGN LABORATORY L T P C

0 0 4 1

OBJECTIVES:

The student should be made to:

- Learn the basics of OO analysis and design skills.
- Get exposed to the UML design diagrams.
- Learn to map design to code.
- Be familiar with the various testing techniques.

Prerequisite: Fundamentals of Computing & C Programming, Object Oriented Programming

LIST OF EXPERIMENTS:

Prepare the following documents for two or three of the experiments listed below and develop the software engineering methodology.

1. **Project Analysis -** Prepare Project Plan by Thorough study of the problem – Identifying project scope, Objectives, Infrastructure.
2. **Software requirement Analysis -** Describe the individual Phases / Modules of the project, Identify deliverables.
3. **System Modeling -** Preparing Class Diagram, Object Diagram, Interaction diagrams, sequence diagrams, collaboration diagrams, state diagrams, activity diagrams, Package diagrams, deployment diagrams, component diagrams.
4. **Data Modeling** - E-R Diagrams and Data dictionary
5. **Software Development and Debugging**
6. **Software Testing -** Prepare test plan test cases and perform validation testing.

SUGGESTED LIST OF APPLICATIONS

1. Payroll System
2. Library Management System
3. Feedback System
4. Internal Marks System
5. Quiz System
6. Online Ticket Reservation System
7. Course Registration System
8. Dashboard System
9. ATM Systems
10. Stock Maintenance
11. Real-Time Scheduler
12. Deposit Monitoring System

COURSE OUTCOMES:

At the end of the course student should be able to

CO1: Prepare a project plan by analyzing project scope and objectives by using OO concepts.
CO2: Design & develop UML diagrams.
CO3: Get knowledge on Argo UML tool for developing UML diagrams.
CO4: Compare test cases, test plan for an application project

LIST OF EQUIPMENTS AND SOFTWARE FOR A BATCH OF 36 STUDENTS

PC	:	36 Nos.
OS	:	Windows 2000/ Windows XP/ NT (or) Higher

Software : ArgoUML (freeware) – to be installed in all PC's.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Prepare a project plan by analyzing project scope and objectives by using OO concepts.	3				3	3		2	2	1					2
CO2	Design & develop UML diagrams.	3		1		3	3		2	2	1					2
CO3	Get knowledge on Argo UML tool for developing UML diagrams.	3				3	3		2	2	1					2
CO4	Compare test cases, test plan for an application project	3	2			3	3		2	2	1					2

518CIP08 EMPLOYABILITY SKILLS LABORATORY L T P C
1 0 3 1

COURSE OBJECTIVES:

1. To equip students of engineering and technology with effective speaking and listening skills in English.
2. To help them enrich their soft skills and interpersonal skills, which will make the transition from college to workplace smoother and help them excel in their career.
3. To enhance the performance of the students in the recruitment processes, self enhancement and launching start ups.

UNIT 1: LISTENING **7**

Listening Audios and answering MCQs - Watching video clips on famous speeches, motivational videos, documentaries and answering MCQs - Listening Comprehension and TED talks.

UNIT 2: SPEAKING **10**

Prepared talk - Extempore - story knitting - Picture Talk - Brainstorming - Debate - Group Discussion - Elevator Speech - Mock HR Interviews - Story Narration - Miming - Short Skits.

UNIT 3: READING **12**

Reading Comprehension - Verbal Analogy - Classification - Alphabet Test - Logical Sequence of Words - Statement & Conclusions - Statement & Courses of Action - Situation Reaction Test -Theme Detection - Deriving Conclusions from Passages.

UNIT 4: WRITING **7**

Business Letters - Email Writing - Essay Writing - Paragraph Writing - Paraphrasing.

UNIT 5: CAREER SKILLS **9**

Vocabulary Test (GRE, TOEFL, TOEIC & CAT Exam words) - Confused Pair of words - Contronyms - One Word Substitution - Sequencing of Sentences – Sentence correction.

TOTAL : 45 PERIODS

LAB REQUIREMENTS:

1. Teacher console and systems for students.
2. English Language Lab Software
3. Career Lab Software

COURSE OUTCOMES:

On completion of the course, the students shall have the ability to:

CO1: Comprehend the various strategies of listening and its significance.
CO2: Articulate their views clearly and concisely with self-confidence and persuasiveness.
CO3: Understand the prevailing practices of testing in the recruitment process by the corporatesand the institutional selection processes.
CO4: Communicate the corporate and social requirements in an impressive written mode.
CO5: Enhance their verbal skills in the screening tests competently both for recruitment and pursuing higher studies as well.

TEXT BOOKS:

1. Agarwal R. S., A Modern Approach to Verbal and Non-verbal Reasoning, Chand & Co.,New Delhi, 2012.
2. Ashraf Rizvi M. Effective Technical Communication. TATA McGraw Hill, New Delhi: 2007.

REFERENCES:

1. Lingua: Essays for TOEFL/IELTS, Dreamtech Press, New Delhi, 2016.
2. Lily Mangalam, Global English Comprehension, Allied Publishers Pvt. Ltd., New Delhi,2014.
3. Sharon Weiner Green and Ira K. Wolf, Barron' s GRE, Glagotia Publications Pvt. Ltd.,18th Edition, New Delhi, 2011.

4. Mohamed Elias, R. Gupta' s IELTS/TOEFL Essays, Ramesh Publishing House, 6th Edition,New Delhi, 2016.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Comprehend the various strategies of listening and its significance.	3		1			3			2	1					
CO2	Articulate their views clearly and concisely with self-confidence and persuasiveness.	3					2			1	1					
CO3	Understand the prevailing practices of testing in the recruitment process by the corporates and the institutional selection processes.	3								2	1					
CO4	Communicate the corporate and social requirements in an impressive written mode.	3	2							1	1					
CO5	Enhance their verbal skills in the screening tests competently both for recruitment and pursuing higher studies as well.	3									1					

518CIE01 C# AND .NET PROGRAMMING L T P C

3 0 0 3

OBJECTIVE(S):

- To understand the fundamentals of .NET Programming
- To develop real time applications using C#
- To update and enhance skills in writing Windows applications,ADO.NET and ASP.NET.

Prerequisite: Object Oriented Programming.

UNIT-I C# LANGUAGE FUNDAMENTALS 9

The Building Block of the .NET Platform (CLR,CTS, and CLS) – Overview of Assemblies - The Anatomy of a Simple C# Program - Defining Classes and Creating Objects - The System Console Class-Establishing Member Visibility - Default Values of Class Member Variables- Member Variable Initialization Syntax- Static Keyword - Method Parameter Modifiers - Iteration Constructs - Decision Constructs and the Relational / Equality Operators - Understanding Value Types and Reference Types-Boxing and Unboxing - Working with .NET Enumerations - Overriding Some Default Behaviors of System. Object - The System Data Types - String Data Type - .NET Array Types - Custom Namespaces.

UNIT-II OBJECT ORIENTED PROGRAMMING WITH C# 9

Understanding the C# Class Type - Reviewing the Pillars of OOP - The First Pillars: C#'s Encapsulation Services, The Second Pillar: C#'s Inheritance Support - Programming for Containment/Delegation - The Third Pillar: C#'s Polymorphic Support-C# Casting Rules - Understanding Object Lifetime - Basics of Object Lifetime - Role of Application Roots - Garbage Collection - Building Finalizable and Disposable Types. Exception Handling - Throwing a Generic Exception - Catching Exceptions.

UNIT-III INTERFACES, COLLECTIONS, DELEGATES, EVENTS AND LAMDAEXPRESSION 9

Defining Interfaces in C#-Implementing an Interface in C# - Contrasting Interfaces to Abstract Base Classes-Building Interface Hierarchies - Building Enumerable Types (IEnumerable and IEnumerator) Building Cloneable Objects (ICloneable) -Building Comparable Objects (IComparable) -The Interfaces of the System - Collections Namespace - Defining a Delegate in C# -Simplest Possible Delegate Example-Enabling Multicasting -C# Events - LamdasExpression.

UNIT-IV DEVELOPING WINDOW APPLICATION FORMS 9

Windows Forms Types - Application Class- Functionality of the Control Class - Functionality of the Form Class- Building Windows Applications - Working with StatusStrips - Working with ToolStrips - Building an MDI Application - Basic Controls.

UNIT-V ADO.NETAND ASP.NET 9

ADO.NET Overview – Using Database Connections, Commands, The Data Reader, The DataSet Class,ASP.NET Introduction – Web Forms – ADO.NET and Data Binding-ASP.NET Features – User and Custom Controls – Master Pages- Site Navigation – Security.

TOTAL: 45 HOURS

COURSE OUTCOMES:

At the end of the course students should be able to:

CO1: Understand anatomy of C# Programming

CO2: Develop Console application using object oriented concepts, advanced features in C#.

CO3: Develop Window form application with Database connectivity.

CO4: Build Applications using ADO.NETAND ASP.NET**.**

TEXT BOOKS:

1. Andrew Troelsen, "Pro C# 5.0 and the .NET 4.5 Framework" Apress, Sixth Edition,2012ISBN: 978-1-4302-4233-8
2. Christian Nagel et al. "Professional C# 2012 with .NET 4.5", Wiley India, 2012.

REFERENCE BOOKS:

1. Herbert Schildt, "The Complete Reference: C# 4.0", Tata McGraw Hill, 2012.
2. E. Balagurusamy, "Programming in C#", Tata McGraw-Hill, 2004.
3. O`Reilly "Programming C# 5.0" ,O'Reilly Media ISBN: 978-1-4493-2041-6 | ISBN 10:1-4493-2041-4, October 2012.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Understand anatomy of C# Programming	3				3		1								2
CO2	Develop Console application using object oriented concepts, advanced features in C#.	3		1		3	2	2	3							1
CO3	: Develop Window form application with Database connectivity.	3				2	2	1	2							1
CO4	Build Applications using ADO.NETAND ASP.NET.	3	2			2	2	1	2							2

518CSE02 SCRIPTING LANGUAGE L T P C
3 0 0 3

PREREQUISITE: Fundamentals of Computing and C Programming, Object oriented programming

OBJECTIVES:

- Demonstrates an in depth understanding of tools and scripting languages necessary for design and development of applications.
- Explores the nature of scripting and provides skills in scripting language design.
- Learn to write simple scripts to automate system using appropriate languages.
- Conceive basics of text processing, client and server level scripting and GUI programming.

UNIT I INTRODUCTION TO SCRIPTING AND PERL 9

Scripts and Programs - Origin of Scripting - Characteristics of Scripting Languages - Uses of Scripting Languages - Web Scripting. Perl backgrounder- Perl overview - Perl parsing rules - Variables and Data - Statements and Control structures –Subroutines - Packages - Modules - Working with Files - Data Manipulation.

UNIT II Introduction to PHP 9

Introduction - Programming in web environment - variables – constants - data types - operators -

Statements - Functions - Arrays – OOP: Classes and Objects-Constructor- Inheritance- Overloading and overriding - String Manipulation and regular expressions - File handling and data storage.

UNIT III PHP and MySQL

Setting up webpages to communicate with PHP – Handling Form Controls -PHP and MySQL database - PHP Connectivity - Sending and receiving E-mails - Debugging and error handling - PHP Frameworks: Codeignter – Laravel.

UNIT IV OOC AND DB INTEGRATION IN PYTHON 9

Python Basics - Introduction to OOC – Classes and Instances **–** Static and Class Methods – Composition – Inheritance – Built-in Functions – Integrated Web Applications in Python - Python and MySQL Database Integration: Connect Database – Create and Insert Operations – Parameter Passing – Retrieving data from Database. Case Study on SciPy, Django, Open CV.

UNIT V INTRODUCTION TO RUBY 9

Introduction to Ruby - Core Programming Elements – Conditional Structures – Loop Structures – Arrays – Using Objects - Defining Classes and Creating Objects - Object Inheritance – FileInput/Output.

TOTAL HOURS: 45 HOURS

COURSE OUTCOMES:

At the end of the course the students should be able to

CO1: Apply Perl scripts in application development and data analysis
CO2: Develop Web based application using PHP and MySQL
CO3: Design and implement short and efficient Python scripts for longer constructs.
CO4: Illustrate Ruby scripts in application development

TEXT BOOKs

1. Martin C. Brown, "Perl: The Complete Reference", 2nd Edition, Tata McGraw-Hill Publishing Company Limited, Indian Reprint 2012.
2. Steve Suehring, "PHP6& MySQL Bible", John Wiley Publishing Inc., Reprint 2010.
3. Wesley J. Chun, "Core Python Programming", Prentice Hall, 2010.
4. Ophir Frieder, Gideon Frieder and David Grossman, "Computer Science Programming Basics with Ruby", First Edition, O'Reilly, 2013.

REFERENCES

1. RasmusLerdorf and Levin Tatroe, "Programming PHP", O'Reilly, 2012.
2. Tom Christiansen, Jon Orwant, Larry Wall, Brian Foy, "Programming Perl", 4th Edition, O'Reilly Media, 2012.
3. Steven Holzner, "PHP: The Complete Reference", 2nd Edition, Tata McGraw-Hill Publishing Company Limited, Indian Reprint 2010.
   Paul Barry, "Head First Python", O'Reilly Media, 2010

ONLINE REFERENCES

1. https://www.perl.org/
2. http://php.net/manual/en/
3. http://www.learnpython.org/
4. http://www.pythontutor.com/
5. http://www.diveintopython3.net./

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Apply Perl scripts in application development and data analysis.	3		1		3	2		2							2
CO2	Develop Web based application using PHP and MySQL	3				3	3		2							2
CO3	Design and implement short and efficient Python scripts for longer constructs.	3	2			2	3		2							2
CO4	Illustrate Ruby scripts in application development	3				3	2		2							2

518CIE03 ADVANCED JAVA PROGRAMMING L T P C
3 0 0 3

PREREQUISITE: JAVA PROGRAMMING

AIM:

To enable the students to design and develop enterprise wide distributed and multitier applications using advanced Java Technology.

OBJECTIVES:

- To learn advanced Java programming concepts like Servlets, Session management and JDBCin Servlets.
- To develop java Beans Application in Java
- To understand the concepts of EJB and implementation of EJB
- To understand the concept of RMI and ORB
- To understand the basic concepts of JSP and javamail API

UNIT I SERVLETS AND SESSION MANAGEMENT 9

Servlet overview – the Java web server – your first servlet – servlet chaining – server side includes- Session management – security – HTML forms – using JDBC in servlets – applet to servlet communication.

