ADHIYAMAAN COLLEGE OF ENGINEERING
(AUTONOMOUS), HOSUR

B.E. COMPUTER SCIENCE AND ENGINEERING

REGULATION 2018

(Choice Based Credit System)

CURRICULAM & SYLLABUS

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)

PEO1: The graduates of the program will have sound knowledge in Mathematical, Scientific and Engineering concepts necessary to formulate, analyse, 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 Multi-disciplinary 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 including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

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

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

PO 7 **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

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

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

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

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

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

Programme Specific Outcomes (PSOs)

PSO1: 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.

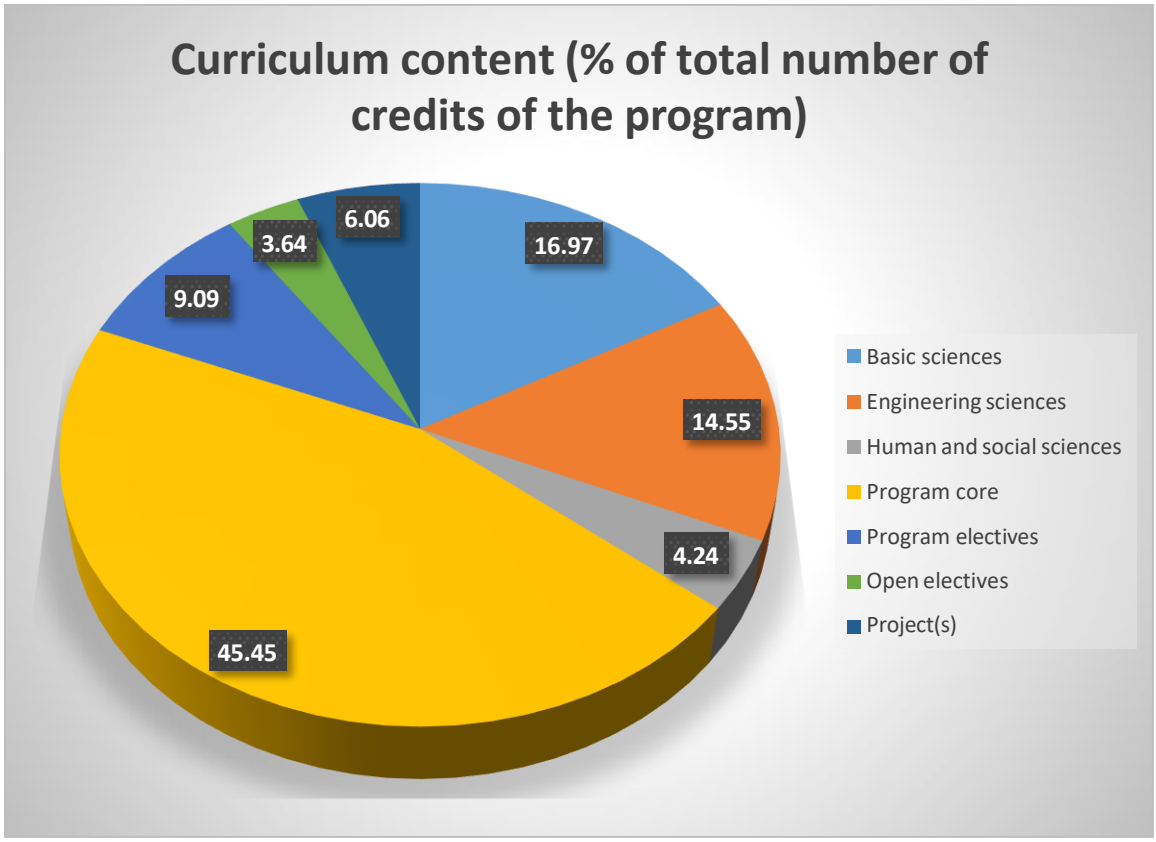
PSO3: Successful career and entrepreneurship: The ability to employ modern computer languages, Environments, and platforms in creating innovative career paths to be an entrepreneur and a zest for higher studies.

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

COMPONENTS OF THE CURRICULUM
REGULATIONS 2018

Course component	Curriculum content (% of total number of credits of the program)	Total number of contact hours	Total number of credits
Basic sciences	16.97	38	28
Engineering sciences	14.55	25	24
Humanities and social sciences	4.24	6	7
Program core	45.45	86	75
Program electives	9.09	15	15
Open electives	3.64	6	6
Project(s) (EEC)	6.06	20	10
Total number of credits			165



STRUCTURE OF THE CURRICULUM

Course Code	Course Title	Total Number of contact hours				Credits
		Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
118ENT01	Technical English	2	0	0	45	2
118MAT02	Engineering Mathematics-I	3	0	0	45	3
118PHT03	Engineering Physics	2	0	0	45	2
118CYT04	Engineering Chemistry	3	0	0	45	3
118PPT05	Problem Solving And Python Programming	3	0	0	45	3
118ESE06	Basic Electrical Electronics and Instrumentation Engineering	3	0	0	45	3
118PHP07	Engineering Physics Laboratory	0	0	2	30	1
118PPP08	Problem Solving and Python Programming Laboratory	0	0	2	30	1
218ENT01	Communicative English	2	0	2	45	3
218MAT02	Engineering Mathematics-II	3	1	0	60	4
218GET03	Environmental Science and Engineering	2	0	0	45	2
218EGT04	Engineering Graphics	3	1	0	60	4
218PPT05	Programming in C	3	0	0	45	3
218BSE09	Physics for Information Science	0	0	2	30	2
218CYP07	Engineering Chemistry Laboratory	0	0	2	30	1
218EPP08	Engineering Practice Laboratory	0	0	2	30	1
218CPP09	Programming in C Laboratory	0	0	2	30	1
318MAT01	Engineering Mathematics-III	3	1	0	60	4
318CIT02	Digital Electronics	3	0	0	45	3
318CST03	Database Management Systems	3	0	0	45	3
318CIT04	Object Oriented Programming in C++	3	0	0	45	3
318CIT05	Data Structures	3	0	0	45	3
318CIT06	Computer Organization	3	0	0	45	3
318CIP07	Digital Electronics Laboratory	0	0	2	30	1

318CSP08	Database Management Systems Laboratory	0	0	2	30	1
318CSP09	OOPs and Data Structures Laboratory	0	0	2	30	1
418DMT01	Discrete Mathematics	3	1	0	60	4
418CIT02	Design and Analysis of Algorithm	3	0	0	45	3
418CIT03	Java Programming	3	0	0	45	3
418CIT04	Operating Systems	3	0	0	45	3
418CST05	Computer Networks	3	0	0	45	3
418CIT06	Software Engineering	3	0	0	45	3
418CIP07	Java Programming Laboratory	0	0	2	30	1
418CIP08	Operating Systems Laboratory	0	0	2	30	1
418CSP09	Computer Networks Laboratory	0	0	2	30	1
518PQT01	Probability and Queuing Theory	3	1	0	60	4
518CIT02	Micro-Processor and Microcontroller	3	0	0	45	3
518CST03	Object Oriented Analysis and Design	3	0	0	45	3
518CIT04	Theory of Computation	3	1	0	60	4
518CSE02	Scripting Language	3	0	0	45	3
518BAO03	Engineering Ethics and Human Values	3	0	0	45	3
518CIP06	Micro-Processor and Microcontroller Laboratory	0	0	2	30	1
518CSP07	Object Oriented Analysis and Design Laboratory	0	0	2	30	1
518CIP08	Employability Skill Laboratory	1	0	2	30	1
618CST01	Mobile Application Development	3	0	0	45	3
618CST02	Compiler Design	3	0	0	45	3
618CIT03	Data Warehousing and Data Mining	3	0	0	45	3
618CST04	Web Programming	3	0	0	45	3
618CST05	Artificial Intelligence	3	0	0	45	3
618CSE05	Software Project Management	3	0	0	45	3
618CSP07	Mobile Application Development Laboratory	0	0	2	30	1
618CSP08	Data Mining Laboratory	0	0	2	30	1
618CSP09	Web Programming Laboratory	0	0	2	30	1