UNIT II JAVA BEANS APPLICATION DEVELOPMENT 9

Java Beans: The software component assembly model- The java beans development kit- developing beans – notable beans – using infobus - Glasgow developments - Application Builder tool- JAR files- Introspection-Bound Properties-Persistence-customizers - java beans API.

UNIT III ENTERPRISE JAVA BEANS 9

EJB: EJB architecture- EJB requirements – design and implementation – EJB session beans- EJB entity beans-EJB Clients – deployment tips, tricks and traps for building distributed and other systems – implementation and future directions of EJB-Variable in perl- perl control structures and operators – functions and scope

UNIT IV RMI AND OBJECT REQUEST BROKER 9

RMI – Overview – Developing applications with RMI: Declaring & Implementing remote interfaces-stubs & skeletons, Registering remote objects, writing RMI clients –Pushing data from RMI Servlet – RMI over Inter- ORB Protocol

UNIT V JAVA SERVER PAGES AND JAVAMAIL API 9

JSP –Introduction JSP-Examining MVC and JSP -JSP scripting elements & directives-Working with variables scopes-Error Pages - using Java Beans in JSP Working with Java Mail-Understanding Protocols in Javamail-Components-Javamail API-Integrating into J2EE-Understanding Java Messaging Services-Transactions

Total = 45 hours

COURSE OUTCOMES:

At the end of the course students will be able to

CO1: Understand the advanced concepts of Java programming such as Servlets, Session management and JDBC in servlets.

CO2: Design and develop java beans Application and implementation of EJB in Java

CO3: Develop and Implement the RMI and ORB protocol

CO4: Develop applications using JSP and javamail API.

CO5: Gain the knowledge of Server Side programming by implementing Servlet and JSP.

TEXT BOOKS:

1. H. Schildt, 2014, Java 2 Complete Reference, 9th Edition, Tata McGraw Hill, New Delhi.
2. J. McGovern,R. Adatia,Y. Fain, 2003, J2EE 1.4 Bible, Wiley-dreamtech India Pvt. Ltd, NewDelhi

REFERENCE(S):

1. K. Moss, 1999, Java Servlets, Second edition, Tata McGraw Hill, New Delhi.
2. D. R.Callaway,1999, Inside Servlets, Addison Wesley, Boston
3. Joseph O'Neil, 2010, Java Beans from the Ground Up, Tata McGraw Hill, New Delhi.
4. TomValesky, Enterprise Java Beans, Addison Wesley.
5. Cay S Horstmann & Gary Cornell, Core Java Vol II Advanced Features, Addison Wesley.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Understand the advanced concepts of Java programming such as Servlets, Session management and JDBC in servlet .	3			1	3	2	1	2							2
CO2	Design and develop java beans Application and implementation of EJB in Java	3		1		3	2	2	2							2
CO3	Develop and Implement the RMI and ORB protocol	3			1	2	1		1							1
CO4	Develop applications using JSP and javamail API	3			1	3	2	1	2							2
CO5	Gain the knowledge of Server Side programming by implementing Servlet and JSP.	3	2		2	3	2	2	2							2

518CSE04 SOFTWARE TESTING L T P C
3 0 0 3

PREREQUISITES: NIL

OBJECTIVES:

The student should be made to:

- To learn the criteria for test cases.
- To learn the design of test cases.
- To understand test management and test automation techniques.
- To apply test metrics and measurements.

UNIT – I INTRODUCTION 9

Testing as an Engineering Activity – Testing as a Process – Testing Maturity Model- Testing axioms – Basic definitions – Software Testing Principles – The Tester's Role in a Software Development

Organization – Origins of Defects – Cost of defects – Defect Classes – The Defect Repository and Test Design –Defect Examples- Developer/Tester Support of Developing a Defect Repository.

UNIT - II TEST CASE DESIGN STRATEGIES **9**

Test case Design Strategies – Using Black Box Approach to Test Case Design – Boundary Value Analysis – Equivalence Class Partitioning – State based testing – Cause-effect graphing – Compatibility testing – user documentation testing – domain testing - Random Testing – Requirements based testing – Using White Box Approach to Test design – Test Adequacy Criteria – static testing vs. structural testing –code functional testing – Coverage and Control Flow Graphs – Covering Code Logic – Paths – code complexity testing – Additional White box testing approaches- Evaluating Test Adequacy Criteria.

UNIT - III LEVELS OF TESTING **9**

The need for Levels of Testing – Unit Test – Unit Test Planning – Designing the Unit Tests – The Test Harness – Running the Unit tests and Recording results – Integration tests – Designing Integration Tests – Integration Test Planning – Scenario testing – Defect bash elimination System Testing – Acceptance testing – Performance testing – Regression Testing – Internationalization testing – Ad-hoc testing – Alpha, Beta Tests – Testing OO systems – Usability and Accessibility testing – Configuration testing – Compatibility testing – Testing the documentation – Website testing.

UNIT - IV TEST MANAGEMENT **9**

People and organizational issues in testing – Organization structures for testing teams – testing services –Test Planning – Test Plan Components – Test Plan Attachments – Locating Test Items – test management

– test process – Reporting Test Results – Introducing the test specialist – Skills needed by a test specialist

– Building a Testing Group- The Structure of Testing Group- .The Technical Training Program.
CaseStudy : FitNesse, Mozilla Testopia, Bromine, Test Case Web (TCW)

UNIT - V TEST AUTOMATION **9**

Software test automation - skills needed for automation - scope of automation - design and architecture for automation - requirements for a test tool - challenges in automation - Test metrics and measurements - project, progress and productivity metrics. **Case Study: Selenium, Appium**

TOTAL HOURS: 45 HOURS

COURSE OUTCOMES
At the end of the course the students will be able to:
CO1: Design test cases suitable for a software development for different domains.
CO2: Identify suitable tests to be carried out.
CO3: Prepare test planning based on the document.
CO4: Document test plans and test cases designed.
CO5**:** Use automatic testing tools.

TEXT BOOKS:

1. Srinivasan Desikan and Gopalaswamy Ramesh, "Software Testing - Principles and Practices",Pearson Education, 2006.
2. Ron Patton, "Software Testing", Second Edition, Sams Publishing, Pearson Education, 2007.

REFERENCES:

1. Ilene Burnstein, - Practical Software Testing, Springer International Edition, 2003.
2. Edward Kit Software Testing in the Real World - Improving the Process, Pearson Education,1995.
3. Boris Beizer, Software Testing Techniques – 2nd Edition, Van Nostrand Reinhold, New York,1990.
4. Aditya P. Mathur, - Foundations of Software Testing - Fundamental Algorithms and Techniques,Dorling Kindersley (India) Pvt. Ltd., Pearson Education, 2008.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Design test cases suitable for a software development for different domains..	3				3	3	2	2	2					2	2
CO2	Identify suitable tests to be carried out.	3		1		3	3	1	1							2
CO3	Prepare test planning based on the document.	3				1	1	1	2						1	2
CO4	Document test plans and test cases designed.	3		1		3	3	1	2	1						2
CO5	Use automatic testing tools.	3	2			3	3	2	2	2					2	2

518CSE05 COMPUTER GRAPHICS AND MULTIMEDIA SYSTEMS L T P C
3 0 0 3

PREREQUISITES: NIL

OBJECTIVES:

- Acquire knowledge on Display Devices and OpenGL Programming.
- Design and develop Two Dimensional Graphics.
- Learn Three Dimensional Graphics and Visible Surface Detection Methods.
- Gain knowledge on Multimedia Data Structures and Databases.
- Use Compression Techniques and Multimedia Applications in Real World Problems.

UNIT I INTRODUCTION TO GRAPHICS 9

Overview of Display Devices-Introduction to OpenGL - Point Functions - Line Functions - Fill-Area Functions - Character Functions - Color Functions - Output Primitives - Line Drawing Algorithms - DDA, Bresenham's Algorithm - Circle Generating Algorithm - Mid-Point Circle Algorithm - Ellipse generating Algorithm - Mid-Point Ellipse Algorithm.

UNIT II TWO DIMENSIONAL GRAPHICS 9

Coordinate Systems - Two Dimensional Geometric Transformations -OpenGL Functions for Two Dimensional Geometric Transformation -Two Dimensional Viewing - Two Dimensional Viewing Pipeline - Clipping Window- OpenGL Functions for Two Dimensional Viewing - Clipping Algorithms - Line Clipping Algorithms - Cohen Sutherland - Nicholl-Lee-Nicholl - Polygon Clipping Algorithm - Sutherland Hodgeman Algorithm - Curve Clipping - Text Clipping.

UNIT III THREE DIMENSIONAL GRAPHICS 9

Three Dimensional Geometric Transformations - Affine Transformations - OpenGL Functions for Three Dimensional Geometric Transformation- Three Dimensional Viewing - Three Dimensional Viewing Pipeline - OpenGL Functions for Three Dimensional Viewing - Visible Surface Detection Methods - Depth Buffer Method - A-Buffer Method - BSP Tree Method - Ray Casting Method - Wire Frame Visibility Method - Color Models -RGB Color Model - CMY and CMYK Color Models - HSV and HLS Color Models.

UNIT IV MULTIMEDIA BASICS 9

Components of Multimedia - Multimedia Software Tools - File Formats - Multimedia Data Structures - KD Trees - Insertion - Deletion - Search - Elements - Multimedia Databases - Design and Architecture - Text/Document Database - Precision and Recall - Retrieval Technique - Video Database - Video Segmentation - Video Standards - Audio Database - General Model - Capturing Audio Content - IndexingAudio Content.

UNIT V MULTIMEDIA APPLICATIONS 9

Media Compression - Lossless Compression - Compression Algorithms - Run Length - VLC - Lossless Image Compression - Introduction to Lossy Compression -Multimedia Application Classes - Types - Virtual Reality Design - Components - Design Issues - Multimedia Authoring Systems - Hypermedia Application Design Consideration - User Interface Design - Augmented Reality.

TOTAL HOURS: 45

COURSE OUTCOMES:

At the end f the course the students will be able to

CO1: Create Interactive Computer Graphics using OpenGL.

CO2: Develop Two Dimensional Transformations and Clipping Algorithms.

CO3: Design and Apply Three Dimensional Graphics and Visible Surface Detection Methods.

CO4: Explore different Multimedia Data Structures and Databases.

CO5: Apply Compression Techniques and Multimedia Applications in Real Time Problems.

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TEXTBOOKS:

- Donald D. Hearn, M. Pauline Baker and Warren Carithers, "Computer Graphics with OpenGL", FourthEdition, Prentice Hall, 2010.
- V.S.Subramanian, "Principles of Multimedia Database Systems", Harcourt India PvLtd., 2001 Prabhat K Andleigh, Kiran Thakrar, "Multimedia Systems Design", First EditionPHI2008.

REFERENCES:

- Ze-Nian Li and Mark S Drew, "Fundamentals of Multimedia", Pearson Prentice Hall, 2004.
- Ralf Steinmetz, Klara Steinmetz, "Multimedia Computing, Communications and Applications",Pearson Education, 2009.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Create Interactive Computer Graphics using OpenGL .	3				3	1	1	3							
CO2	Develop Two Dimensional Transformations and Clipping Algorithms	3		1		3	1	1	3							
CO3	Design and Apply Three Dimensional Graphics and Visible Surface Detection Methods.	3				3	1	1	3							
CO4	Explore different Multimedia Data Structures and Databases.	3	2			3	1	1	3							
CO5	Apply Compression Techniques and Multimedia Applications in Real Time Problems.	3				3	1	1	3							

71CIT01 CRYPTOGRAPHY AND SECURITY IN COMPUTING L T P C
3 0 0 3

Prerequisite: Computer Networks

OBJECTIVES:

- Learn the fundamentals of Cryptography.
- Comprehend the Mathematical Foundations of Security Principles.
- Describe the principles of Public Key Cryptosystem, Hash Function, Key Management andInternet Security.
- Gain knowledge about Security in Network and Program.

UNIT-I SYMMETRIC KEY ENCRYPTION 10

Overview - Classical Encryption Techniques -Block Ciphers and the Data Encryption Standard - Block Cipher Operation - Advanced Encryption Standard: AES Structure, AES Transformation Function - **RC6**.

UNIT-II NUMBER THEORY AND PUBLIC KEY ENCRYPTION 10

Basic Concepts in Number Theory: Prime Numbers, Modular Arithmetic, The Euclidean Algorithm , Fermat's and Euler's Theorem**-** Testing for Primality - The Chinese Remainder Theorem **-** PublicKey Cryptography a-**Diffie Hellman Key Exchange and** RSA - Cryptographic Hash Functions: Applications, Secure Hash Algorithm (SHA) - Digital Signature - DSS ,RSA **and Elgamal Digital Signature**.

UNIT-III KEY MANAGEMENT AND INTERNET SECURITY 9

Key Management and Distribution - Authentication Applications: Kerberos - **Biometrics** - Electronic Mail Security: PGP, S/MIME - IP Security Overview.

UNIT-IV SECURITY IN NETWORKS 8

Threats in Networks - Firewalls: Design, Types, and Configuration -Intrusion Detection System: Types, Goals, Strengths and Limitations, Snort.

UNIT-V PROGRAM SECURITY 8

Secure Programs - Nonmalicious Program Errors - Viruses and other Malicious Code -TargetedMalicious Code - Control against Program Threats.

TOTAL: 45

COURSE OUTCOMES:

At the end of the course the students are able to

CO1: Convert Plain text to Cipher text using classical and symmetric encryption techniques.

CO2: Apply number theory concepts and algorithms of public key cryptosystems to performencryption and decryption.

CO3: Apply key management and authentication techniques to provide secure Communication.

CO4: Understand the importance of firewalls and intrusion Detection System.

CO5: Discover and identify abnormalities within the network caused by worms, viruses andprogram threats.

TEXT BOOKS:

1. William Stallings, "Cryptography and Network Security, Seventh Edition, Prentice Hall, NewDelhi, 2017.
2. Charles P.Pfleeger,Shari Lawrence Pfleeger, "Security in Computing", FifthEdition,PrenticeHall, 2018.