718CIT01	Cryptography and Security in Computing	3	0	0	45	3
718CST02	Machine Learning Techniques	3	0	0	45	3
718CST03	Mobile Computing	3	0	0	45	3
718CST04	Cloud Computing	3	0	0	45	3
718CIE06	Cyber Security and Law	3	0	0	45	3
718BAO02	Management Information System	3	0	0	45	3
718CSP07	Machine Learning Techniques Laboratory	0	0	2	30	1
718CSP08	Cloud Computing Laboratory	0	0	2	30	1
718CSP09	Mini Project	0	0	2	30	1
818CIT01	Big Data Analytics	3	0	0	45	3
818CIE08	Augmented Reality and Virtual Reality Development	3	0	0	45	3
818CSE11	Software Quality Assurance	3	0	0	45	3
818CSP01	Project Work & Viva Voce	0	0	16	240	8

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CURRICULUM R2018-Choice Based Credit System

(Applicable to the students admitted from the Academic year 2018-2019 onward)

SEMESTER I

S.No	Course Code	Course Title	Category	L	T	P	C	MARKS		
								CA	EA	TOT
THEORY										
1	118ENT01	Technical English	HS	2	0	0	2	50	50	100
2	118MAT02	Engineering Mathematics-I	BS	3	0	0	3	50	50	100
3	118PHT03	Engineering Physics	BS	2	0	0	2	50	50	100
4	118CYT04	Engineering Chemistry	BS	3	0	0	3	50	50	100
5	118PPT05	Problem Solving and Python Programming	ES	3	0	0	3	50	50	100
6	118ESE0X	ELECTIVE (GROUP1)	ES	3	0	0	3	50	50	100
PRACTICALS										
7	118PHP07	Engineering Physics Laboratory	BS	0	0	2	1	50	50	100
8	118PPP08	Problem Solving and Programming Laboratory	ES	0	0	2	1	50	50	100
TOTAL				16	0	4	18	50	50	100

ELECTIVE (GROUP1)

S.No	Course Code	Course Title	Category	L	T	P	C	MARKS		
								CA	EA	TOT
1	118ESE01	Basic Civil and Mechanical Engineering	ES	3	0	0	3	50	50	100
2	118ESE05	Basic Mechanical Electrical and Instrumentation Engineering	ES	3	0	0	3	50	50	100
3	118ESE06	Basic Electrical Electronics and Instrumentation Engineering	ES	3	0	0	3	50	50	100
								50	50	100
4	118ESE07	Biology For Engineers	ES	3	0	0	3	50	50	100

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SEMESTER II

S.No	Course Code	Course Title	Category	L	T	P	C	MARKS		
								CA	EA	TOT
THEORY										
1	218ENT01	Communicative English	HS	2	0	2	3	50	50	100
2	218MAT02	Engineering Mathematics-II	BS	3	1	0	4	50	50	100
3	218GET03	Environmental Science and Engineering	HS	2	0	0	2	50	50	100
4	218EGT04	Engineering Graphics	EG	3	1	0	4	50	50	100
5	218PPT05	Programming in C	ES	3	0	0	3	50	50	100
6	218BSE0X	ELECTIVE (GROUP2)	BS	2	0	0	2	50	50	100
PRACTICALS										
7	218CYP07	Engineering Chemistry Laboratory	BS	0	0	2	1	50	50	100
8	218EPP08	Engineering Practice Laboratory	ES	0	0	2	1	50	50	100
9	218CPP09	Programming in C Laboratory		0	0	2	1	50	50	100
TOTAL				15	1	6	21			

ELECTIVE (GROUP2)

S.No	Course Code	Course Title	Category	L	T	P	C	MARKS		
								CA	EA	TOT
THEORY										
1	218BSE01	Material Science	BS	2	0	0	2	50	50	100
2	218BSE02	Quantum Mechanics for Engineers	BS	2	0	0	2	50	50	100
3	218BSE03	Chemistry for Technologists	BS	2	0	0	2	50	50	100
4	218BSE04	Energy Storage Devices and Fuel Cells	BS	2	0	0	2	50	50	100
5	218BSE07	Semiconductor physics	BS	2	0	0	2	50	50	100
6	218BSE09	Physics for Information Science	BS	2	0	0	2	50	50	100

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SEMESTER – III

S.No	Course Code	Course Title	Category	L	T	P	C	MARKS		
								CA	EA	TOT
THEORY										
1	318MAT01	Engineering Mathematics-III	BS	3	1	0	4	50	50	100
2	318CIT02	Digital Electronics	ES	3	0	0	3	50	50	100
3	318CST03	Database Management Systems	HS	3	0	0	3	50	50	100
4	318CIT04	Object Oriented Programming in C++	PC	3	0	0	3	50	50	100
5	318CIT05	Data Structures	PC	3	0	0	3	50	50	100
6	318CIT06	Computer Organization	PC	3	0	0	3	50	50	100
PRACTICALS										
7	318CIP07	Digital Electronics Laboratory	ES	0	0	2	1	50	50	100
8	318CSP08	Database Management Systems Laboratory	PC	0	0	2	1	50	50	100
9	318CSP09	OOPS and Data Structures Laboratory	PC	0	0	2	1	50	50	100

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SEMESTER – IV

S.No	Course Code	Course Title	Category	L	T	P	C	MARKS		
								CA	EA	TOT
1	418DMT01	Discrete Mathematics	BS	3	1	0	4	50	50	100
2	418CIT02	Design and Analysis of algorithm	PE	3	0	0	3	50	50	100
3	418CIT03	Java Programming	PC	3	0	0	3	50	50	100
4	418CIT04	Operating Systems	PC	3	0	0	3	50	50	100
5	418CST05	Computer Networks	PC	3	0	0	3	50	50	100
6	418CIT06	Software Engineering	PC	3	0	0	3	50	50	100
PRACTICALS										
7	418CIP07	Java Programming Laboratory	ES	0	0	2	1	50	50	100
8	418CIP08	Operating Systems Laboratory	PC	0	0	2	1	50	50	100
9	418CSP09	Computer Networks Laboratory	PC	0	0	2	1	50	50	100

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SEMESTER – V

S.No	Course Code	Course Title	Category	L	T	P	C	MARKS		
								CA	EA	TOT
THEORY										
1	518PQT01	Probability and Queuing Theory	BS	3	1	0	4	50	50	100
2	518CIT02	Micro-Processor and Microcontrollers with Applications	ES	3	0	0	3	50	50	100
3	518CST03	Object Oriented Analysis and Design	PC	3	0	0	3	50	50	100
4	518CIT04	Theory of Computation	PC	3	1	0	4	50	50	100
5	518CSExx	**Open Elective –I**	OE	3	0	0	3	50	50	100
6	518CSExx	**Professional Elective -I**	PE	3	0	2	4	50	50	100
PRACTICALS										
7	518CIP06	Micro-Processor and Microcontrollers Laboratory	ES	0	0	2	1	50	50	100
8	518CSP07	Object Oriented Analysis and Design Laboratory	PC	0	0	2	1	50	50	100
9	518CIP08	Employability Skill Laboratory	EEC	1	0	2	1	50	50	100

V Semester-Professional Elective-I (Integrated)

S.No	Course Code	Course Title	Category	L	T	P	C	MARKS		
								CA	EA	TOT
THEORY										
1	518CIE01	C# and .NET Programming	PE	3	0	2	4	50	50	100
2	518CSE02	Scripting Language	PE	3	0	0	3	50	50	100
3	518CIE03	Advanced Java Programming	PE	3	0	2	4	50	50	100
4	518CSE04	Software Testing	PE	3	0	2	4	50	50	100
5	518CSE05	Computer Graphics and Multimedia Systems	PE	3	0	2	4	50	50	100

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SEMESTER – VI

S.No	Course Code	Course Title	Category	L	T	P	C	MARKS		
								CA	EA	TOT
THEORY										
1	618CST01	Mobile Application Development	PC	3	0	0	3	50	50	100
2	618CST02	Compiler Design	PC	3	0	0	3	50	50	100
3	618CIT03	Data Warehousing and Data Mining	PC	3	0	0	3	50	50	100
4	618CST04	Web Programming	PC	3	0	0	3	50	50	100
5	618CST05	Artificial Intelligence	PC	3	0	0	3	50	50	100
6	618CSExx	Professional Elective –II	PE	3	0	0	3	50	50	100
PRACTICALS										
7	618CSP07	Mobile Application Development Laboratory	PC	0	0	2	1	50	50	100
8	618CSP08	Data Mining Laboratory	PC	0	0	2	1	50	50	100
9	618CSP09	Web Programming Laboratory	PC	0	0	2	1	50	50	100

VI Semester – Professional Elective – II

S.No	Course Code	Course Title	Category	L	T	P	C	MARKS		
								CA	EA	TOT
THEORY										
1	618CSE01	Multi core Architecture	PE	3	0	0	3	50	50	100
2	618CSE02	Parallel and Distributed Computing	PE	3	0	0	3	50	50	100
3	618CSE03	High Performance Computing	PE	3	0	0	3	50	50	100
4	618CSE04	Network Design and Management	PE	3	0	0	3	50	50	100
5	618CSE05	Software Project Management	PE	3	0	0	3	50	50	100

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SEMESTER – VII

S.No	Course Code	Course Title	Category	L	T	P	C	MARKS		
								CA	EA	TOT
THEORY										
1	718CIT01	Cryptography and Security in Computing	PC	3	0	0	3	50	50	100
2	718CST02	Machine Learning Techniques	PC	3	0	0	3	50	50	100
3	718CST03	Mobile Computing	PC	3	0	0	3	50	50	100
4	718CST04	Cloud Computing	PC	3	0	0	3	50	50	100
5	718CSExx	Professional Elective -II	PC	3	0	0	3	50	50	100
6	718CSExx	Open Elective - II	PE	3	0	0	3	50	50	100
PRACTICALS										
7	718CSP07	Machine Learning Laboratory	PC	0	0	2	1	50	50	100
8	718CSP08	Cloud Computing Laboratory	PC	0	0	2	1	50	50	100
9	718CSP09	Mini Project	EEC	0	0	2	1	50	50	100

VII Semester-Professional Elective- III

S.No	Course Code	Course Title	Category	L	T	P	C	MARKS		
								CA	EA	TOT
THEORY										
1	718CIE01	Internet of Things	PE	3	0	0	3	50	50	100
2	718CIE02	Building Enterprise Application	PE	3	0	0	3	50	50	100
3	718CIE03	Pervasive Computing	PE	3	0	0	3	50	50	100
4	718CIE04	Information Storage Management	PE	3	0	0	3	50	50	100
5	718CIE05	Agile Software Development	PE	3	0	0	3	50	50	100
6	718CIE06	Cyber Security and Law	PE	3	0	0	3	50	50	100

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SEMESTER – VIII

S.No	Course Code	Course Title	Category	L	T	P	C	MARKS		
								CA	EA	TOT
THEORY										
1	818CIT01	Big Data Analytics	PC	3	0	0	3	50	50	100
2	818CSExx	Professional Elective- IV	PC	3	0	0	3	50	50	100
3	818CSExx	Professional Elective- V	PC	3	0	0	3	50	50	100
PRACTICALS										
4	818CSP01	Project Work & Viva Voce	PC	0	0	16	8	50	50	100

VIII Semester-Professional Elective- IV

S.No	Course Code	Course Title	Category	L	T	P	C	MARKS		
								CA	EA	TOT
THEORY										
1	818CIE01	Software Defined Networks	PE	3	0	0	3	50	50	100
2	818CSE02	Social Network Analysis	PE	3	0	0	3	50	50	100
3	818CIE08	Augmented and Virtual Reality	PE	3	0	0	3	50	50	100
4	818CIE04	Green Computing	PE	3	0	0	3	50	50	100
5	818CSE05	Adhoc and Sensor networks	PE	3	0	0	3	50	50	100
6	818CSE06	Block chain Technologies	PE	3	0	0	3	50	50	100

VIII Semester-Professional Elective- V

S.No	Course Code	Course Title	Category	L	T	P	C	MARKS		
								CA	EA	TOT
THEORY										
1	818CSE11	Software Quality Assurance	PE	3	0	0	3	50	50	100
2	818CIE07	Service Oriented Architecture	PE	3	0	0	3	50	50	100
3	818CSE08	Digital Forensics	PE	3	0	0	3	50	50	100
4	818CIE09	Deep Learning	PE	3	0	0	3	50	50	100
5	818CSE10	Visualization Techniques	PE	3	0	0	3	50	50	100
6	818CSE12	Web Mining	PE	3	0	0	3	50	50	100

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Courses offered by CSE Department as Open Elective to other Departments

S.No	COURSE CODE	COURSE TITLE	CAT	L	T	P	C
1	X18OE01	PC Hardware and Trouble shooting	OE	3	0	0	3
2	X18OE02	Oops in C++	OE	3	0	0	3
3	X18OE03	Computer organization and Architecture	OE	3	0	0	3
4	X18OE04	Java Programming	OE	3	0	0	3
5	X18OE05	Software Project Management	OE	3	0	0	3
6	X18OE06	Software Quality and Testing	OE	3	0	0	3
7	X18OE07	Ad hoc and Sensor Networks	OE	3	0	0	3
8	X18OE08	Grid and Cloud Computing	OE	3	0	0	3
9	X18OE09	Web Programming	OE	3	0	0	3
10	X18OE10	Internet of Things	OE	3	0	0	3
11	X18OE10	Big Data Analytics	OE	3	0	0	3

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One Credit Courses offered by the Department

Course Code	Course Title	No. of Hours	Credits
X18OC01	Automated Software Testing tools	15	1
X18OC02	Data Mining Tools	15	1
X18OC03	Network Simulators	15	1
X18OC04	Big Data Analytic Tools	15	1
X18OC05	NPTEL Online Certification Course	15	1
X18OC06	Industry Internship	15	1
X18OC07	Startup Management	15	1
X18OC08	Ethics and Values	15	1
X18OC09	Soft Skills	15	1
X18OC10	Document and Report Writing Using Latex	15	1

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(Applicable to the students admitted from the Academic year 2018-2019 onwards)

S.No.	Semester	Credits
1	I	18
2	II	21
3	III	22
4	IV	22
5	V	23
6	VI	21
7	VII	21
8	VIII	17
Total		165

SEMESTER I

S.No	Course Code	Course Title	Category	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 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	118ESE06	Basic Electrical Electronics and Instrumentation Engineering	ES	3	0	0	3	3

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:

On successful completion of the course the students 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

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PSO3
CO1	3	3	1	1	1	-	1	-	-	3	-	1	3	2	1
CO2	3	3	1	3	1	-	3	-	-	3	-	1	3	2	1
CO3	3	3	1	1	2	-	3	-	-	3	-	1	3	2	1
CO4	3	3	1	2	2	-	1	-	-	3	-	1	3	2	1
CO5	3	3	1	1	2	-	1	-	-	3	-	1	3	2	1
AVG	3	3	1	1.6	1.6	-	1.8	-	-	3	-	1	3	2	1

3-HIGH, 2 MODERATE, 1-LOW, '-' NO CORRELATION

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:

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

CO1: Develop the knowledge of basic linear algebraic concepts

CO2: Design the Combinational and sequential circuits

CO3: Acquire the basic knowledge of ordinary differential calculus

CO4: Compute maxima and minima of a function

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.

CO/PO	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PSO3
CO1	3	3	1	3	2	-	3	-	-	-	-	1	3	2	1
CO2	3	3	1	3	2	-	3	-	-	-	-	1	3	2	1
CO3	3	3	1	3	2	-	3	-	-	-	-	1	3	2	1
CO4	3	3	1	2	2	-	1	-	-	-	-	1	3	2	1
CO5	3	3	1	3	2	-	1	-	-	-	-	1	3	2	1
AVG	3	3	1	2.8	2	-	2.2	-	-	-	-	1	3	2	1

3-HIGH, 2 MODERATE, 1-LOW, '-' NO CORRELATION

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 – homo junction – 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:

On successful completion of the course the students 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.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PSO3
CO1	3	3	2	3	2	2	3	-	-	-	-	1	3	2	1
CO2	3	3	2	3	2	2	3	-	-	-	-	1	3	2	1
CO3	3	3	2	3	2	2	3	-	-	-	-	1	3	2	1
CO4	3	3	2	3	2	2	3	-	-	-	-	1	3	2	1
CO5	3	3	2	3	2	2	3	-	-	-	-	1	3	2	1
AVG	3	3	2	3	2	2	3	-	-	-	-	1	3	2	1

3-HIGH, 2 MODERATE, 1-LOW, '-' NO CORRELATION

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 alkalinity-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, and 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

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

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.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PSO3
CO1	3	1	1	2	2	2	2	-	-	-	-	1	3	2	3
CO2	3	1	1	2	2	2	2	-	-	-	-	1	3	2	3
CO3	3	1	1	2	2	2	2	-	-	-	-	1	3	2	3
CO4	3	1	1	2	2	2	2	-	-	-	-	1	3	2	3
CO5	3	1	1	2	2	2	2	-	-	-	-	1	3	2	3
AVG	3	1	1	2	2	2	2	-	-	-	-	1	3	2	3

3-HIGH, 2 MODERATE, 1-LOW, '-' NO CORRELATION

118PPT05	PROBLEM SOLVING AND PYTHON PROGRAMMING (Common to all Circuit Branches)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

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: squareroot, 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:

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

CO1: Understand the algorithmic solutions for the process of simple computational problems

CO2:Write and execute simple Python programs

CO3:Design and Develop simple Python program to solve problems

CO4:Analyze a Python program into functions

CO5:Manipulate compound data using Python lists, tuples, dictionaries

TOTAL: 45hrs.