REFERENCE BOOKS:

1. Behrouz A Forouzan, "Cryptography and Network Security", Tata McGraw Hill Education Pvt.Ltd., New Delhi, 2010.

2. AtulKahate," Cryptography and Network Security",ThirdEdition,McGraw Hill Education Pvt.Ltd., New Delhi, 2013.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Convert Plain text to Cipher text using classical and symmetric encryption techniques.	3			2	1									1	
CO2	Apply number theory concepts and algorithms of public key cryptosystems to performencryption and decryption.	3		1	3	3		2							1	
CO3	Apply key management and authentication techniques to provide secure Communication.	3		1	2	3		2			3				1	
CO4	Understand the importance of firewalls and intrusion Detection System.	3	2		3										1	
CO5	Discover and identify abnormalities within the network caused by worms, viruses andprogram threats.	3			2	3		1			3				1	

718CST02 MACHINE LEARNING TECHNIQUES L T P C
3 0 0 3

OBJECTIVES:

- To understand the basic concepts and techniques of Machine Learning.
- To have a thorough understanding of the widely used Machine learning algorithms

- To be familiar with different dimensionality reduction methods.
- To recognize various tree, deterministic, evolutionary and graphical models of machine learning algorithms

UNIT I INTRODUCTION 9

Learning – Types of Machine Learning – Supervised Learning – The Brain and the Neuron – Design a Learning System – Perspectives and Issues in Machine Learning – Concept Learning Task – Concept Learning as Search – Finding a Maximally Specific Hypothesis – Version Spaces and the Candidate Elimination Algorithm – Linear Discriminants – Perceptron – Linear Separability

– Linear Regression.

UNIT II LINEAR MODELS 9

Multi-layer Perceptron – Going Forwards – Going Backwards: Back Propagation Error – Multi- layer Perceptron in Practice – Examples of using the MLP – Overview – Deriving Back- Propagation – Radial Basis Functions and Splines – Concepts – RBF Network – Curse of Dimensionality – Interpolations and Basis Functions – Support Vector Machines

UNIT III TREE AND PROBABILISTIC MODELS 9

Learning with Trees – Decision Trees – Constructing Decision Trees – Classification and Regression Trees – Ensemble Learning – Boosting – Bagging – Different ways to Combine Classifiers – Probability and Learning – Data into Probabilities – Basic Statistics – Gaussian Mixture Models – Nearest Neighbor Methods – Unsupervised Learning – K means Algorithms – Vector Quantization – Self Organizing Feature Map

UNIT IV DIMENSIONALITY REDUCTION AND EVOLUTIONARY MODELS 9

Dimensionality Reduction – Linear Discriminant Analysis – Principal Component Analysis – Factor Analysis – Independent Component Analysis – Locally Linear Embedding – Isomap – Least Squares Optimization – Evolutionary Learning – Genetic algorithms – Genetic Offspring: - Genetic Operators – Using Genetic Algorithms – Reinforcement Learning – Overview – Getting Lost Example – Markov Decision Process

UNIT V GRAPHICAL MODELS 9

Markov Chain Monte Carlo Methods – Sampling – Proposal Distribution – Markov Chain Monte Carlo – Graphical Models – Bayesian Networks – Markov Random Fields – Hidden Markov Models – Tracking Methods

TOTAL: 45 PERIODS

COURSE OUTCOMES

At the end of the course the students are able to

CO1: Distinguish between, supervised, unsupervised and semi-supervised learning
CO2: Apply the suitable machine learning strategy to real-world applications.
CO3: Suggest supervised, unsupervised or semi-supervised learning algorithms for any given problem
CO4: Modify existing machine learning algorithms to improve classification efficiency
CO5: Design systems that uses the appropriate graph models of machine learning

UNIT V GRAPHICAL MODELS **9**

Markov Chain Monte Carlo Methods – Sampling – Proposal Distribution – Markov Chain Monte Carlo – Graphical Models – Bayesian Networks – Markov Random Fields – Hidden Markov Models – Tracking Methods

TOTAL: 45 PERIODS

COURSE OUTCOMES

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CO4: Modify existing machine learning algorithms to improve classification efficiency
CO5: Design systems that uses the appropriate graph models of machine learning

TEXT BOOK:

1. Stephen Marsland, —Machine Learning – An Algorithmic Perspective, Second Edition,Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.
2. Tom M Mitchell, —Machine Learning, First Edition, McGraw Hill Education, 2013.

REFERENCE BOOKS:

1. Peter Flach, —Machine Learning: The Art and Science of Algorithms that Make Sense ofData, First Edition, Cambridge University Press, 2012.
2. Jason Bell, —Machine learning – Hands on for Developers and Technical Professionals, First Edition, Wiley, 2014
3. Ethem Alpaydin, —Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series), Third Edition, MIT Press, 2014.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Distinguish between, supervised, unsupervised and semi-supervised learning	3							2					1		
CO2	Apply the suitable machine learning strategy to real-world applications.	3		1			2	2								
CO3	Suggest supervised, unsupervised or semi-supervised learning algorithms for any givenproblem	3		1			1		3					3		
CO4	Modify existing machine learning algorithms to improve classification efficiency	3	2					2						1		
CO5	Design systems that uses the appropriate graph models of machine learning	3					3	3	3							

718CST03 **MOBILE COMPUTING** **L T P C**
3 0 0 3

OBJECTIVES:

- To understand the basic concepts of mobile computing.
- To learn the basics of mobile telecommunication system.
- To be familiar with the network layer protocols and Ad-Hoc networks.
- To know the basis of transport and application layer protocols.
- To gain knowledge advances in mobile computing and application

UNIT I INTRODUCTION **9**

Introduction to Mobile Computing – Applications of Mobile Computing- Generations ofMobile Communication Technologies- Multiplexing – Spread spectrum -MAC Protocols – SDMA- TDMA- FDMA- CDMA

UNIT II MOBILE TELECOMMUNICATION SYSTEM **9**

Introduction to Cellular Systems - GSM – Services & Architecture – Protocols – Connection Establishment – Frequency Allocation – Routing – Mobility Management – Security – GPRS- UMTS- – Architecture – Handover - Security

UNIT III MOBILE NETWORK LAYER **9**

Mobile IP – DHCP – AdHoc– Proactive protocol-DSDV, Reactive Routing Protocols – DSR,AODV , Hybrid routing –ZRP, Multicast Routing- ODMRP, Vehicular Ad Hoc networks(VANET) –MANET Vs VANET – Security.

UNIT IV MOBILE TRANSPORT AND APPLICATION LAYER **9**

Mobile TCP– WAP – Architecture – WDP – WTLS – WTP –WSP – WAE – WTAArchitecture– WML

UNIT V ADVANCES IN MOBILE COMPUTING AND APPLICATIONS **9**

4G Networks: Introduction, features and challenges, network architecture, 5G Networks: Introduction. Comparison of 3G/4G/5G Networks. Mobile Device Operating Systems – Special Constraints & Requirements – MCommerce – Structure – Pros & Cons – Mobile Payment System – Security Issues

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course, the students should be able to:

- Explain the basics of mobile telecommunication systems
- Illustrate the generations of telecommunication systems in wireless networks
- Determine the functionality of MAC, network layer and Identify a routing protocol foragiven Ad hoc network
- Explain the functionality of Transport and Application layers
- Acquire knowledge on advances in Mobile Computing and its applications

TEXT BOOKS:

1. Jochen Schiller, —Mobile Communications‖, PHI, Second Edition, 2003.
2. Prasant Kumar Pattnaik, Rajib Mall, —Fundamentals of Mobile Computing‖, PHILearning Pvt.Ltd, New Delhi – 2012

REFERENCES

1. Dharma Prakash Agarval, Qing and An Zeng, "Introduction to Wireless and Mobile systems",Thomson Asia Pvt Ltd, 2005.
2. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, —Principles ofMobile Computing‖, Springer, 2003.
3. William.C.Y.Lee,—Mobile Cellular Telecommunications-Analog and Digital Systems‖,Second Edition,TataMcGraw Hill Edition ,2006.
4. C.K.Toh, —AdHoc Mobile Wireless Networks‖, First Edition, Pearson Education, 2002.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Explain the basics of mobile telecommunication systems.	3			3	1										1
CO2	Illustrate the generations of telecommunication systems in wireless networks	3		1	2				1							1
CO3	Determine the functionality of MAC, network layer and Identify a routing protocol for agiven Ad hoc network	3		1	3	2										2
CO4	Explain the functionality of Transport and Application layers	3	2		1	1			2							2
CO5	Acquire knowledge on advances in Mobile Computing and its applications	3			2	1			2							

718CST04 CLOUD COMPUTING L T P C
3 0 0 3

OBJECTIVES:

- To understand the concept of cloud and utility computing.
- To understand the various issues in cloud computing.
- To familiarize themselves with the lead players in cloud.
- To appreciate the emergence of cloud as the next generation computing paradigm.
- To use cloud platforms

UNIT-I INTRODUCTION **8**

Introduction - Historical Development - Cloud Computing Architecture – The Cloud Reference Model-**NIST Cloud Computing Reference Architecture** – Cloud Characteristics – Cloud Deployment Models: Public, Private, Community, Hybrid Clouds - Cloud Delivery Models: IaaS, PaaS, SaaS – Open Source Private Cloud Software: Eucalyptus, Open Nebula, Open Stack.

UNIT-II VIRTUALIZATION **9**

Data Center Technology - Virtualization - Characteristics of Virtualized Environments - Taxonomy of Virtualization Techniques – Virtualization and Cloud Computing – Pros and Cons of Virtualization - Implementation Levels of Virtualization - Tools and Mechanisms: Xen, VMWare, Microsoft Hyper-V.

UNIT-III CLOUD COMPUTING MECHANISM **10**

Cloud Infrastructure Mechanism: Cloud Storage-**Storage-as-a-Service – Advantages of Cloud Storage – Cloud Storage Providers – S3-**Cloud Usage Monitor, Resource Replication – Specialized Cloud Mechanism: Load Balancer, SLA Monitor, Pay-per-use Monitor, Audit Monitor, Failover System, Hypervisor, Resource Cluster, Multi Device Broker, State Management Database – Cloud Management Mechanism: Remote Administration System, Resource Management System, SLA Management System, Billing Management System.

UNIT-IV HADOOP AND MAP REDUCE **9**

Apache Hadoop – Hadoop Map Reduce – Hadoop Distributed File System- Hadoop I/O- Developing a Map Reduce Application - Map Reduce Types and Formats - Map Reduce Features– Hadoop Cluster Setup – Administering Hadoop.

UNIT-V SECURITY IN THE CLOUD **9**

Basic Terms and Concepts – Threat Agents – Cloud Security Threats – Cloud Security Mechanism: Encryption, Hashing, Digital Signature, Public Key Infrastructure, Identity and Access Management, Single Sign-on, Cloud Based Security Groups, Hardened Virtual Server Images

TOTAL HOURS: 45

COURSE OUTCOMES:

Upon completion of the course, the students will be able to:

CO1: Articulate the main concepts, key technologies, strengths and limitations of cloud Computing.

CO2: Choose the appropriate technologies, algorithms and approaches for the related issues in Cloud.

CO3: Identify the architecture, storage, infrastructure and delivery models of cloud computing.

CO4: Understand and apply Map and Reduce Programming.

CO5: Understand the core issues of cloud computing such as security, privacy and interoperability.

TEXT BOOK:

1. Thomas Erl, Zaigham Mahood, Ricardo uttini, “Cloud Computing, Concept, Technologyand Architecture”, Prentice Hall, 2013.

REFERENCE BOOKS:

1. Toby Velte, Anthony Velte, Robert C. Elsenpeter, - Cloud Computing, A Practical Approach Tata McGraw-Hill Edition, 2010.
2. Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, - Mastering Cloud Computing,Tata McGraw-Hill, 2013.
3. Arshdeep Bahga, Vijay Madisetti, - Cloud Computing: A Hands- On Approach‖, Universities Press, 2014.

4. Tom White, - Hadoop: The Definitive Guide, O'Reilly Media, 4th Edition, 2015.
5. James E Smith and Ravi Nair, -Virtual Machines, Elsevier, 2005.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Articulate the main concepts, key technologies, strengths and limitations of cloud Computing.	3			3		3		2		3					
CO2	Choose the appropriate technologies, algorithms and approaches for the related issues inCloud.	3			1		2		2		1					
CO3	Identify the architecture, storage, infrastructure and delivery models of cloud computing.	3		1			3		3		2					
CO4	Understand and apply Map and Reduce Programming	3		1	2		1		1		2					
CO5	Understand the core issues of cloud computing such as security, privacy and interoperability	3	2				1		2		3					

718CSP07 **MACHINE LEARNING TECHNIQUES LABORATORY** **L T P C**
0 0 2 1

OBJECTIVE(S):

- Make use of Data sets in implementing the machine learning algorithms
- Identify and Implement the machine learning concepts and algorithms for various applications
- Design learning model for appropriate application
- Explore supervised and unsupervised learning algorithms for real world problems

SUGGESTED LIST OF EXPERIMENTS (ANY 5) :

The suggested list Experiments can be implemented using Java / Python

1. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.

2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.

3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.

4. Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets.

5. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.

6. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering (You can add Java/Python ML library classes/API in the program).

7. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.

TOTAL: 45

COURSE OUTCOMES:

Upon completion of the course, students will be able to:

CO1: Understand the implementation procedures for the machine learning algorithms.

CO2: Design Java/Python programs for various Learning algorithms.

CO3: Apply appropriate data sets to the Machine Learning algorithms.

CO4: Identify and apply Machine Learning algorithms to solve real world problems.

CO5: Apply effectively the Neural Networks concept for appropriate problems.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Understand the implementation procedures for the machine learning algorithms.	3			3	3										
CO2	Design Java/Python programs for various Learning algorithms	3			3		3		2		1					
CO3	Apply appropriate data sets to the Machine Learning algorithms.	3		1	3	3					2					
CO4	Identify and apply Machine Learning algorithms to solve real world problems.	3		1	3		2		3							
CO5	Apply effectively the Neural Networks concept for appropriate problems	3	2		3	2			1		3					

718CSP08 CLOUD COMPUTING LABORATORY L T P C
0 0 4 2

OBJECTIVE(S):

- Create practical exposure to virtualization concepts by creating virtual machines
- Learn Application and back end web service development
- Expose to database hosting and accessing in virtual environment
- Demonstrate the use of map and reduce
- Familiar with installation and configuration in cloud platforms

LIST OF EXPERIMENTS:

1.Design and create virtual machine configuration for the given problem. Justify the use of CPU, Memory, GPU and storage. Create the Virtual machine.