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 ComputationalProblem-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.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PSO3
CO1	3	2	3	3	2	2	-	-	-	-	-	1	3	2	2
CO2	3	3	3	3	2	2	-	-	-	-	-	1	3	2	2
CO3	2	3	3	3	2	2	-	-	-	-	-	1	3	2	2
CO4	3	2	3	3	2	2	-	-	-	-	-	1	3	2	2
CO5	3	3	3	3	2	2	-	-	-	-	-	1	3	2	2
AVG	2.8	2.6	3	3	2	2	-	-	-	-	-	1	3	2	2

3-HIGH, 2 MODERATE, 1-LOW, '-' NO CORRELATION

118ESE06	BASIC ELECTRICAL,ELECTRONICS AND INSTRUMENTATION 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, Super plasticizers - 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, AVG - 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

On successful completion of the course the 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.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PSO3
CO1	3	3	3	3	2	-	3	-	-	-	-	1	3	2	2
CO2	3	3	3	3	2	-	3	-	-	-	-	1	3	2	2
CO3	3	3	3	2	2	-	1	-	-	-	-	1	3	2	2
CO4	3	3	3	3	2	-	1	-	-	-	-	1	3	2	2
CO5	3	1	3	2	2	-	1	-	-	-	-	1	3	2	2
AVG	3	2.6	3	2.6	2	-	1.8	-	-	-	-	1	3	2	2

3-HIGH, 2 MODERATE, 1-LOW, '-' NO CORRELATION

118PHP07	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. Determination of laser parameters – Wavelength.
2. Particle size determination using Diode Laser.
3. Determination of thickness of a thin wire-Air wedge method.
4. Determination of velocity of sound and compressibility of liquid- Ultrasonic interferometer.
5. Determination of wavelength of mercury spectrum-Spectrometer grating.
6. Determination of thermal conductivity of a bad conductor-Lee's disc method.
7. Determination of Young's modulus of the material –Non uniform bending.
8. Determination of viscosity of liquid – Poiseuille's method.
9. Spectrometer- Dispersive power of prism.
10. Determination of Young's modulus of the material - Uniform bending.
11. Tensional pendulum- Determination of Rigidity modulus.

TOTAL HOURS: 45 PERIODS

COURSE OUTCOMES

On successful completion of the course the students 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.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PSO3
CO1	3	3	1	2	2	-	-	-	1	-	-	1	3	2	3
CO2	3	3	1	2	2	-	-	-	1	-	-	1	3	2	3
CO3	3	3	1	2	2	-	-	-	1	-	-	1	3	2	3
CO4	3	3	1	2	2	-	-	-	1	-	-	1	3	2	3
CO5	3	1	1	2	2	-	-	-	1	-	-	1	3	2	3
AVG	3	2.6	1	2	2	-	-	-	1	-	-	1	3	2	3

3-HIGH, 2 MODERATE, 1-LOW, '-' NO CORRELATION

		L	T	P	C
118PPP08	**PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY (Common to all Circuit Branches)**	0	0	2	1

COURSE OBJECTIVES:

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:

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

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

CO2: Implement Python programs utilizing conditional statements and loops.

CO3: Develop Python programs incrementally by defining functions and invoking them.

CO4: Examine Python lists, tuples, and dictionaries as representations of compound data.

CO5: Construct Python programs to read and write data into to the files.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PSO3
CO1	3	2	2	2	2	2	-	-	2	-	-	2	3	3	3
CO2	3	3	2	2	2	2	-	-	2	-	-	2	3	3	3
CO3	2	3	2	2	2	2	-	-	2	-	-	2	3	2	3
CO4	3	2	2	2	2	2	-	-	2	-	-	2	3	2	3
CO5	3	2	2	2	2	2	-	-	2	-	-	2	3	2	3
Avg	2.8	2.4	2	2	2	2	-	-	2	-	-	2	3	2.4	3

3-HIGH, 2 MODERATE, 1-LOW, '-' NO CORRELATION

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	218EGT04	Engineering Graphics	EG	2	0	4	4	4
5	218CPT05	Programming in C	ES	3	0	0	3	3
6	218BSE0X	ELECTIVE (GROUP2)	BS	2	0	0	2	2
PRACTICALS								
7	218CYP07	Engineering Chemistry Laboratory	BS	0	0	2	1	1
8	218EPP08	Engineering Practice Laboratory	ES	0	0	2	1	1
9	218CPP09	Programming in C Laboratory						
	TOTAL			15	1	6	19	19

ELECTIVE (GROUP2)

S.No	Course Code	Course Title	Category	L	T	P	Total Contact Periods	Credits
THEORY								
1	218BSE02	Quantum Mechanics for Engineers	BS	2	0	0	2	2
2	218BSE03	Chemistry for Technologists	BS	2	0	0	2	2
3	218BSE04	Energy Storage Devices and Fuel Cells	BS	2	0	0	2	2
4	218BSE07	Semiconductor physics	BS	2	0	0	2	2
5	218BSE09	Physics for Information Science	BS	2	0	0	2	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 **9**

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 **9**

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 **9**

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 **9**

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 **9**

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

On successful completion of the course the students 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.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	3	2	-	1	1	2	3	-	1	3	2	2
CO2	2	3	1	3	2	-	1	1	2	3	-	1	3	2	2
CO3	2	2	1	2	2	-	1	1	2	3	-	1	3	2	2
CO4	3	2	1	2	2	-	1	1	2	3	-	1	3	2	2
CO5	3	1	1	2	2	-	1	1	2	3	-	1	3	2	2
AVG	2.6	2.2	1	2.4	2	-	1	1	2	3	-	1	3	2	2

3-HIGH, 2 MODERATE, 1-LOW, '-' NO CORRELATION

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 parallelepipeds.

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:

On successful completion of the course the students 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.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PSO3
CO1	3	3	2	3	2	2	-	-	-	-	-	1	3	2	2
CO2	3	3	2	3	2	2	-	-	-	-	-	1	3	2	2
CO3	3	3	2	3	2	2	-	-	-	-	-	1	3	2	2
CO4	3	3	2	2	2	2	-	-	-	-	-	1	3	2	2
CO5	3	3	2	2	2	2	-	-	-	-	-	1	3	2	2
AVG	3	3	2	2.6	2	2	-	-	-	-	-	1	3	2	2

3-HIGH, 2 MODERATE, 1-LOW, '-' NO CORRELATION

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 – bio geographical 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

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

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.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PSO3
CO1	3	3	2	3	2	2	3	1	-	-	-	1	3	2	2
CO2	3	3	2	3	2	2	3	1	-	-	-	1	3	2	2
CO3	3	3	2	2	2	2	3	1	-	-	-	1	3	2	2
CO4	3	2	2	2	2	2	3	1	-	-	-	1	3	2	2
CO5	3	1	2	2	2	2	3	1	-	-	-	1	3	2	2
AVG	3	2.4	2	2.4	2	2	3	1	-	-	-	1	3	2	2

3-HIGH, 2 MODERATE, 1-LOW, '-' NO CORRELATION

218EGT04	ENGINEERING GRAPHICS	L	T	P	C
		4	0	0	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

On successful completion of the course the students 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.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PSO3
CO1	3	3	1	3	2	2	-	-	-	-	-	1	3	3	2
CO2	3	3	1	3	2	2	-	-	-	-	-	1	3	3	2
CO3	3	3	1	2	2	2	-	-	-	-	-	1	3	3	2
CO4	3	3	1	2	2	2	-	-	-	-	-	1	3	3	2
CO5	3	1	1	2	2	2	-	-	-	-	-	1	3	3	2
AVG	3	2.6	1	2.4	2	2	-	-	-	-	-	1	3	3	2

3-HIGH, 2 MODERATE, 1-LOW, '-' NO CORRELATION

		L	T	P	C
218CPP08	**PROGRAMMING IN C (Common to CSE & IT)**	3	0	0	3

COURSE OBJECTIVES:

- To develop C Programs using basic programming constructs
- To develop C programs using arrays and strings
- To develop applications in C using functions, pointers and structures
- To do input/output and file handling in C

UNIT-I BASICS OF C LANGUAGE **9**

Introduction to C Programming – Fundamentals – Structure of a C Program – Compilation and Linking Processes – Constants, Variables – Data Types – Expressions Using Operators in C – Managing Input and Output Operations – Decision Making and Branching – Looping Statements - Solving Simple Scientific and Statistical Problems.

UNIT-II ARRAYS AND STRINGS **9**

Arrays – Initialization – Declaration -One Dimensional and Two Dimensional Arrays - Strings- String Operations – String Arrays. Simple Programs - Sorting- Searching - Matrix Operations- Pre-processors Directives.

UNIT-III FUNCTIONS, STRUCTURES & UNIONS **9**

Functions: Definition of function – Declaration of function – Pass by value - Pass by reference – Recursion.

Structures and Unions: Introduction - Need for structure data type - Structure definition – Structure declaration - Structure within a structure - Union - Programs using Structures and Unions.

UNIT-IV POINTERS **9**

Pointers: Definition – Initialization – Pointer Operators -Pointers arithmetic – Pointers and arrays

- Dynamic memory allocation - Example Problems - Parameter passing: Pass by value - Pass by reference

UNIT-V STORAGE CLASSES AND FILES **9**

Storage classes – auto, static, extern, and register- scope rules - Files: Introduction – Using files in C - Operations on files - Types of file processing:

Sequential access, Random access - Sequential access file working with text files - File Handling Functions - Error handling -Command line arguments.

TOTAL: 45hrs

COURSE OUTCOMES:

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

CO1: Develop simple applications in C basics

CO2:Design and implement applications using arrays and strings

CO3: Develop and implement applications in C using functions and structures

CO4: Develop applications in C using pointers.

CO5: Design applications using sequential and random access file processing.

TEXT BOOKS:

1. Ashok.N.Kamthane,- "Computer Programming" , Pearson Education, Second edition(India), 2012.
2. E.Balagurusamy, - "Computing fundamentals and C Programming" , Tata McGraw-HillPublishing Company Limited, 2008.

REFERENCES:

1. Pradip Dey, Manas Ghoush, -"Programming in C", Oxford University Press, 2012.
2. Byron Gottfried, - "Programming with C", 2nd Edition, (Indian Adapted Edition),

   TMHPublications, 2010.
3. Stephen G.Kochan, - "Programming in C", 4th Edition, Pearson Education India, 2015.
4. Brian W.Kernighan and Dennis M.Ritchie, -"The C Programming Language", Pearson
5. Education Inc., 2005.
6. Behrouz A.Forouzan and Richard.F.Gilberg, - "Computer Science A StructuredProgramming Approach using C" 3rd Edition, Cengage Publications, 2013.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PSO3
CO1	3	3	2	3	2	-	-	-	-	-	-	1	3	2	2
CO2	3	3	2	3	2	-	-	-	-	-	-	1	3	2	2
CO3	3	3	2	3	2	-	-	-	-	-	-	1	3	2	2
CO4	3	3	2	2	2	-	-	-	-	-	-	1	3	2	2
CO5	3	3	2	3	2	-	-	-	-	-	-	1	3	2	2
AVG	3	3	2	2.8	2	-	-	-	-	-	-	1	3	2	2

3-HIGH, 2 MODERATE, 1-LOW, '-' NO CORRELATION

		L	T	P	C
218CYP07	**ENGINEERING CHEMISTRY LABORATORY**	**0**	**0**	**2**	**1**

COURSE OBJECTIVES:

- 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:

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

CO1: Carry out the volumetric experiments and improve the analytical skills.

CO2: Understand the maintenance and usage of analytical instruments and thereby develop thei 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 differen 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.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	-	2	-	-	3	-	1
CO2	3	3	-	2	-	-	-	-	-	-	-	-	3	-	1
CO3	3	3	-	2	3	-	2	-	-	3	-	-	3	-	1
CO4	3	3	-	3	2	-	-	-	-	-	-	-	3	-	1
CO5	3	3	-	-	-	-	-	-	-	1	-	-	3	-	1
AVG	3	3	-	1.4	1	-	0.4	-	-	1.2	-	-	3	-	1

3-HIGH, 2 MODERATE, 1-LOW,'-' NO CORRELATION

		L	T	P	C
218BSE09	**PHYSICS FOR INFORMATION SCIENCE**				
	(Common to CSE & IT)	**2**	**0**	**0**	**2**

COURSE OBJECTIVES:

- To make the students to understand the basics of crystallography and its importance in
- studying materials properties.
- To make the students understand the importance in studying electrical properties of
- materials.
- To enable the students to gain knowledge in semiconductor physics.
- To establish a sound grasp of knowledge on different optical properties of materials.
- To inculcate an idea of significance of nano structures and quantum confinement.

UNIT I CRYSTALLOGRAPHY **6**

Crystal structures: Crystal lattice – basis - unit cell and lattice parameters – crystal systems andBravais lattices – Structure and packing fractions of SC, BCC, FCC and HPC structures –Miller indices –distance between successive planes.

UNIT II ELECTRICAL PROPERTIES OF MATERIALS **6**

Classical free electron theory - Expression for electrical conductivity – Thermal conductivity, expression - Wiedemann-Franz law – Success and failures - Fermi- Dirac statistics – Density of energy states.

UNIT III SEMICONDUCTOR PHYSICS **6**

Intrinsic Semiconductors – Properties - Energy band diagram – Types of semiconductors - direct and indirect band gap, Elemental and Compound semiconductors - carrier concentration in intrinsic semiconductors– Hall Effect.

UNIT IV OPTICAL PROPERTIES OF MATERIALS **6**

Classification of optical materials – carrier generation and recombination processes – Absorption emission and scattering of light in metals, insulators and semiconductors (concepts only) – photocurrent in a P-N diode – solar cell – LED.

UNIT V NANO MATERIALS AND QUANTUM COMPUTING **6**

Introduction - quantum confinement – quantum structures: quantum wells, wires and dots – bandgap of nanomaterials - preparation - ball milling - Plasma arcing method - Electro deposition - applications.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

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

CO1: Know basics of crystallography and its importance for varied materials properties

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: Have the necessary understanding on the functioning of optical materials for optoelectronics
CO5: the basics of quantum structures and their applications and basics of quantum computing

TEXT BOOKS:

1. R. N. Jayaprakash, Physics for information science, Sahana publication, 2022
2. S.O. Kasap. Principles of Electronic Materials and Devices, McGraw Hill Education (Indian Edition), 2020.
3. Jasprit Singh, "Semiconductor Devices: Basic Principles", Wiley (Indian Edition), 2007.
4. S.O. Kasap. Principles of Electronic Materials and Devices, McGraw-Hill Education (Indian Edition), 2020.
5. Parag K. Lala, Quantum Computing: A Beginner& Introduction, McGraw-Hill Education (Indian Edition), 2020.