2. Create key based authentication and login virtual machine from the host machines. Install required software by connecting with SSH or Putty.
3. Install Web server in the virtual machine and create sample web application (HTML, JS) andhost. Run from the browser.
4. Create simple backend logic and communication with front end app using AJAX.
5. Create SQL DB and design schema for user session details. Retrieve the details from front end application.
6. Create user name, store the password in the SQL. Login using user name/password and validate.
7. Create and mount one node Hadoop cluster.
8. Access the Hadoop using API's from the application and show the data.
9. Demonstrate the use of map and reduce using simple program.
10. **Install and Configure Google App Engine**
11. **Design an assignment to retrieve, verify and store user credentials using firebase authentication, the Google App engine standard environment, & Google cloud datastore.**
12. **Case Study of Microsoft Azure.**

TOTAL: 45

COURSE OUTCOMES:

Upon completion of the course, students will be able to:

CO1: Design and develop highly scalable cloud-based applications by creating andconfiguring virtual machines on the cloud

CO2:.Create a sample web application

CO3: Store and retrieve the data in cloud databases.

CO4: Compare, contrast, and evaluate the key trade-offs between multiple approaches tomap reduce in cloud system design.

CO5: Develop and deploy cloud application using popular cloud platforms

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

Software: Eucalyptus or Open Nebula or equivalent, Virtual box , Ubuntu.

Hardware: Standalone desktops 30 Nos

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Design and develop highly scalable cloud-based applications by creating andconfiguring virtual machines on the cloud	3					2		3		2					
CO2	Create a sample web application	3					2		3		2					
CO3	Store and retrieve the data in cloud databases	3		1	2		3		2		2					
CO4	Compare, contrast, and evaluate the key trade-offs between multiple approaches tomap reduce in cloud system design	3		1	3		2		2		2					
CO5	Develop and deploy cloud application using popular cloud platforms	3	2		1		1									

718CIT01 INTERNET OF THINGS L T P C
3 0 0 3

OBJECTIVE(S):

- To understand the fundamentals of Internet of Things
- To learn about the basics of IOT protocols
- To build a small low cost embedded system using Raspberry Pi.
- To apply the concept of Internet of Things in the real world scenario.

Prerequisites: Nil

UNIT-I INTRODUCTION9

Introduction to Internet of Things Definition & Characteristics of IoT, Evolution of IoT, Physical Design of IoT-Things in IoT, IoT Protocols, Logical Design of IoT, IoT Functional Blocks, IoT Communication Models, IoT Communication APIs, IoT Enabling Technologies, Wireless Sensor Networks. Cloud Computing Big Data Analytics, Communication Protocols, Embedded Systems IoT Levels & Deployment Templates, IoT Level-1, IoT Level-2, IoT Level-3, IoT Level-4,IoT Level5,IoTLevel-6 .

UNIT-II IoT, M2M AND PLATFORM DESIGN METHODOLOGY9

IoT and M2M: Introduction, M2M, Difference between IoT and M2M, SDN and NFV for IoT, Software Defined Networking, Network Function Virtualization, NETCONF, YANG, IoT System Management with NETCONF-YANG, IoT Platforms Design Methodology : IoT Design Methodology , Purpose & Requirements Specification , Process Specification, Domain Model Specification, Information Model Specification, Service Specifications, IoT Level Specification, Functional View Specification, Operational View Specification, Device & Component Integration, Application Development.

UNIT-III PYTHON PACKAGES AND IOT PHYSICAL DEVICES 8

Python Packages of Interest for IoT-JSON, XML, HTTPLib & URLLib, SMTPLib, Raspberry Pi, About the Board, Linux on Raspberry Pi, Raspberry Pi Interfaces, Serial, SPI, I2C Programming Raspberry Pi with Python-Controlling LED with Raspberry Pi, Interfacing an LED and Switch with Raspberry Pi, Interfacing a Light Sensor (LDR) with Raspberry Pi, Other IoT Devices-pcDuino, Beagle Bone Black, Cubie board.

UNIT-IV IoT PHYSICAL SERVERS & CLOUD OFFERINGS 9

IoT Physical Servers & Cloud Offerings,WAMP - AutoBahn for IoT,Xively Cloud for IoT, Python Web Application Framework – Django, Django Architecture , Starting Development with Django , Designing a RESTful Web API,Amazon Web Services for IoT , Amazon EC2, Amazon AutoScaling ,Amazon S3,Amazon RDS Amazon DynamoDB, Amazon Kinesis, Amazon SQS,AmazonEMR,SkyNetIoT Messaging Platform.

UNIT-V DATA ANALYTICS FOR IoT& CASE STUDIES 10

Data Analytics for IoT-Apache Oozie, setting up Oozie, Oozie Workflows for IoT Data Analysis, ApacheSpark, Apache Storm, Setting up a Storm Cluster, Using Apache Storm for Real-time DataAnalysis, REST-based approach, Web Socket-based approach. Case Studies Illustrating IoT Design-Smart Lighting, SmartParking, Weather Monitoring System-Weather Reporting Bot, Smart Irrigation, IoT Printer, Tools for IoT-Chef, Puppet.

TOTAL: 45

COURSE OUTCOMES:

At the end of the course, the student should be able to:

CO1: Compare and analyze different design issues and domains of IoT.

CO2: Identify different design methodologies and end point devices of IoT.

CO3: Prepare different cloud based and embedded solution for IoT.

CO4: Formulate different case studies related to IoT framework.

CO5: Solve data analytical and real-time application problems on IoT.

TEXT BOOKS:

1. ArshdeepBagha ,VijayMadisetti,Internet of Things (A Hands-on-Approach), UniversityPress, 2015.

REFERENCE BOOKS:

1. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), - Architecting the Internet of Things, Springer, 2011.
2. Honbo Zhou, - The Internet of Things in the Cloud: A Middleware Perspective, CRCPress,2012.
3. Jan Ho¨ ller, Vlasios Tsiatsis , Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand. David Boyle, "From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence", Elsevier, 2014.
4. Olivier Hersent, David Boswarthick, Omar Elloumi , -The Internet of Things – Key applications andProtocols, Wiley, 2012
5. The Evolution of Internet of Things-TexasInstruments. (http://www.ti.com/lit/ml/swrb028/swrb028.pdf)

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Compare and analyze different design issues and domains of IoT.	3					3									
CO2	Identify different design methodologies and end point devices of IoT.	3		1		3	3									
CO3	Prepare different cloud based and embedded solution for IoT.	3		1			2									
CO4	Formulate different case studies related to IoT framework.	3	2			2		2					3			
CO5	Solve data analytical and real-time application problems on IoT	3				1		3					2			

718CIE02 BUILDING ENTERPRISE APPLICATION L T P C
3 0 0 3

OBJECTIVE(S):

- Building and design of the foundational enterprise IT architecture
- To evolving technology, continued improvements in enterprise applications and establishing baseline metrics is important to the sustenance of key infrastructure elements of software enterprise applications
- A Unified meta-model of elements can lead to effective business analysis from an idea that originated in order to bring rigid engineering concepts to building enterprise IT systems, Enterprise Architecture (EA) is evolving into a business-driven
- To formally capture and implement the dynamic and static elements of an enterprise to manage enterprise change

UNIT I INTRODUCTION 8

Introduction to Enterprise Applications and their Types, Software Engineering Methodologies, Life Cycle of Raising an Enterprise Application, Introduction to Skills Required to Build an Enterprise Application, Key Determinants of Successful Enterprise Applications, and Measuring the Success of Enterprise Applications.

UNIT II INCEPTING ENTERPRISE APPLICATIONS 9

Inception of Enterprise Applications, Enterprise Analysis, Business Modeling, Requirements Elicitation, Use Case Modeling, Prototyping, Non Functional Requirements, Requirements Validation, Planning and Estimation.

UNIT III ARCHITECTING AND DESIGNING ENTERPRISE APPLICATIONS 10

Concept of Architecture, Views and Viewpoints, Enterprise Architecture, Logical Architecture, Technical Architecture - Design, Different Technical Layers, Best Practices, Data Architecture and Design – Relational, XML, and Other Structured Data Representations, Infrastructure Architecture and Design Elements - Networking, Internetworking, and Communication Protocols, IT Hardware and Software, Middleware, Policies for Infrastructure Management, Deployment Strategy, Documentation of Application Architecture and Design.

UNIT IV CONSTRUCTING ENTERPRISE APPLICATIONS 9

Construction Readiness of Enterprise Applications - Defining a Construction Plan, Defining a Package Structure, Setting up a Configuration Management Plan, Setting up a Development Environment, Introduction to the Concept of Software Construction Maps, Construction of Technical Solutions Layers, Methodologies of Code Review, Static Code Analysis, Build and Testing, Dynamic Code Analysis – Code Profiling and Code Coverage**.**

UNIT V TESTING AND ROLLING OUT ENTERPRISE APPLICATIONS 9

Types and Methods of Testing an Enterprise Application, Testing Levels and Approaches, Testing Environments, Integration Testing, Performance Testing, Penetration Testing, Usability Testing, Globalization Testing and Interface Testing, User Acceptance Testing, Rolling out an Enterprise Application.

Total 45 Hrs

COURSE OUTCOMES:

At the end of the course, the student should be able to:

CO1: Understand the fundamental of Enterprise applications and key determinants to measurethe success.

CO2: Demonstrate an understanding of different modelling techniques used to design Enterprise applications.

CO3: Develop knowledge in designing Enterprise Applications.

CO4: Construct Enterprise applications by understanding the design.

CO5: Test and roll out the enterprise applications in real environment.

TEXT BOOK

1. Raising Enterprise Applications: A Software Engineering Perspective, Anubhav Pradhan Satheesha B. Nanjappa Senthil K. Nallasamy Veerakumar Esakimuthu, 1st Edition, Wiley India Pvt Ltd, 2010, ISBN:9788126519460.

REFERENCE BOOKS

1. Raffaele Garofalo, "Building Enterprise Applications with Windows Presentation Foundation and the Model View ViewModel Pattern", 1st Edition, Microsoft Press, 2011
2. Dominic Duggan, "Enterprise Software Architecture and Design Entities, Services, and Resources", 1st Edition, Wiley India Pvt Ltd, 2012
3. Martin Fowler, "Patterns of Enterprise Application Architecture", 1st Edition, Pearson/Goels Computer Hut Publisher,

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Solve data analytical and real-time application problems on IoT	3			3											
CO2	Demonstrate an understanding of different modelling techniques used to design Enterpriseapplications.	3			2	2		2								
CO3	Develop knowledge in designing Enterprise Applications.	3		1	3	1	3					3				
CO4	Construct Enterprise applications by understanding the design.	3		1	1	3	2	2				2				
CO5	Test and roll out the enterprise applications in real environment.	3	2		3			3								

718CIE03 BUSINESS INTELLIGENCE AND ITS APPLICATION L T P C
3 0 0 3

OBJECTIVE(S):

- To Understand the BI concept and frame work
- To Understand Transaction Processing and Analytical applications and describe the need for Business Intelligence
- To identify the metrics, indicators and make recommendations to achieve the business goal

UNIT I INTRODUCTION TO BUSINESS INTELLIGENCE 9

Introduction to digital data and its types – structured, semi-structured and unstructured, Introduction to OLTP and OLAP (MOLAP, ROLAP, HOLAP), BI Definitions & Concepts, BI Framework, Data Warehousing concepts and its role in BI, BI Infrastructure Components – BI Process, BI Technology, BI Roles & Responsibilities, Business Applications of BI, BI best practices

UNIT II BASICS OF DATA INTEGRATION (EXTRACTION TRANSFORMATION LOADING) 9

Concepts of data integration, needs and advantages of using data integration, introduction to common data integration approaches, Meta data - types and sources, Introduction to data quality, data profiling concepts and applications, introduction to ETL using Pentaho data Integration (formerly Kettle).

UNIT III INTRODUCTION TO MULTI-DIMENSIONAL DATA MODELING 9

Introduction to data and dimension modeling, multidimensional data model, ER Modeling vs. multi-dimensional modeling, concepts of dimensions, facts, cubes, attribute, hierarchies, star and snowflake schema, introduction to business metrics and KPIs, creating cubes using Microsoft Excel

UNIT IV BASICS OF ENTERPRISE REPORTING 9

A typical enterprise, Malcolm Baldrige - quality performance framework, balanced scorecard, enterprise dashboard, balanced scorecard vs. enterprise dashboard, enterprise reporting using MS Access / MS Excel, best practices in the design of enterprise dashboards.

UNIT IV BI AND MOBILITY 9

Understanding BI and Mobiltiy,BI and Cloud Computing, Business Intelligence for ERP systems, Social CRM and BI,Case Study-Good Food Restaurants, TenTo Ten Retails stores.

Total:45Hrs

TEXT BOOKS

1. Business Intelligence by David Loshin
2. Business intelligence for the enterprise by Mike Biere.

Fundamentals of Business Analytics by R.N.Prasad And Seema Acharya Wiley India,2011

REFERENCE BOOKS

1. Business intelligence roadmap by Larissa Terpeluk Moss, Shaku Atre
2. An introduction to Building the Data Warehouse – IBM
3. Business Intelligence For Dummies – Swain Scheps
4. Successful Business Intelligence: Secrets to making Killer BI Applications by Cindi Howson
5. Information dashboard design by Stephen Few

COURSE OUTCOMES:

At the end of the course, the student should be able to:
CO1: Understand the fundamental of business intelligence and key determinants to measurethe success.
CO2: Demonstrate an understanding of different modelling techniques used to design businessapplications and data integration.
CO3: Develop knowledge in multidimensional data model
CO4: Construct Enterprise applications by understanding the design.
CO5: Understanding BI and Mobiltiy and Cloud Computing

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Understand the fundamental of business intelligence and key determinants to measurethe success	3			3	3										
CO2	Demonstrate an understanding of different modelling techniques used to design businessapplications and data integration.	3		1	3	3										
CO3	Develop knowledge in multidimensional data model	3		1	2	2	3		3							
CO4	Construct Enterprise applications by understanding the design.	3	2		1	1	2		1							
CO5	Understanding BI and Mobiltiy and Cloud Computing	3			3	1			2							

718CIE04 INFORMATION STORAGE MANAGEMENT L T P C

3 0 0 3

OBJECTIVE(S):

- Understand logical and physical components of a storage infrastructure
- To study different types of storage area networks
- To gain knowledge in different backup and recovery topologies and their role in providing disasterrecovery and business continuity capabilities
- To gain knowledge in information security and identify different storage virtualization technologies

Pre requisites: Computer Networks, Database Systems

UNIT I INTRODUCTION TO STORAGE TECHNOLOGY 9

Review data creation and the amount of data being created and understand the value of data to a business, challenges in data storage and data management, Solutions available for data storage, Core elements of a data center infrastructure, role of each element in supporting business activities.