REFERENCES:

1. Charles Kittel, Introduction to Solid State Physics, Wiley India Edition, 2019.
2. Y.B.Band and Y.Avishai, Quantum Mechanics with Applications to Nanotechnology and Information Science, Academic Press, 2013.
3. V.V.Mitin, V.A. Kochelap and M.A.Stroscio, Introduction to Nanoelectronics, Cambridge Univ.Press, 2008.
4. G.W. Hanson, Fundamentals of Nanoelectronics, Pearson Education (Indian Edition) 2009.
5. B.Rogers, J.Adams and S.Pennathur, Nanotechnology: Understanding Small Systems, CRC Press, 2014.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PSO3
CO1	3	3	2	2	2	2	1	-	-	-	-	1	3	2	2
CO2	3	3	2	3	2	2	1	-	-	-	-	1	3	2	2
CO3	3	3	2	2	2	2	1	-	-	-	-	1	3	2	2
CO4	3	3	2	2	2	2	1	-	-	-	-	1	3	2	2
CO5	3	3	2	2	2	2	1	-	-	-	-	1	3	2	2
AVG	3	3	2	2.2	2	2	1	-	-	-	-	1	3	2	2

3-HIGH, 2 MODERATE, 1-LOW, '-' NO CORRELATION

		L	T	P	C
218EPP08	**ENGINEERING PRACTICE LABORATORY**	**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

On successful completion of the course 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: 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.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PSO3
CO1	3	3	1	3	2	-	-	-	2	-	-	1	3	2	3
CO2	3	3	1	3	2	-	-	-	2	-	-	1	3	2	3
CO3	3	3	1	3	2	-	-	-	2	-	-	1	3	2	3
CO4	3	3	1	2	2	-	-	-	2	-	-	1	3	2	3
CO5	3	1	1	2	2	-	-	-	2	-	-	1	3	2	3
AVG	3	2.6	1	2.6	2	-	-	-	2	-	-	1	3	2	3

3-HIGH, 2 MODERATE, 1-LOW, '-' NO CORRELATION

	C PROGRAMMING LABORATORY	L	T	P	C
218CPP08	(CSE/IT)	0	0	2	1

COURSE OBJECTIVES:

- To develop C programs using conditional and looping statements
- To expertise in arrays and strings
- To build modular programs

Prerequisite: Programming in C

LIST OF EXPERIMENTS:

1. Programs using, I/O statements and expressions.
2. Programs using decision-making statements.
3. Programs using looping statements
4. Programs using 1-D and 2-D array.
5. Write a program for scientific and statistical problem.
6. Solving problems using string functions
7. Programs using user defined functions.
8. Program using Recursive and pass by value and call by reference
9. Sort the list of numbers using pass by reference.
10. Program using structures and pointers.
11. Program using structures and functions.
12. Program using i) Sequential access file.

    ii) Random access file.

COURSE OUTCOMES:

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

CO1: Write and compile programs using C- Language.

CO2: Develop programs in C for any computing problems

CO3: Implement program using control statements.

CO4: Handle arrays and strings.

CO5: Implement program using using structures.

LIST OF EQUIPMENTS 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 / Linux.Turbo C.

CO/PO	PO1	PO2	PO 3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PSO3
CO1	3	3	2	3	2	-	-	-	2	-	-	3	3	3	3
CO2	3	3	2	3	2	-	-	-	2	-	-	3	3	3	3
CO3	3	3	2	3	2	-	-	-	2	-	-	3	3	3	3
CO4	3	3	2	2	2	-	-	-	2	-	-	3	3	3	3
CO5	3	1	2	2	2	-	-	-	2	-	-	3	3	3	3
AVG	3	2.6	2	2.6	2	-	-	-	2	-	-	3	3	3	3

3-HIGH, 2 MODERATE, 1-LOW, '-' NO CORRELATION

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

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 this 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 of simple 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

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

CO1: Know the methods to solve partial differential equations occurring in various physical and engineering problems.

CO2: Describe an oscillating function which appear in a variety of physical problems by Fourier series helps them to understand its basic nature deeply.

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.

CO4: Understand the effect of Fourier transform techniques and their applications.

CO5: 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

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

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PSO3
CO1	3	3	2	3	1	-	-	-	-	-	-	1	3	2	2
CO2	3	3	2	3	1	-	-	-	-	-	-	1	3	2	2
CO3	3	3	2	3	1	-	-	-	-	-	-	1	3	2	2
CO4	3	3	2	3	1	-	-	-	-	-	-	1	3	2	2
CO5	3	3	2	3	1	-	-	-	-	-	-	1	3	2	2
AVG	3	3	2	3	1	-	-	-	-	-	-	1	3	2	2

3-HIGH, 2 MODERATE, 1-LOW, '-' NO CORRELATION

		L	T	P	C
318CIT02	**DIGITAL ELECTRONICS**	**3**	**0**	**0**	**3**

Course Objectives:

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

- Introduce basic postulates of Boolean algebra and shows the correlation between Boolean expressions
- Outline the formal procedures for the analysis and design of combinational circuits and 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 in VHDL.

Prerequisites: Nil

UNIT – I BOOLEAN ALGEBRA AND LOGIC GATES **9**

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 **9**

Combinational circuits – Analysis and design procedures - Circuits for arithmetic operations – Code conversion -Decoders and encoders - Multiplexers and multiplexers–Comparator.

UNIT – III SYNCHRONOUS AND ASYNCHRONOUS SEQUENTIAL LOGIC **9**

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 AND LOGIC FAMILIES **9**

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

UNIT – V PROGRAMMING WITH VHDL **9**

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

TOTAL: 45 HOURS

Course Outcomes:

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

CO1:Solve the Postulates of Boolean algebra using different techniques

CO2:Design the Combinational and sequential circuits

CO3:Apply the concept of synchronous and asynchronous circuit
CO4:Summarize the concept of memories and programmable logic devices. Knowledge in VHDL for VLSI Design
CO5:Demonstrate the concepts of memories I/O

Text books:

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

References:

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 Publishing Company,2008

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PSO3
CO1	3	2	3	3	1	2	1	-	-	-	-	1	3	2	2
CO2	3	2	3	3	1	2	1	-	-	-	-	1	3	2	2
CO3	3	2	3	3	1	2	1	-	-	-	-	1	3	2	2
CO4	3	2	3	3	1	2	1	-	-	-	-	1	3	2	2
AVG	3	2	3	3	1	2	1	-	-	-	-	1	3	2	2

3-HIGH, 2 MODERATE, 1-LOW, '-' NO CORRELATION

318CST03	DATABASE MANAGEMENT SYSTEM	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- Learn the fundamentals of data models and conceptualize and depict a database system using ER diagram.
- 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 System Architecture – 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 – Timestamp Based 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: 45 Hours

COURSE OUTCOMES:
On successful completion of the course the students will be able to:

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

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

CO3:Apply normalization techniques to eliminate dependency in a database schema.

CO4:Analyze concurrency control and recovery mechanism.

CO5:Construct different file with Indexing techniques

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Ramesh 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.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	3	1	2	1	-	-	-	-	1	3	2	2
CO2	3	2	3	3	1	2	1	-	-	-	-	1	3	2	2
CO3	3	2	3	3	1	2	1	-	-	-	-	1	3	2	2
CO4	3	2	3	3	1	2	1	-	-	-	-	1	3	2	2
AVG	3	2	3	3	1	2	1	-	-	-	-	1	3	2	2

3-HIGH, 2 MODERATE, 1-LOW, '-' NO CORRELATION

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

COURSE 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 : 45 Hours

COURSE OUTCOMES:

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

CO1: Understand the concepts of classes and objects to solve simple problems

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

CO3: Develop solutions for given problems using Polymorphism and Inheritance concepts to solve 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:

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

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PSO3
CO1	1	3	1	2	2	-	-	-	-	-	-	3	3	3	3
CO2	1	3	1	2	2	-	-	-	-	-	-	3	3	3	3
CO3	1	3	1	2	2	-	-	-	-	-	-	3	3	3	3
CO4	1	3	1	2	2	-	-	-	-	-	-	3	3	3	3
CO5	1	3	1	2	2	-	-	-	-	-	-	3	3	3	3
AVG	1	3	1	2	2	-	-	-	-	-	-	3	3	3	3

3-HIGH, 2 MODERATE, 1-LOW, '-' NO CORRELATION

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

UNIT V 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 : 45 Hours

COURSE OUTCOMES:

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

CO1: Familiarize with the List Operations and its types

CO2: Understand and Demonstrate the applications using Stack and Queues data structures.

CO3: Design and Implement applications using tree Structure.

CO4: Analyze the various 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 Learning Private Limited Publishers, 2011

REFERENCES:

1. Michael T. Goodric ,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 code to build scalable and robust applications in C++", 2018

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

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3	1	2	-	-	-	-	-	-	3	3	3	3
CO2	2	3	3	1	2	-	-	-	-	-	-	3	3	3	3
CO3	2	3	3	1	2	-	-	-	-	-	-	3	3	3	3
CO4	2	3	2	2	1	-	-	-	-	-	-	3	3	3	3
CO5	2	3	2	2	1	-	-	-	-	-	-	3	3	3	3
AVG	2	3	2.6	1.4	1.6	-	-	-	-	-	-	3	3	3	3

3-HIGH, 2 MODERATE, 1-LOW, '-' NO CORRELATION

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: 45 Hours

COURSE OUTCOMES:

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

CO1:Relate the basic operational concepts of computers, ALU and Instructions

CO2:Understand the computer arithmetic and control unit operations.

CO3:Comprehend and analyze the Pipelined Execution.

CO4:Analyze the various Memory Systems and I/O Organization.

CO5: Know the Parallelism and Multiprocessor architectures

TEXT BOOKS:

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

REFERENCE BOOKS:

1. David A. Patterson and John L. Hennessy, -"Computer Organization and Design: The Hardware / Software interface", Fourth Edition, Elsevier, 2012.

2. William Stallings, - "Computer Organization and Architecture – Designing for Performance", Tenth Edition, Pearson Education, 2016.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	1	2	-	-	-	-	-	-	1	3	3	2
CO2	3	2	3	1	2	-	-	-	-	-	-	1	3	3	2
CO3	3	2	3	1	2	-	-	-	-	-	-	1	3	3	2
CO4	3	2	3	1	2	-	-	-	-	-	-	1	3	3	2
CO5	3	2	3	1	2	-	-	-	-	-	-	1	3	3	2
AVG	3	2	3	1	2	-	-	-	-	-	-	1	3	3	2

3-HIGH, 2 MODERATE, 1-LOW, '-' NO CORRELATION

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

COURSE OBJECTIVES:

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 using basic 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.

Total Hours: 30

Course Outcomes

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

CO1: Apply Digital ICs for various applications.

CO2: Analyze the various combinational circuits using logic gates.

CO3: Implement various sequential circuits using logic gates

CO4: Write VHDL code for various combinational circuits

CO5: Write VHDL code for various sequential circuits

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	2	1	-	1	-	2	-	-	1	3	2	2
CO2	3	2	3	2	1	-	1	-	2	-	-	1	3	2	2
CO3	3	2	3	2	1	-	1	-	2	-	-	1	3	2	2
CO4	3	2	3	2	1	-	1	-	2	-	-	1	3	2	2
CO5	3	2	3	2	1	-	1	-	2	-	-	1	3	2	2
AVG	3	2	3	2	1	-	1	-	2	-	-	1	3	2	2

3-HIGH, 2 MODERATE, 1-LOW, '-' NO CORRELATION

318CSP08 DATABASE MANAGEMENT SYSTEMS LABORATORY

L	T	P	C
0	0	2	1

COURSE OBJECTIVES:

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

Total Hours: 30

COURSE OUTCOMES:

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

CO1: Design and implement database schema for a given problem domain.

CO2: Populate and query a database using SQL operations.

CO3: Prepare reports.

CO4: Apply concurrency control and recovery mechanism.

CO5: 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

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PSO3
CO1	3	3	1	3	2	-	-	-	2	-	-	3	3	3	3
CO2	3	3	1	2	2	-	-	-	2	-	-	3	3	3	3
CO3	3	3	1	2	2	-	-	-	2	-	-	3	3	3	3
CO4	3	3	1	3	2	-	-	-	2	-	-	3	3	3	3
CO5	3	-	1	-	-	-	-	-	2	-	-	3	3	3	3
AVG	3	3	1	2.5	2	-	-	-	2	-	-	3	3	3	3

3-HIGH, 2 MODERATE, 1-LOW, '-' NO CORRELATION

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

Tree Traversal.

10. Operation of Binary Search Tree.

Graph Traversal.

11. Applications of Graph (Dijikstras, Prims, Kruskal)
12. Searching and Sorting Algorithms
13. Hashing Techniques

Total Hours: 30

COURSE OUTCOMES:

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

CO1: Applying the object oriented programming concepts.

CO2: Implement various file concepts and demonstrate exception handling in object oriented Programming

CO3: Create programs for manipulating List, Stack and Queue ADT with its Applications.

CO4: Apply and implement Tree and Graph Data Structures for Real Time Applications.

CO5: Construct 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 / Linux Turbo C / C++.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PSO3
CO1	3	3	3	2	2	-	-	-	2	-	-	3	3	3	3
CO2	3	3	3	2	2	-	-	-	2	-	-	3	3	3	3
CO3	3	3	3	2	2	-	-	-	2	-	-	3	3	3	3
CO4	3	3	3	2	2	-	-	-	2	-	-	3	3	3	3
CO5	3	3	2	2	1	-	-	-	2	-	-	3	3	3	3
AVG	3	3	2.8	2	1.8	-	-	-	2	-	-	3	3	3	3

3-HIGH, 2 MODERATE, 1-LOW, '-' NO CORRELATION

SEMESTER – IV

S.No	Course Code	Course Title	Category	Periods Per Week			Total Contact Periods	Credits
				L	T	P		
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	418CIT04	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

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 – Bipartite graphs - 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 algebraic systems – Sub lattices – direct product and Homomorphism – Some special lattices – Boolean algebra.

TOTAL = 45+15=60 PERIODS

Course Outcomes

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

CO1: understand and demonstrate the applications of basic concepts of an algorithm and counting principles in combinatorial mathematics.

CO2: acquaint the graph theory concepts which serves as the base for the real time applications in network analysis.

CO3: expertise the knowledge of logics helps to verify the correctness of computer programs and to draw conclusions from scientific experiments.

CO4: internalise the abstract algebraic structures which provides the ability to deal the theory of sequential machines, formal languages and syntactic analysis.

CO5: Imbibe the concept of Lattices and Boolean algebra.

TEXT BOOKS:

1. T.Veerarajan, “Discrete Mathematics with Graph Theory and Combinatorics”, Tata McGraw–Hill Pub. Co. Ltd, New Delhi.

REFERENCES:

1. Kenneth H.Rosen, “Discrete Mathematics and its Applications”, Seventh edition, Special Indian edition , Tata McGraw – Hill Pub. Co. Ltd., New Delhi, 2011.

2. Trembly J.P. and Manohar R, “Discrete Mathematical Structures with Applications to Computer 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.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PSO3
CO1	3	3	2	3	1	-	-	-	-	-	-	3	2	2	1
CO2	3	3	2	3	1	-	-	-	-	-	-	3	2	2	1
CO3	3	3	2	3	1	-	-	-	-	-	-	3	2	2	1
CO4	3	3	1	3	1	-	-	-	-	-	-	3	2	2	1
CO5	3	3	1	3	1	-	-	-	-	-	-	3	2	2	1
AVG	3	3	1.6	3	1	-	-	-	-	-	-	3	2	2	1

3-HIGH, 2 MODERATE, 1-LOW, ‘-‘ NO CORRELATION

418CIT02	DESIGN AND ANALYSIS OF ALGORITHM	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- 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-IIIDYNAMIC PROGRAMMING AND ITERATIVE IMPROVEMENT 10

Dynamic Programming: General Method - Multistage Graphs - All Pair Shortest Paths - Optimal Binary Search Trees - 0/1 Knapsack - Travelling Salespersons Problem. Iterative Improvement: The Maximum Flow Problem - Maximum Matching in Bipartite Graphs - The Stable Marriage Problem.

UNIT-IVBACKTRACKING AND BRANCH AND BOUND 9

Backtracking: General Method - 8 Queens Problem - Sum of Subsets - Graph Colouring - 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: 45 Hours

COURSE OUTCOMES:

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

CO1: Define various Computing Problems and algorithms.

CO2: Illustrate Divide and Conquer, Greedy Techniques to solve various problems.

CO3: Apply Dynamic programming and iterative improvement to solve problems

CO4: Analyze back tracking and Branch and Bound algorithm

CO5: Evaluate 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.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PSO3
CO1	3	3	3	2	1	-	-	-	-	-	-	3	3	2	2
CO2	3	3	3	2	1	-	-	-	-	-	-	3	3	2	2
CO3	3	3	3	2	1	-	-	-	-	-	-	3	3	2	2
CO4	3	3	3	2	1	-	-	-	-	-	-	3	3	2	2
CO5	3	3	3	2	1	-	-	-	-	-	-	3	3	2	2
AVG	3	3	3	2	1	-	-	-	-	-	-	3	3	2	2

3-HIGH, 2 MODERATE, 1-LOW, '-' NO CORRELATION

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

COURSE OBJECTIVES:

- 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: 45 Hours

COURSE OUTCOMES:

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

CO1: Understand and apply basic syntax and semantics of java programming Language.

CO2: Applying Packages and interfaces for creating real world application.

CO3:Analyze the error handling in string operations using multithreading concepts.