UNIT II STORAGE SYSTEMS ARCHITECTURE 9

Hardware and software components of the host environment, Key protocols and concepts used by each component, Physical and logical components of a connectivity environment , Major physical components of a disk drive and their function, logical constructs of a physical disk, access characteristics, and performance Implications, RAID , RAID levels, Compare and contrast integrated and modular storage systems, High-level architecture and working of an intelligent storage system

UNIT III INTRODUCTION TO NETWORKED STORAGE 9

Evolution of networked storage, Architecture, components, and topologies of FC -SAN, NAS, and IP- SAN, FCoE , iSCSI Benefits of the different networked storage options, understand the need for long- term archiving solutions and describe how CAS full fill the need, understand the appropriateness of the different networked storage options for different application environments.

UNITIV INFORMATION AVAILABILITY, MONITORING & MANAGING DATACENTER 9

Business Continuity- Information Availability, RTO and RPO, Identify single points of failure in a storage infrastructure and list solutions to mitigate these failures, Architecture of backup/recovery and the different backup/ recovery topologies, Data Deduplication, Local and Remote replication technologies. Monitoring the storage infrastructure, Information Life Cycle Management.

UNIT V SECURING STORAGE AND STORAGE VIRTUALIZATION 9

Information security, Critical security attributes for information systems, Storage security domains, List and analyzes the common threats in each domain, Virtualization technologies, block-level and file-level virtualization technologies and processes.

TOTAL: 45

COURSE OUTCOMES:

At the end of the course student should be able to

CO1: Ability to identify the key requirements of data center.

CO2: Analyze the different storage systems architecture.

CO3: Analyze different storage networking technologies.

CO4: Ability to identify key challenges in managing information and also describe the different rolein providing disaster recovery and business continuity capabilities.

CO5: Ability to identify and analyzes the common threats in different domains.

REFERENCE BOOKS:

1. EMC Corporation, Information Storage and Management, Wiley, India, 2nd Edition, 2012.
2. Robert Spalding, “Storage Networks: The Complete Reference“, Tata McGraw Hill, Osborne,2003.
3. Marc Farley, “Building Storage Networks”, Tata McGraw Hill ,Osborne, 2001.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Ability to identify the key requirements of data center .	3			3	3										
CO2	Analyze the different storage systems architecture.	3			2	3		3	3				3			
CO3	Analyze different storage networking technologies.	3		1	1				1				2			
CO4	Ability to identify key challenges in managing information and also describe the different rolein providing disaster recoveryand business continuity capabilities.	3		1		2		2								
CO5	Ability to identify and analyzes the common threats in different domains.	3	2		3	1			2							

718CIE05 AGILE SOFTWARE DEVELOPMENT L T P C
3 0 0 3

OBJECTIVES:

- To provide students with a theoretical as well as practical understanding of agile software development practices and how small teams can apply them to create high-quality software.
- To provide a good understanding of software design and a set of software technologies and APIs.
- To do a detailed examination and demonstration of Agile development and testing techniques.
- To understand the benefits and pitfalls of working in an Agile team.
- To understand Agile development and testing.

UNIT I AGILE METHODOLOGY 9

Theories for Agile Management – Agile Software Development – Traditional Model vs. Agile Model – Classification of Agile Methods – Agile Manifesto and Principles – Agile Project Management – Agile Team Interactions – Ethics in Agile Teams – Agility in Design, Testing – Agile Documentations – Agile Drivers, Capabilities and Values.

UNIT II AGILE PROCESSES 9

Lean Production – SCRUM, Crystal, Feature Driven Development- Adaptive Software Development – Extreme Programming: Method Overview – Lifecycle – Work Products, Roles and Practices.

UNIT III AGILITY AND KNOWLEDGE MANAGEMENT **9**

Agile Information Systems – Agile Decision Making – Earl_S Schools of KM – Institutional Knowledge Evolution Cycle – Development, Acquisition, Refinement, Distribution, Deployment, Leveraging – KM in Software Engineering – Managing Software Knowledge – Challenges of Migrating to Agile Methodologies – Agile Knowledge Sharing – Role of Story- Cards – Story-Card Maturity Model (SMM).

UNIT IV AGILITY AND REQUIREMENT ENGINEERING **9**

Impact of Agile Processes in RE–Current Agile Practices – Variance – Overview of RE Using Agile – Managing Unstable Requirements – Requirements Elicitation – Agile Requirements Abstraction Model – Requirements Management in Agile Environment, Agile Requirements Prioritization – Agile Requirements Modeling and Generation – Concurrency in Agile Requirements Generation.

UNIT V AGILITY AND QUALITY ASSURANCE **9**

Agile Product Development – Agile Metrics – Feature Driven Development (FDD) – Financial and Production Metrics in FDD – Agile Approach to Quality Assurance – Test Driven Development – Agile Approach in Global Software Development.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Upon completion of the course, the students will be able to:

CO1: Realize the importance of interacting with business stakeholders in determining the requirements for a software system

CO2:Perform iterative software development processes: how to plan them, how to execute them.

CO3:Point out the impact of social aspects on software development success. CO4:Develop techniques and tools for improving team collaboration and software quality.

CO5:Perform Software process improvement as an ongoing task for development teams.

CO6:Show how agile approaches can be scaled up to the enterprise level.

TEXT BOOKS:

1. David J. Anderson and Eli Schragenheim, —Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results, Prentice Hall,2003.
2. Hazza and Dubinsky, —Agile Software Engineering, Series: Undergraduate Topics in Computer Science,Springer,2009

REFERENCES:

1.Craig Larman, —Agile and Iterative Development: A Managers Guide, Addison-Wesley, 2004.

2.Kevin C. Desouza, —Agile Information Systems: Conceptualization, Construction,and Management, Butterworth-Heinemann, 2007.

	Course Outcomes	PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Realize the importance of interacting with business stakeholders in determining the requirements for a software system	3			3	3										
CO2	Perform iterative software development processes: how to plan them, how to execute them.	3			3											
CO3	Point out the impact of social aspects on software development success.	3		1	2	2	3		3				3			
CO4	Perform Software process improvement as an ongoing task for development teams.	3		1	1	2	2		1				1			
CO5	Understand the internal storage structures using different file and indexing techniques & advanced database concepts	3	2		1				2				1			

718CIE06 CYBER SECURITY AND LAW L T P C

3 0 0 3

PREREQUISITES: NIL

OBJECTIVES:

Upon Completion of this course,the students will be familiar with

- **Cybercrime and Cyber offence**
- **Cybercrime using mobile devices**
- **Tools and methods used in cybercrime**
- **Fundamental of Computer Forencics**

UNIT I INTRODUCTION TO CYBERCRIME AND CYBER OFFENCE 9

Cybercrime and Information Security, Classifications of Cybercrimes, Cybercrime: The Legal Perspectives, Cybercrimes: Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes, Cybercrime Era: Survival Mantra for the Netizens. Cyber offenses: How Criminals Plan Them: How Criminals Plan the Attacks, Social Cyber stalking Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector, Cloud Computing.

UNIT II CYBERCRIME: MOBILE AND WIRELESS DEVICES 9

Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

UNIT III TOOLS AND METHODS USED IN CYBERCRIME 9

Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks. **Phishing and Identity Theft:** Introduction, Phishing, Identity Theft (ID Theft).

UNIT IV UNDERSTANDING COMPUTER FORENSICS 9

Introduction, Historical Background of Cyber forensics, Digital Forensics Science, The Need for Computer Cyber forensics and Digital Evidence, Forensics Analysis of E-Mail, Digital Forensics Life Cycle, Chain of Custody Concept, Network Forensics, Approaching a Computer Forensics Investigation, Setting up a Computer Forensics Laboratory: Understanding the Requirements, Computer Forensics and Steganography, Relevance of the OSI 7 Layer Model to Computer Forensics, Forensics and Social Networking Sites: The Security/Privacy Threats, Computer Forensics from Compliance Perspective, Challenges in Computer Forensics, Special Tools and Techniques, Forensics Auditing, Anti forensics

.

UNIT V LEGAL PERSPECTIVES ON CYBERCRIMES AND CYBER SECURITY 9

The legal landscape around the world. Need of Cyber laws in the Indian context. The Indian IT Act. Digital signatures and The Indian IT Act. Amendments to The Indian IT Act. Cybercrime and Punishment.

TOTAL: 45 PERIODS

OUTCOMES:

On completion of the course, the student will be able to,

CO1: Discriminate and analyze problems involved in cybercrime

CO2: Synthesis cybercrime issues on wireless and mobile devices

CO3: Use and apply modern cyber forensics tools

CO4: Analyze the computer forensic problems for a feasible solution

CO5: Apply cyber law for a given type of cyber issues

TEXT BOOKS:

1. SunitBelapure and Nina Godbole, "Cyber Security: Understanding Cyber Crimes, Computer Forensics And Legal Perspectives", Wiley India Pvt Ltd, ISBN: 978-81-265-21791, Publish Date 2013
2. Dr. Surya Prakash Tripathi, RitendraGoyal, Praveen Kumar Shukla, KLSI. "Introduction to information security and cyber laws". Dreamtech Pre ss. ISBN: 9789351194736, 2015

REFERENCE BOOKS:

1. Thomas J. Mowbray, "Cybersecurity: Managing Systems , Conducting Testing, and Investigating Intrusions", Copyright © 2014 by John Wiley & Sons, Inc, ISBN: 91-118 - 84965 -1
2. James Graham, Ryan Olson, Rick Howard, "Cyber Security Essentials", CRC Press, 15-Dec-2010

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Discriminate and analyze problems involved in cybercrime	3			3	3			1							
CO2	Synthesis cybercrime issues on wireless and mobile devices	3		1		3			1							
CO3	Use and apply modern cyber forensics tools	3		1		1		3	1		2	1				
CO4	Analyze the computer forensic problems for a feasible solution	3	2			1		2			3	2				
CO5	Apply cyber law for a given type of cyber issues	3			3				2		1	2				

818CIT01 **BIG DATA ANALYTICS** **L T P C**
3 0 0 3

PREREQUISITES: Data Warehousing and Data Mining **and Fundamentals of Machine Learning**

OBJECTIVES:

- Understand the terminologies, **analytics** and processing concepts of Big Data**.**
- Learnvarious Big Data Analytic techniques.
- Explore the **Data Streams processing concepts**
- Familiarize with HadoopEcosystem,**HIVEand PIG Framework**.

UNIT I INTRODUCTION TO BIG DATA 8

Concepts and terminologies – Big Data Characteristics – Types of Data – Big Data Analytics Lifecycle **– Big Data Analytics: Classification of Analytics – Top Challenges Facing Big Data – Importance of Big Data Analytics – Data Analytics Tools**– Big Data Processing Concepts: Parallel Data – Distributed Data –Batch Mode –Real Time Mode.

UNIT II BIG DATA ANALYTICS TECHNIQUES 9

Quantitative Analysis – Qualitative Analysis – Statistical Analysis: A/B Testing – Correlation – **Regression – Linear Regression – Polynomial Regression – Multivariate Regression**-Machine Learning: Classification – Clustering – Outlier Detection – Filtering – Semantic Analysis – Visual Analysis – Heat Maps – Time Series Plots – Network Graph – Spatial Data Mapping-**Reinforcement Learning**.

UNIT III STREAM MEMORY 9

Introduction to Stream Concepts – Stream Data Model and Architecture – Stream Computing – Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Ones in a Window – Decaying Window – Case Studies: Real Time Analytics in Platform (RTAP) Applications – Real Time Sentimental Analysis – Stock Market Predictions - Using Graph Analytics for Big Data: Graph Analytics.

UNIT IV NoSQL DATA MANAGEMENT FOR BIG DATA 9

Schema-less Models: Increasing Flexibility for Data Manipulation – Key Value Stores – Document Stores – Tabular Stores – Object Data Stores – Graph Databases –
NoSQL Databases –Introduction to MongoDB – Terms used in RDBMS and MongoDB – Data Types in MongoDB – MongoDB Query Language.
Case Studies: Big data for E-Commerce-Big data for Blogs

UNIT V BIG DATA FRAMEWORK 10

Hadoop: Introduction to Hadoop – RDBMS Vs Hadoop – Hadoop Overview – Hadoop Distributors – HDFS – Processing Data with Hadoop –- Managing Resources and Application with Hadoop YARN – Hadoop Ecosystem.

Hive: Introduction to Hive – Hive Architecture – Hive Data Types –Hive File Format – Hive Query Language – RC File Implementation – Ser De – User Defined Function (UDF).

Pig: Introduction to Pig - The Anatomy of Pig - Pig on Hadoop - Pig Philosophy - Use Case for Pig: ETL Processing Data Types in Pig - Running Pig - Execution Modes of Pig - HDFS Commands - Relational Operators - Eval Function - Complex Data Types - User-Defined Functions (UDF).

TOTAL HOURS: 45

COURSE OUTCOMES

At the end of the course the students are able to

CO1: Understand the fundamentals of big data, **analytics** and processing concepts. CO2: Apply analytics for various big data based problems.

CO3: Identify**theappropriate solution to data streams related problems**.CO4: Develop applications using NoSQLDB.

CO5: Explore on big data applications using big data framework.

TEXT BOOK:

1. Thomas Erl, WajidKhattak, Paul Buhler, "Big Data Fundamentals: Concepts, Drivers & Techniques" ,Prentice Hall, 2015
2. AnandRajaraman, Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.
3. Seema Acharya, SubhashiniChellappan, "Big Data Analytics", Wiley India Private Limited, First Edition, 2018.

REFERENCE BOOKS:

1. David Loshin, Morgan Kaufman, "Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph", Elsevier Publishers, 2013.
2. Bart Baesens, "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications", Wiley Publishers, 2015.
3. Tom White, "Hadoop The definitive Guide", O'Reilly Publishers, 4th Edition, 2015.
4. Edward Capriolo, Dean Wampler, Jason Rutherglen, "Programming Hive", O'Reilly Publishers, 2012.
5. Tim Hawkins, EelcoPlugge, Peter Membrey, David Hows, "The Definitive Guide to MongoDB: A complete guide to dealing with Big Data using MongoDB", Third Edition, Apress Publishers, 3rdEdition, 2015.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Understand the fundamentals of big data, analytics and processing concepts	3			3	3										
CO2	Apply analytics for various big data based problems.	3		1	1	3										
CO3	Identifytheappropriate solution to data streams related problems.	3		1	1	2			1				3			
CO4	Develop applications using NoSQLDB	3	2		2	1	3		1				2			
CO5	Explore on big data applications using big data framework.	3			3	1	2		3							

818CIE01 SOFTWARE DEFINED NETWORKS L T P C
3 0 0 3

PREREQUISITES: Computer Network

OBJECTIVE(S):

- Fundamentals of Software Defined Networks.
- Separation of the Data Plane and Control Plane.
- Principles of Software Defined Network Programming.
- Various Applications of Software Defined Networks.

UNIT- I INTRODUCTION 9

History Of Software Defined Networking (SDN) – Modern Data Centre – Traditional Switch Architecture – Need For SDN: Evolution Of Switches And Control Planes –Working Of SDN – Fundamental Characteristics Of SDN, SDNOperation, SDNDevices, SDN Controller.

UNIT- II OPENFLOW AND SDN CONTROLLERS 10

Openflow Overview: The Openflow Switch, The Openflow Controller, The Openflow Protocol, The Controller-Switch Secure Channel, Openflow 1.0 and Openflow basic – SDN Controller Models -**SDN Protocol Models – Application Models – Approaches to SDN Security.**

UNIT- III DATA CENTRES 9

Data Centre: DemandsOf Data Centre– Tunneling Technology For Data Centre: VXLAN- NVGRE– STT-Path Technology For Data Centre– Ethernet Fabrics In The Data Centre – VLAN -EVPN-SDN Solution For The Data Center Network.

UNIT- IV SDN PROGRAMMING AND APPLICATIONS 10

Network Function Virtualization –SDN VsNFV– Types OfApplications - SDN Controllers - Controller Considerations –Network Device Considerations – Creating Network Virtualization Tunnels – Offloading Flows InData Centre – Access Control for Campus – Traffic Engineering For Service Providers.

UNIT-V SDN OPEN SOURCE 7

Openflow – Switch Implementation – Controller Implementation – Orchestration AndNetwork Virtualization – Simulation, Testing AndTools – Open Source Cloud Software: Open Stack, Cloud Stack–Juniper SDN Framework – IETF SDN Framework – Open Daylight Controller.

TOTAL: 45 Hrs

COURSE OUTCOMES:

At the end of the course student should be able to

CO1: Compare and contrast between traditional switch architecture and software defined network.

CO2: Understand the functionality of Open flow protocol and SDN controllers.

CO3: Illustrate use of software defined network in data centre.

CO4: Design and develop various applications of SDN.

CO5: Demonstrate the SDN open source framework and software.

TEXT BOOK:

1. PaulGoransson and Chuck Black, "Software Defined Networks: A Comprehensive Approach",secondEdition, Morgan Kaufmann, 2016.

2. Thomas D. Nadeau, Ken Gray, "SDN: Software Defined Networks", O'Reilly Media, 2013.

REFERENCE BOOKS:

1. SiamakAzodolmolky, "Software Defined Networking with Open Flow", Packet Publishing,secondedition,2017.

2. Vivek Tiwari, "SDN and Open Flow for Beginners‖, Amazon Digital Services", Inc., 2013.

3. Fei Hu, Editor, "Network Innovation through Open Flow and SDN: Principles and Design", CRCPress, 2014.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Compare and contrast between traditional switch architecture and software defined network.	3			1		2			3						
CO2	Understand the functionality of Open flow protocol and SDN controllers.	3				2		3		2						
CO3	Illustrate use of software defined network in data centre	3		1			3						3			
CO4	Design and develop various applications of SDN	3		1	3		2			3			3			
CO5	Demonstrate the SDN open source framework and software.	3	2		2	3		2								

818CSE02 SOCIAL NETWORK ANALYSIS L T P C
3 0 0 3

OBJECTIVES:

- To gain knowledge about the empirical and theoretical study of social networks, its Structure and social network data sources.
- To study about the semantic technologies for social network analysis.
- To gain knowledge on visualization of social networks and its applications.
- To gain knowledge about social network analysis software for characterizing the Network structure.
- To engage in critical thinking regarding the applicability of social network theory to Various sociological phenomena.

UNIT I INTRODUCTION 9

Social Network Analysis: Definition and Features – The Development of Social Network Analysis – Basic Graph Theoretical Concepts of Social Network Analysis – Ties, Density, Path, Length, Distance, Betweenness, Centrality, Clique – Electronic Sources for Network Analysis – Electronic Discussion Networks, Blogs and Online Communities, Web-based Networks – Applications of Social Network Analysis.

UNIT II SOCIAL NETWORK ANALYSIS 9

Introduction to Social Networks Profiles – Types of Commercial Social Network Profiles (CSNP) – Quantitative and Qualitative Analysis of CSNP – Analysis of Social Networks Extracted from Log Files – Data Mining Methods Related to SNA and Log Mining – Clustering Techniques – Case Study.

UNIT III SEMANTIC TECHNOLOGY FOR SOCIAL NETWORK ANALYSIS 9

Introduction to Ontology based Knowledge Representation – Ontology Languages for the Semantic Web – RDF and OWL – Modeling Social Network Data – Network Data Representation, Ontological Representation of Social Individuals and Relationships – Aggregating and Reasoning with Social Network Data – Advanced Representations.Suggested Activities:

UNIT IV SOCIAL NETWORK MINING 9

Detecting and Discovering Communities in Social Network: Evaluating Communities – Methods for Community Detection – Applications of Community Mining Algorithms –Ethical Practices in Social Network Mining – Understanding and Predicting Human Behavior for Social Communities – Decentralized Online Social Networks – Multi-Relational Characterization of Dynamic Social Network Communities – Inferential Methods in Social.

UNIT V VISUALIZATION AND APPLICATIONS OF SOCIAL NETWORKS 9

Visualization of Social Networks Node-Edge Diagrams – Random Layout – Force-Directed Layout – Tree Layout – Matrix Representations –Matrix and Node-Link Diagrams – Hybrid Representations – Visualizing Online Social Networks – Applications – Covert Networks – Community Welfare – Collaboration Networks – Co-Citation Networks – Data Privacy in Social Networks.

TOTAL: 45 Hrs

COURSE OUTCOMES:

At the end of the course, the students should be able to:

CO1: Understand basic principles behind network analysis algorithms and develop Practical skills of networkanalysis.
CO2: Model and represent knowledge for social semantic Web.
CO3: Apply data mining techniques on social networks.
CO4: Use extraction and mining tools for analyzing Social networks.
CO5**:** Develop secure social network applications.

TEXT BOOKS:

1. Peter Mika, "Social Networks and the Semantic Web", Springer, 2007.

2. BorkoFurht, "Handbook of Social Network Technologies and Applications", Springer, 2010.

3. Song Yang, Franziska B. Keller, Lu Zheng, "Social Network Analysis: Methods and Examples", Sage Publication, 2016.

REFERENCES:

1. GuandongXu, Yanchun Zhang, Lin Li, "Web Mining and Social Networking Techniques and Applications", Springer, 2011.

2. Max Chevalier, Christine Julien, Chantal Soulé-Dupuy, "Collaborative and Social Information Retrieval andAccess: Techniques for Improved User Modelling", IGI Global, 2009.

3. John G. Breslin, Alexandre Passant, Stefan Decker, "The Social Semantic Web", Springer, 2009.

4. John Scott, Peter J. Carrington, "The SAGE Handbook of Social Network Analysis", Sage Publication, 2011.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Understand basic principles behind netwo analysis algorithms and develop Practi skills of network analysis.	3			3	1										
CO2	Model and represent knowledge for soc semantic Web.	3				2					2					
CO3	Apply data mining techniques on soc networks	3		1		2		3	1		2		2			
CO4	Use extraction and mining tools f analyzing Social networks.	3		1				2	2		2		3			
CO5	Develop secure social network application	3	2		3			1	2		1		1			

818CIE03	AUGMENTED AND VIRTUAL REALITY	L T P C 3 0 03

PREREQUISITES: COMPUTER GRAPHICS AND MULTIMEDIA

OBJECTIVE(S):

- To introduce the relevance of this course to the existing technology through demonstrations, case studies and applications with a futuristic vision along with socio-economic impact and issues
- To understand virtual reality, augmented reality and using them to build real-time applications
- To know the intricacies of these platform to develop augmented applications with better optimality

UNIT I INTRODUCTION 9

Introduction of Virtual Reality: Fundamental Concept and Components of Virtual Reality. Primary Features and Present Development on Virtual Reality. Multiple Models of Input and Output Interface in Virtual Reality: Input -- Tracker, Sensor, Digital Glove, Movement Capture, Video-based Input, 3D Menus & 3DScanner etc. Output -- Visual /Auditory / Haptic Devices.

UNIT II VIRTUAL REALITY 9

Visual Computation in Virtual Reality: Fundamentals of Computer Graphics. Software and Hardware Technology on Stereoscopic Display. Advanced Techniques in CG: Management of Large Scale Environments & Real Time Rendering.

UNIT III INTERACTIVE TECHNIQUES 9

Interactive Techniques in Virtual Reality: Body Track, Hand Gesture, 3D Manus, Object Grasp. Development Tools and Frameworks in Virtual Reality: Frameworks of Software Development Tools in VR. X3D Standard; Vega, MultiGen, Virtools etc.

UNIT IV APPLICATIONS OF VIRTUAL REALITY 9

Application of VR in Digital Entertainment: VR Technology in Film & TV Production. VR Technology in Physical Exercises and Games, Demonstration of Digital Entertainment by VR.

UNIT V AUGUMENTED REALITY 9

Augmented and Mixed Reality, Taxonomy, technology and features of augmented reality, difference between AR and VR, Challenges with AR, AR systems and functionality, Augmented reality methods, visualization techniques for augmented reality, wireless displays in educational augmented reality applications, mobile projection interfaces, marker-less tracking for augmented reality, enhancing interactivity in AR environments, evaluating AR systems.

TOTAL: 45 Hrs

COURSE OUTCOMES:

At the end of the course, the student should be able to:

CO1: Identify the Fundamentals of Virtual Reality

CO2: Analyse and Implement the software is used in Virtual Reality

CO3: Recognize the VR frames work used in real-time .

CO4: Recognize various applications in Digital Entertainment

CO5: Analyze the working fundamentals of Augmented Reality in various Sectors.

TEXT BOOKS:

1) Burdea, G. C. and P. Coffet. Virtual Reality Technology, Second Edition. Wiley-IEEE Press, 2003/2006.
2) Alan B. Craig, Understanding Augmented Reality, Concepts and Applications, Morgan Kaufmann, 2013.

REFERENCES:

1) Alan Craig, William Sherman and Jeffrey Will, Developing Virtual Reality Applications,Foundations of Effective Design, Morgan Kaufmann, 2009.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Identify the Fundamentals of Virtual Reality	3			3	1										
CO2	Analyse and Implement the software is used in Virtual Reality	3		1		2					2					
CO3	Recognize the VR frames work used in real-time	3		1		2		3	1		2		2			
CO4	Recognize various applications in Digital Entertainment	3	2					2	2				3			
CO5	Analyze the working fundamentals of Augmented Reality in various Sectors.	3			3			1	2		1		1			

818CIE04 **GREEN COMPUTING** **L T P C**
3 0 0 3

OBJECTIVES:

- To acquire knowledge to adopt green computing practices
- To understand the issues related with Green compliance

- To analyze the green computing grid framework
- To learn about energy saving practices
- To understand the impact of e-waste and carbon waste.

UNIT I FUNDAMENTALS 9

Green IT Fundamentals: Business, IT, and the Environment: Introduction – Green Vision – Green Value – Environmental Intelligence – Business Intelligence. **Green IT Strategies: Drivers, Dimensions, and Goals:** Green Strategic Alignment - Green IT Drivers - Green IT Business Dimensions - Green IT Business Dimensions (Factors). **Environmentally Responsible Business:** Environmental Areas Covered - Mobility and Environment - Green IT Metrics and Measurements - Context Sensitivity and Automation in Green IT Measures.

UNIT II GREEN ASSETS AND MODELING 9

Green Assets – End User Devices - Green Business Process Management: Green Reengineering - Green Processes: Individual, Organizational, and Collaborative - Green BPM and Standards - Green Business Analysis - Green Requirements Modeling - Green IT Governance - Quality of Service (QoS) and Green Business Processes - Green Mobile Business Processes. Green Enterprise Architecture, Environmental Intelligence, and Green Supply Chains

UNIT III GREEN FRAMEWORK 9

Virtualizing of IT systems –Role of electric utilities, Telecommuting, teleconferencing and teleporting – Materials recycling –Best ways for Green PC –Green Data center –Green Grid framework.

UNIT IV GREEN COMPLIANCE 9

Green Compliance: Protocols, Standards, and Audits: Protocols and Standards-Government initiatives - Audit types **Emergent Carbon Issues: Technologies and Future**: Introduction-cloud computing –SaaS Nanotechnologies-Quantum/Trinary computing-Eco design-Green ICT-collaborative environmental intelligence-carbon emission management.

UNIT V CASE STUDIES 9

Environmentally Responsible Business Strategies (ERBS) Research project Survey–Case study scenarios for Trial Runs-case studies: Applying Green IT Strategies and Applications to Hospital, Packaging Industry, and Telecom sector.

TOTAL: 45 Hrs

COURSE OUTCOMES:

At the end of the course, the students should be able to:

CO1: Acquire knowledge to adopt green computing practices to minimize negative impacts on the environment.
CO2: Enhance the skill management in Green business process
CO3: Practice Green framework in the modern Societ
CO4: Utilize and adopt green compliance in different environmental scenarios.
CO5: Apply the green computing strategies and develop various business applications.

TEXT BOOKS:

1. BhuvanUnhelkar, —Green IT Strategies and Applications-Using Environmental Intelligence‖,CRC Press,June 2011

REFERENCES:

1. Alin Gales, Michael Schaefer, Mike Ebbers, —Green Data Center: Steps for the Journey‖, Shoff/IBM rebook, 2011.
2. Carl Speshocky, —Empowering Green Initiatives with IT‖, John Wiley and Sons, 2010.
3. John Lamb, —The Greening of IT‖, Pearson Education, 2009.
4. Jason Harris, —Green Computing and Green IT- Best Practices on Regulations and Industry‖,Lulu.com,2008.
5. Woody Leonhard, Katherrine Murray, —Green Home computing for dummies‖, August 2009.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Acquire knowledge to adopt green computing practices to minimize negative impacts on the environment.	3			2	2										
CO2	Enhance the skill management in Green business process	3			1						1					
CO3	Practice Green framework in the modern Society	3		1		2			3		2					
CO4	Utilize and adopt green compliance in different environmental scenarios.	3		1		1					1					
CO5	Apply the green computing strategies and develop various business applications.	3	2		3	1			2		1					

818CSE05 **WIRELSS AD HOC SENSOR NETWORKS** **L T P C**
3 0 0 3

PREREQUISITES: Computer Networks

OBJECTIVE(S):

- To learn about the issues and challenges in the design of wireless ad hoc networks.
- To understand the working of MAC and Routing Protocols for ad hoc and sensor networks
- To learn about the Transport Layer protocols and their QoS for ad hoc and sensor networks
- To understand various security issues in ad hoc and sensor networks and the corresponding solutions.

UNIT I MAC & ROUTING IN AD HOC NETWORKS 9

Introduction – Issues and challenges in ad hoc networks – MAC Layer Protocols for wireless ad hoc networks – Contention-Based MAC protocols – MAC Protocols Using Directional Antennas – Multiple-Channel MAC Protocols – Power-Aware MAC Protocols – Routing in Adhoc Networks – Design Issues – Proactive, Reactive and Hybrid Routing Protocols.

UNIT II TRANSPORT & QOS IN AD HOC NETWORKS 9

TCP‟s challenges and Design Issues in Ad Hoc Networks – Transport protocols for adhoc networks – Issues and Challenges in providing QoS – MAC Layer QoS solutions –Network Layer QoS solutions – QoS Model.

UNIT III MAC & ROUTING IN WIRELESS SENSOR NETWORKS 9

Introduction – Applications – Challenges – Sensor network architecture – MAC Protocols for wireless sensor networks – Low duty cycle protocols and wakeup concepts – Contention- Based protocols – Schedule-Based protocols – IEEE 802.15.4 Zigbee –Topology Control – Routing Protocols.

UNIT IV TRANSPORT & QOS IN WIRELESS SENSOR NETWORKS 9

Data-Centric and Contention-Based Networking – Transport Layer and QoS in Wireless Sensor Networks – Congestion Control in network processing – Operating systems for wireless sensor networks – Examples.

UNIT V SECURITY IN AD HOC AND SENSOR NETWORKS 9

Security Attacks – Key Distribution and Management – Intrusion Detection – Software based Anti-tamper techniques – Water marking techniques – Defense against routing attacks – Secure Ad hoc routing protocols – Broadcast authentication WSN protocols – TESLA – Biba – Sensor Network Security Protocols – SPINS.

TOTAL: 45 Hrs

COURSE OUTCOMES:

At the end of the course, the student should be able to:

CO1:Identify different issues in wireless ad hoc and sensor networks.
CO2:Analyze the MAC protocol design concepts in Ad Hoc networks.
CO3:Identify different MAC protocols and evaluate the QOS related performance measurement of Sensor Networks.
CO4:Recognize various routing protocols and its issues in WSN.
CO5:To identify and understand security issues in ad hoc and sensor networks

TEXT BOOKS:

1) C. Siva Ram Murthy and B.S. manoj, “Ad Hoc Wireless Networks – Architectures and Protocols”, Pearson Education, 2012.
2) Carlos de Morais Cordeiro, Dharma Prakash Agrwal, Ad Hoc and Sensor Network:Theory and Applications, 2nd Edition, World Scientific Publishing Co, 2011.

3) Holger Karl, Andreas Willing, —Protocols and Architectures for Wireless Sensor Networks, John Wiley & Sons, Inc., 2005.

REFERENCES:

1. Subir Kumar Sarkar, T G Basavaraju, C Puttamadappa, —Ad Hoc Mobile Wireless Networks, Auerbach Publications, 2008.
2. Carlos De Morais Cordeiro, Dharma Prakash Agrawal, —Ad Hoc and Sensor Networks: Theory and Applications (2nd Edition), World Scientific Publishing, 2011.
3. Waltenegus Dargie, Christian Poellabauer, —Fundamentals of Wireless Sensor Networks Theory and Practice, John Wiley and Sons, 2010.
4. Xiang-Yang Li , "Wireless Ad Hoc and Sensor Networks: Theory and Applications,1227 th edition, Cambridge university Press,2008.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Identify different issues in wireless ad hoc and sensor networks.	3				3										
CO2	Analyze the MAC protocol design concepts in Ad Hoc networks.	3		1		2		3			1					
CO3	Identify different MAC protocols and evaluate the QOS related performancemeasurement of Sensor Networks	3		1	3					3	2					
CO4	Recognize various routing protocols and its issues in WSN.	3	2		3	1		2		2	1					
CO5	To identify and understand security issues in ad hoc and sensor networks	3			3	2				1	1					

818CSE06 BLOCK CHAIN TECHNOLOGIES L T P C
3 0 0 3

OBJECTIVE(S):

- To understand Blockchain's fundamental components, and examine decentralization using blockchain.
- To explain how crypto currency works, from when a transaction is created to when it is considered part of the Blockchain.
- To explain the components of Ethereum and Programming Languages for Ethereum.
- To study the basics of Hyperledger and Web3.
- To learning of solidity and de-centralized apps on Ethereum.

UNIT I INTRODUCTION TO BLOCKCHAIN 9

History of Blockchain – Types of Blockchain – Consensus – Decentralization using Blockchain – Blockchain and Full Ecosystem Decentralization – Platforms for Decentralization. **Applications: Internet of Things, Medical Record Management System, Domain Name Service.**

UNIT II INTRODUCTION TO CRYPTOCURRENCY 9

Bitcoin – Digital Keys and Addresses – Transactions – Mining – Bitcoin Networks and Payments – Wallets – Alternative Coins – Theoretical Limitations – Bitcoin limitations – Name coin – Prime coin – Zcash – Smart Contracts – Ricardian Contracts.

UNIT III ETHEREUM 9

The Ethereum Network – Components of Ethereum Ecosystem – Ethereum Programming Languages: Runtime Byte Code, Blocks and Blockchain, Fee Schedule – Supporting Protocols – Solidity Language.

UNIT IV WEB3 AND HYPERLEDGER 9

Introduction to Web3 – Contract Deployment – POST Requests – Development Frameworks– Hyperledger asa Protocol – The Reference Architecture – Hyperledger Fabric –Distributed Ledger – Corda.

UNIT V SOLIDITY PROGRAMMING 9

Solidity - Language of Smart Contracts, Installing Solidity & Ethereum Wallet, Basics of Solidity, General Value Types-Global Variables and Functions-Expressions and Control Structures-Writing Smart Contracts.

TOTAL: 45 Hrs

COURSE OUTCOMES:

At the end of the course student should be able to

CO1: Understand the technology components of Blockchain and how it works behind the scenes

CO2: Identify different approaches to developing decentralized applications.

CO3: Understand Bitcoin and its limitations by comparing with other alternative coins.

CO4: Devise solution using the Ethereum model.

CO5: Understand and use Hyperledger and its development framework

TEXT BOOKS:

1. Imran Bashir, “Mastering Blockchain: Distributed Ledger Technology, Decentralization and Smart Contracts Explained”, Second Edition, Packt Publishing,
2. Ritesh Modi,”Solidity Programming Essentials: A beginner's guide to build smartcontracts for Ethereum and blockchain”,First Edition,Packt Publishing,

REFERENCE BOOKS:

1. Arshdeep Bahga, Vijay Madisetti, “Blockchain Applications: A Hands On Approach”, VPT, 2017.
2. Andreas Antonopoulos, Satoshi Nakamoto, “Mastering Bitcoin”, O’Reilly, 2014.
3. Roger Wattenhofer, “The Science of the Blockchain” CreateSpace Independent Publishing, 2016.
4. A. Narayanan, J. Bonneau, E. Felten, A. Miller, S. Goldfeder, “Bitcoin and Crypto currency Technologies: A Comprehensive Introduction”, Princeton University Press, 2016.
5. Alex Levering ton, “Ethereum Programming” Packt Publishing, 2017

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Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Understand the technology components of Blockchain and how it works behind the scenes	3				3										
CO2	Identify different approaches to developing decentralized applications.	3				2			2							
CO3	Understand Bitcoin and its limitations by comparing with other alternative coins.	3		1		1	3		2	3		2				
CO4	Devise solution using the Ethereum model.	3		1		1	2		2	2		3				
CO5	Understand and use Hyperledger and its development framework.	3	2			1						3				

818CIE07 SERVICE ORIENTED ARCHITECTURE L T P C
3 0 0 3

PREREQUISITES: Networks and web services

OBJECTIVE(S):

- To learn fundamentals of XML
- To provide an overview of Service Oriented Architecture and Web services and theirimportance
- To learn web services standards and technologies
- To learn service oriented analysis and design for developing SOA based applications

UNIT I XML 9

XML document structure – Well-formed and valid documents – DTD – XML Schema – Parsing XMLusing DOM, SAX – XPath - XML Transformation and XSL – Xquery.

UNIT II SERVICE ORIENTED ARCHITECTURE (SOA) BASICS 9

Characteristics of SOA, Benefits of SOA , Comparing SOA with Client-Server and Distributedarchitectures –-- Principles of Service Orientation – Service layers.

UNIT III WEB SERVICES (WS) AND STANDARDS 8

Web Services Platform – Service descriptions – WSDL – Messaging with SOAP – Service discovery –UDDI – Service-Level Interaction Patterns – Orchestration and Choreography.

UNIT IV WEB SERVICES EXTENSIONS 8

WS-Addressing - WS-Reliable Messaging - WS-Policy – WS-Coordination – WS -Transactions - WS-Security – Examples.

UNIT V SERVICE ORIENTED ANALYSIS AND DESIGN 11

– SOA delivery strategies – Service oriented analysis – Service Modelling – Service oriented design – Standards and composition guidelines -- Service design – Business process design – Case Study

COURSE OUTCOMES:

At the end of the course, the student should be able to:
CO1: Understand XML technologies
CO2: Understand service orientation, benefits of SOA CO3: Understand web services and WS standards
CO4: Use web services extensions to develop solutions
CO5: Understand and apply service modeling, service oriented analysis and design for application development

TEXT BOOKS:

1. Thomas Erl, " Service Oriented Architecture: Concepts, Technology, and Design", Pearson Education, 2005
2. Sandeep Chatterjee and James Webber, "Developing Enterprise Web Services: An Architect'sGuide", Prentice Hall, 2004

REFERENCES BOOKS:

1. James McGovern, Sameer Tyagi, Michael E Stevens, Sunil Mathew, "Java Web ServicesArchitecture", Elsevier, 2003.
2. Ron Schmelzer et al. " XML and Web Services", Pearson Education, 2002.
3. Frank P.Coyle, "XML, Web Services and the Data Revolution", Pearson Education, 2002

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Understand XML technologies	3			3	3										
CO2	Understand service orientation, benefits of SOA	3				2							3			
CO3	Understand web services and WS standards	3		1		1		3		2		3	2			
CO4	Use web services extensions to develop solutions	3		1	1	1		2		3		2	2			
CO5	Understand and apply service modeling, service oriented analysis and design for applicationdevelopment	3	2		3	1				1						

818CSE08 DIGITAL FORENSICS L T P C
3 0 0 3

OBJECTIVE(S):

- To provide an understanding of computer forensics fundamentals.
- To analyze various computer forensics technologies.
- To identify methods for data recovery.
- To apply the methods for preservation of digital evidence.

UNIT I INCIDENT AND INCIDENT RESPONSE 9

Introduction to Security Threats: Introduction – Computer Crimes – Computer Threats and Intrusions – Phishing – Identity Theft – Cyber Terrorism and Cyber War – Need for Security: Information Security – OS Security – Database Security – Software Development Security – Introduction to Incident – Incident Response Methodology – Steps – Activities in Initial Response Phase after Detection of an Incident.

UNIT II FILE STORAGE AND DATA RECOVERY 9

File Systems – FAT, NTFS, NTFS Encrypting File System – Forensic Analysis of File Systems – Storage Fundamentals – Initial Response & Volatile Data Collection from Windows System – Initial Response & Volatile Data Collection from UNIX system – Forensic Duplication – Tools – Discover of Electronic Evidence – Identification of Data – Reconstructing Past Events – Networks.

UNIT III NETWORK AND EMAIL FORENSICS 9

Network Evidence – Types of Network Monitoring – Setting Up a Network Monitoring System – Network Data Analysis – Email Clients – Email Tracing – Internet Fraud – Spam Investigations – Mobile Forensics – Subscriber Identity Module (SIM) Investigations – Wireless Device Investigations – PDA Investigations.

UNIT IV SYSTEM FORENSICS 9

Data Analysis: Analysis Methodology – Investigating Live Systems (Windows & Mac OS) – Hacking: Investigating Hacker Tools – Ethical Issues – Cybercrime. Forensic and Investigative tools – Forensic Equipment's for evidence collection – Post exploitation.

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UNIT V IMAGE AND VIDEO FORENSICS 9

Recognizing a Graphics File – Data Compression – Locating and Recovering Graphics Files – Identifying Unknown File Formats – Copyright Issues with Graphics – Fraud using image and video – Detection of Fraud in images and video. (refbook1)

TOTAL: 45 Hrs

COURSE OUTCOMES:

At the end of the course student should be able to

CO1: Recognize attacks on systems.
CO2.: Design a counter attack incident response and incident response methodology.
CO3: Illustrate the methods for data recovery, evidence collection and data seizure
CO4: Understand network and email attacks and forensic investigation with tools.
CO5: Analyze various image encryption/decryption, steganography and fraud in image

TEXT BOOKS:

1. Kevin Mandia, Jason T. Luttgens, Matthew Pepe, "Incident Response and Computer Forensics",Tata McGraw-Hill, 2014
2. Bill Nelson, Amelia Philips, Christopher Steuart, "Guide to Computer Forensics and Investigations", Cengage Learning, 2018.

REFERENCE BOOKS:

1. John R. Vacca, "Computer Forensics", Firewall Media, 2009.
2. .Rafay Baloch, "Ethical Hacking and Penetration Testing Guide", Auerbach Publications, FirstEdition, 2014.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Recognize attacks on systems.	3			3	3										
CO2	Design a counter attack incident response and incident response methodology.	3			2							3				
CO3	Illustrate the methods for data recovery, evidence collection and data seizure	3		1	2		3		3	3		3				
CO4	Understand network and email attacks and forensic investigation with tools.	3		1	1	2	2		1	2		2				
CO5	Analyze various image encryption/decryption, steganography and fraud in image	3	2			3			2	1						

818CSE09 DEEP LEARNING TECHNIQUES L T P C
3 0 0 3

PREREQUISITES : Artificial Intelligence and Machine Learning

OBJECTIVES:

- Understand the concept, techniques in deep learning**.**
- Learn Feed forward and backward network model.
- Create models using CNN and RNN.
- Learn Tensor flow to implement deep learning techniques.

UNIT 1: Introduction to Deep Learning and Activation Functions 9

Historical Trends in Deep Learning -Activation Functions : Sigmoid, ReLU, Hyperbolic Functions,Softmax. Artificial Neural Networks : Introduction, Perceptron Training Rule - XOR Gate, Gradient Descent Rule

UNIT 2: Deep Feed forward Networks 9

Gradient Descent and Backpropagation: Gradient Based Learning, Stochastic Gradient Descent,Backpropagation, Some problems in ANNOptimization and Regularization :Overfitting and Capacity, Cross Validation, FeatureSelection, Regularization, Hyperparameters

UNIT 3: Convolutional Neural Networks 9

Introduction to Convolutional Neural Networks: Introduction to CNNs, Kernel filter,Principles behind CNNs, Multiple Filters, CNN applicationsIntroduction to Recurrent Neural Networks:, Unfolded RNNs,Bidirectional RNNs, Deep RNNs, RNN applications.

UNIT 4: Introduction to TensorFlow **9**

Introduction to TensorFlow :Computational Graph, Key highlights, Creating a Graph,Regression example, Gradient Descent, TensorBoard, Modularity, Sharing Variables,Keras.

UNIT 5: Applications **9**

Deep Learning applications: Large Scale Deep Learning- Image Processing, Natural Language Processing, SpeechRecognition, Video Analytics.

Total – 45 Hrs

COURSE OUTCOMES

At the end of the course the students are able to

CO1: Understand the fundamentals of deep learning and activation functions. CO2: Apply backpropagation network model for real world problems.

CO3: Design model using CNN and RNN. CO4: Develop applications using Tensorflow.

CO5: Explore deep learning model for different applications.

Text Book

1. Goodfellow, I., Bengio,Y., and Courville, A., Deep Learning, MIT Press, 2016.

References

1. Bishop, C. ,M., Pattern Recognition and Machine Learning, Springer, 2006.
2. Yegnanarayana, B., Artificial Neural Networks PHI Learning Pvt. Ltd, 2009.
3. Golub, G.,H., and Van Loan,C.,F., Matrix Computations, JHU Press,2013.
4. Satish Kumar, Neural Networks: A Classroom Approach, Tata McGraw-Hill Education,2017.

REFERENCE BOOKS

1. Adam Gibson, Deep Learning: A Practitioner's Approach, O'Reilly Media,August 2017
2. Li Deng, “Deep Learning: Methods and Applications”, Microsoft Technical Report.
3. Josh Patterson and Adam Gibson, "Deep Learning: A practitioner's approach", O'Reilly, USA, 2017.
4. Francois Chollet, "Deep Learning using Python", Manning Publications, USA, 2017.
5. Yusuke Sugomori, Bostjan Kaluza, Soares and Alan M. F. Souza, "Deep Learning: Practical Neural Networks with Java", PACKT Publishing, UK, 2017.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Understand the fundamentals of deep learning and activation functions.	3														
CO2	Apply backpropagation network model for real world problems	3		1	2	2						2				
CO3	Design model using CNN and RNN.	3		1	1	3		2			3	2		2		
CO4	Develop applications using Tensorflow.	3	2		3	2		2			3	2		1		
CO5	Explore deep learning model for different applications.	3			3	2					1			2		

818CSE010 VISUALIZATION TECHNIQUES L T P C

3 0 0 3

OBJECTIVES

- To learn about different Visualization Techniques
- To study the Interaction techniques in information visualization fields
- To understand various abstraction mechanisms
- To create interactive visual interfaces

UNIT I FOUNDATIONS FOR DATA VISUALIZATION 9

Introduction to Visualization – Visualization stages – Experimental Semiotics based on Perception – Gibson's Affordance theory – A Model of Perceptual Processing – Costs and Benefits of Visualization – Types of Data.

UNIT II COMPUTER VISUALIZATION 9

Non-Computer Visualization – Computer Visualization: Exploring Complex Information Spaces –Fisheye Views – Applications – Comprehensible Fisheye views – Fisheye views for 3D data – Non Linear Magnification – Comparing Visualization of Information Spaces – Abstraction in computer Graphics – Abstraction in user interfaces.

UNIT III MULTIDIMENSIONAL VISUALIZATION 9

1D, 2D, 3D – Multiple Dimensions – Trees – Web Works – Data Mapping: Document Visualization – Workspaces.

UNIT IV TEXTUAL METHODS OF ABSTRACTION 9

From Graphics to Pure Text – Figure Captions in Visual Interfaces – Interactive 3D illustrations with images and text – Related work –Consistency of rendered – images and their textual labels – Architecture – Zoom techniques for illustration purpose – Interactive handling of images and text

UNIT V ABSTRACTION IN TIME AND INTERACTIVE SYSTEMS 9

Animating non Photo realistic Computer Graphics – Interaction Facilities and High LevelSupport for Animation Design – Zoom Navigation in User Interfaces – Interactive Medical Illustrations – Rendering Gestural Expressions – Animating design for Simulation – Tactile Maps for Blind People – Synthetic holography – Abstraction Versus Realism– Integrating Spatial and Non Spatial Data.

TOTAL: 45 Hrs

COURSE OUTCOMES:

At the end of the course student should be able to

CO1: Define and characterize data science, apply basic data visualization techniques in differentways.

CO2: Exposure to a number of common data domains and corresponding analysis tasks,including multivariate data, networks, text and cartography.

CO3: Explain principles of visual perception

CO4: Apply visualization techniques for various data analysis tasks

CO5: Practical experience building and evaluating visualization systems.

TEXT BOOK

1. Colin Ware "Information Visualization Perception for Design",3rd edition, Morgan Kaufman2012.

2. Stuart.K.Card, Jock.D.Mackinlay and Ben Shneiderman, "Readings in InformationVisualization UsingVision to think", Morgan Kaufmann Publishers, 1999.

3.Thomas Strothotte, "Computer Visualization–Graphics Abstraction and Interactivity", Springer VerlagBerlin Heiderberg 1998.

REFERENCE BOOKS

1. Chaomei Chan, "Information Visualization",Beyond the horizon, 2nd edition, Springer Verlag,2004.

2. Pauline Wills, "Visualisation: A Beginner's Guide", Hodder and Stoughlon, 1999.

3.Benedikt. M, "Cyberspace: FirotSteps",MIT Press, 1991.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Define and characterize data science, apply basic data visualization techniques in differentways.	3														
CO2	Exposure to a number of common data domains and corresponding analysis tasks, including multivariate data, networks, text and cartography	3		1	2	2						2				
CO3	Explain principles of visual perception	3		1	1	3		2			3	2				
CO4	Apply visualization techniques for various data analysis tasks	3	2		3	2		2			3	2				
CO5	Practical experience building and evaluating visualization systems.	3			3	2		2			1					

818CSE011 SOFTWARE QUALIY ASSURANCE L T P C
3 0 0 3

OBJECTIVE(S):

- To give a clear picture on quality management, documentation and control for software quality.
- To provide knowledge on standards, models and tools used for quality management.
- To perform measurement and assessment of software quality.

UNIT I INTRODUCTION TO SOFTWARE QUALITY & ARCHITECTURE 9

Need For Software Quality – Quality Challenges – Software Quality Assurance (SQA) – Definition And Objectives – Software Quality Factors – McCall's Quality Model – SQA System and Architecture – Software Project Life Cycle Components – Management of SQA components
– Pre-Project Software Quality Components – Contract Review – Development and Quality Plans.

UNIT II SQA COMPONENTS AND PROJECT LIFE CYCLE 9

Software Development Methodologies – Quality Assurance Activities in the Development Process – Verification, Validation & Qualification – Reviews: Objectives – Formal designReview – Peer Review – Quality of Software Maintenance Components – Pre-Maintenance Software Quality Components – Maintenance Software Quality Assurance Tools – Assuring the Quality of External participants contributions: Objectives, Types, Risks & Benefits, Tools – CASE Tools and Their effect on Software Quality.

UNIT III SOFTWARE QUALITY INFRASTRUCTURE 9

Procedures And Work Instructions – Supporting Quality devices – Templates – Checklists – Staff Training and Certification – Corrective and Preventive Actions – Configuration Management – Software Change Control – Configuration Management Audit – Documentation Control – Storage and Retrieval.

UNIT IV SOFTWARE QUALITY MANAGEMENT, METRICS 9

Project Process Control – Computerized Tools – Software Quality Metrics – Objectives of Quality Measurement – Process Metrics – Product Metrics – Implementation – Limitations of Software Metrics – Cost of Software Quality – Classical Quality Cost Model – Extended Model
– Application of Cost Model.

UNIT V STANDARDS, CERTIFICATIONS 9

Quality Management Standards – ISO 9001 And ISO 9000–3 – Capability Maturity Models (CMM & CMMI) – Organization of Quality Assurance – Department Management Responsibilities – Project Management Responsibilities – SQA Units And Other Actors In SQA Systems.

TOTAL: 45 Hrs

COURSE OUTCOMES:

At the end of the course, the student should be able to:

CO1:Learn to document, control and manage software quality with the aid of tools andstandards.

CO2: Distinguish between various software quality models.

CO3: Measure and assess software quality through process and product metrics.

CO4: Distinguish between the software quality standards.

TEXT BOOKS:

1. Daniel Galin, "Software Quality Assurance: From Theory to Implementation", Pearson Education, 2004.

REFERENCES BOOKS:

1. Stephen H. Kan, "Metrics and Models in Software Quality Engineering", Pearson Education, 2002.
2. Mordechai Ben-Menachem, Garry S.Marliss, "Software Quality: Producing Practical, Consistent Software", BS Publications, 2014.

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Learn to document, control and manage software quality with the aid of tools and standards.	3			3	3										
CO2	Distinguish between various software quality models	3		1		2										
CO3	Measure and assess software quality through process and product metrics.	3		1		1		3		2			2			
CO4	Distinguish between the software quality standards	3	2		1	1		2		3			2			

818CSE012 **WEB MINING** **L T P C**

3 0 0 3

PREREQUISITES : Data Warehousing and Data Mining

OBJECTIVES:

- Introduce the basic concepts and techniques of Information Retrieval, Web Search, Data Mining, and Machine Learning for extracting knowledge from the web.
- To know the different categories of web mining
- To appreciate the use of web mining in web applications
- Develop skills of using recent data mining software for solving practical problems of Web Mining

UNIT I INTRODUCTION 9

Introduction – Web Mining – Theoretical background –Algorithms and techniques – Association rule mining – Sequential Pattern Mining -Information retrieval and Web search – Information retrieval Models Relevance Feedback- Text and Web page Pre-processing – Inverted Index – Latent Semantic Indexing – Web Search – Meta-Search – Web Spamming

UNIT II WEB CONTENT MINING 9

Web Content Mining – Supervised Learning – Decision tree - Naïve Bayesian Text Classification - Support Vector Machines - Ensemble of Classifiers. Unsupervised Learning - K- means Clustering - Hierarchical Clustering –Partially Supervised Learning – Markov Models - Probability-Based Clustering - Evaluating Classification and Clustering – Vector Space Model – Latent semantic Indexing – Automatic Topic Extraction - Opinion Mining and Sentiment Analysis – Document Sentiment Classification

UNIT III WEB LINK MINING 9

Web Link Mining – Hyperlink based Ranking – Introduction of Social Networks Analysis- Co- Citation and Bibliographic Coupling - Page Rank -Authorities and Hubs -Link-Based Similarity Search - Enhanced Techniques for Page Ranking - Community Discovery – Web Crawling -A Basic Crawler Algorithm Implementation Issues- Universal Crawlers- Focused Crawlers- TopicalCrawlers- Evaluation - Crawler Ethics and Conflicts - New Developments

UNIT IV STRUCTURED DATA EXTRACTION 9

Structured Data Extraction: Wrapper Generation – Preliminaries- Wrapper Induction- Instance-Based Wrapper Learning ·- Automatic Wrapper Generation: Problems - String Matching and Tree Matching - Multiple Alignment - Building DOM Trees - Extraction Based on a Single List Page and Multiple pages Introduction to Schema Matching - Schema-Level Match -Domain and Instance-Level Matching – Extracting and Analyzing Web Social Networks

UNIT V WEB USAGE MINING 9

Web Usage Mining - Click stream Analysis -Web Server Log Files - Data Collection and Pre- Processing - Cleaning and Filtering- Data Modeling for Web Usage Mining - The BIRCH Clustering Algorithm - Affinity Analysis and the A Priori Algorithm – Binning - Discovery and Analysis of Web Usage Patterns – Modeling user interests –Probabilistic Latent Semantic Analysis – Latent Dirichlet Allocation Model– Applications- Collaborative Filtering- Recommender Systems – Web Recommender systems based on User and Item – PLSA and LDAModels.

TOTAL: 45 Hrs

Course Outcomes (COs):

On successful completion of this course, the students should be able to

CO1: Identify the different components of a web page that can be used for mining

CO2: Apply machine learning concepts to web content mining

CO3: Design a system to collect information available on the web to build Recommendersystems

CO4: Analyze social media data using appropriate data/web mining techniques

CO5: Build a simple search engine using available open source tools

TEXT BOOKS:

1. G. Sreedhar-Web Data Mining and the Development of Knowledge-Based Decision Support Systems IGI Global; 1st edition, March 2017.
2. Mai Ayad-Introduction to web Mining,LAP Lambert Academic Publishing, January,2012
3. Bing Liu, —Web Data Mining, Exploring Hyperlinks, Contents and Usage Data, Springer, Second Edition, 2011.

REFERENCE BOOKS:

1. GuandongXu ,Yanchun Zhang, Lin Li, —Web Mining and Social Networking: Techniques and Applications‖, Springer, First Edition.2010.
2. Zdravko Markov, Daniel T. Larose, —Data Mining the Web: Uncovering Patterns inWeb Content, Structure, and Usage‖, John Wiley & Sons, Inc., 2007.
3. SoumenChakrabarti, —Mining the Web: Discovering Knowledge from Hypertext Data

Course Outcomes		PSo1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Identify the different components of a web page that can be used for mining	3			3	3										
CO2	Apply machine learning concepts to web content mining	3		1		3		3			3					
CO3	Design a system to collect information available on the web to build Recommendersystems	3		1					2		3					
CO4	Analyze social media data using appropriate data/web mining techniques	3	2		3			2	2		1					
CO5	Build a simple search engine using available open source tools	3			3	1			2							