CO4:Creating a GUI based application using applets and swings

CO5: Understand the usage of utility and 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.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PSO3
CO1	3	3	3	1	3	-	-	-	-	-	-	2	3	3	2
CO2	3	3	3	2	3	-	-	-	-	-	-	3	3	3	2
CO3	3	3	1	2	3	-	-	-	-	-	-	2	3	3	2
CO4	3	3	2	2	3	-	-	-	-	-	-	3	3	3	2
CO5	3	3	2	3	3	-	-	-	-	-	-	2	3	3	2
AVG	3	3	2.2	2	3	-	-	-	-	-	-	2.4	3	3	2

3-HIGH, 2 MODERATE, 1-LOW, '-' NO CORRELATION

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

COURSE OBJECTIVES:

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

Pre-requisites: Nil

UNIT-I PROCESSES AND THREADS **9**

Introduction to Operating Systems – Computer System Organization – Computer System Architecture - Operating System Structures: OS Services - System Calls –Types of System Calls – SystemPrograms – System Structure. Processes: Process Concept–Process Scheduling – 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 AND PROCESS 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 MEMORY MANAGEMENT **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-IVSTORAGEMANAGEMENT **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 – Directory implementation – Allocation Methods – Free-Space Management – Efficiency and Performance – Recovery. Case Studies: File System in Linux

UNIT-V I/O SYSTEMS AND 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: 45 Hours

COURSE OUTCOMES:

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

CO1: Gain extensive knowledge and apply the concepts of process management

CO2: Illustrate the various scheduling algorithms and methods of dead lock handling

CO3:Compare various memory management and paging techniques.

CO4: Analyze disk management functionalities and file systems.

CO5: Know 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", Third Edition, TMH 2012.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PSO3
CO1	3	2	2	1	2	-	-	-	-	-	-	3	3	3	2
CO2	3	2	2	2	3	-	-	-	-	-	-	3	3	3	2
CO3	3	2	2	1	3	-	-	-	-	-	-	3	3	3	2
CO4	3	2	2	1	3	-	-	-	-	-	-	3	3	3	2
CO5	3	1	1	1	2	-	-	-	-	-	-	3	3	3	2
AVG	3	1.8	1.8	1.2	2.6	-	-	-	-	-	-	3	3	3	2

3-HIGH, 2 MODERATE, 1-LOW, '-' NO CORRELATION

418CST05	COMPUTER NETWORKS	L	T	P	C
		3	0	0	3

COURSE 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 LINK LAYER 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 NETWORK LAYER 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 IVTRANSPORTLAYER 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: 45 Hours

COURSE OUTCOMES:

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

CO1: Recognize the basics of networking and data transmission

CO2: Examine different data link layer flow and error control techniques.

CO3: Identify and assess how well different routing algorithms perform.

CO4: Look over the congestion control and flow control algorithms for end-to-end QoS.

CO5: Review the characteristics and methods of use of several 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.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PSO3
CO1	3	1	2	1	1	1	1	0	1	1	-	1	-	2	3
CO2	1	1	1	1	1	1	1	0	1	1	-	1	-	2	1
CO3	2	1	2	1	1	1	1	0	1	1	-	1	-	2	1
CO4	1	1	2	1	2	2	1	0	1	1	-	2	-	2	2
CO5	2	1	1	1	2	3	1	0	1	1	-	3	-	1	3
AVG	1.8	1	1.6	1	1.4	1.6	1	0	1	1	-	1.6	-	1.8	2

3-HIGH, 2 MODERATE, 1-LOW, '-' NO CORRELATION

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

COURSE OBJECTIVES:

- Provide an overview of software engineering and software process models.
- Comprehend fundamental concepts of requirements engineering and requirements specification.
- Understand the different design techniques and software architectural styles.
- LearnVarious testing strategies and maintenance measures

Pre-requisites: Nil

UNIT-I SOFTWARE PROCESS MODELS AND AGILE DEVELOPMENT 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 Process Models - The Unified Process - Introduction to Agility-Agile process- Extreme Programming - XP Process.

UNIT-II REQUIREMENTS ENGINEERING 8

Functional and Non-Functional Requirements - User requirements, System requirements, Software Requirements Document – Requirement Engineering Process**:** Feasibility Studies, Requirements Elicitation and Analysis -Requirements Validation - Requirements Management.

UNIT-III ANALYSIS AND DESIGN MODELING 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 Mobile App 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 SOFTWARE MAINTENANCE 8

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

TOTAL: 45 Hours

COURSE OUTCOMES:

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

CO1: Understand the various development 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 the

methods for software architecture.

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

CO5: Evaluate 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 Pledger and Joanne M. Atlee, "Software Engineering: Theory and Practice", 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 Engineering Approach", Wiley-India, 2007.
4. Stephen R.Schach, "Software Engineering", Tata McGraw-Hill Publishing Company Limited, 2007.
5. S.A.Kelkar,"Software Engineering", Prentice Hall of India Pvt,2007.
6. Zaigham Mahmood, Saqib Saeed: Software Engineering framework for the cloud computing Paradigms, Springer,2013.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PSO3
CO1	2	2	2	1	1	2	-	-	-	-	-	3	3	2	2
CO2	2	2	2	1	1	2	-	-	-	-	-	3	3	2	2
CO3	2	2	2	1	1	2	-	-	-	-	-	3	3	2	2
CO4	2	2	2	1	1	1	-	-	-	-	-	3	3	2	2
CO5	2	2	2	2	2	1	-	-	-	-	-	3	3	2	2
AVG	2	2	2	1.2	1.2	1.6	-	-	-	-	-	3	3	2	2

3-HIGH, 2 MODERATE, 1-LOW, '-' NO CORRELATION

418CIP07	JAVA PROGRAMMING LABORATORY	L	T	P	C
		0	0	2	1

COURSE OBJECTIVES:

- To create Java programs that leverages 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:
On successful completion of the course the students will be able to:

CO1: Write a program 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: Apply I/O Functionality to read and write the files
CO5: Implements string handling functions.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PSO3
CO1	2	2	2	2	3	-	-	-	2	-	-	3	3	3	3
CO2	2	2	3	2	3	-	-	-	2	-	-	3	3	3	3
CO3	2	2	2	3	3	-	-	-	2	-	-	3	3	3	3
CO4	2	2	2	2	3	-	-	-	2	-	-	3	3	3	3
CO5	2	2	2	1	3	-	-	-	2	-	-	3	3	3	3
AVG	2	2	2.2	2	3	-	-	-	2	-	-	3	3	3	3

3-HIGH, 2 MODERATE, 1-LOW, '-' NO CORRELATION

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

COURSE OBJECTIVES:

- 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, memory management 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, amount, 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 AVG waiting time and AVG 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:

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

CO1: Design and implement the basic basic services and functionalities of operating system using system call.

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

CO3: Build Producer Consumer problem for process synchronization

CO4: Implement memory management and file allocation techniques algorithms.

CO5: Be familiar with production and security mechanism.

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 in individual PCs (or)

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

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PSO3
CO1	3	2	2	2	3	-	-	-	2	-	-	3	3	3	3
CO2	3	2	2	2	3	-	-	-	2	-	-	3	3	3	3
CO3	3	2	2	2	3	-	-	-	2	-	-	3	3	3	3
CO4	3	2	2	2	3	-	-	-	2	-	-	3	3	3	3
CO5	3	2	2	2	2	-	-	-	2	-	-	3	3	3	3
AVG	3	2	2	2	2.8	-	-	-	2	-	-	3	3	3	3

3-HIGH, 2 MODERATE, 1-LOW, '-' NO CORRELATION

418CSP09	COMPUTER NETWORKS LABORATORY	L	T	P	C
		0	0	2	1

COURSE OBJECTIVES:

- 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:

Study of Basic concepts of Network Simulator (NS2), its installation and working environment.

8. Using NS2 Network Simulation,

a) Initialize & Network simulator object.
b) Group of Nodes to form a LAN
c) Delay of Link
d) Bandwidth of Link.

9. 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 by TCP/UDP.
10. Simulate a wired network and measure the following performance metrics
    i) Throughput ii)Delay iii) PacketLoss
11. Implement Link State routing and Distance Vector routing measure the following performance metrics

    i) Throughput ii) Delayiii) PacketLoss

12. Experiment on packet capture and network traffic using wire sharktool.

TOTAL: 30 Hours

COURSE OUTCOMES:

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

CO1: Implement the basic concepts of open source network simulator.

CO2: Design and implement various routing algorithms.

CO3: Simulate networks and design the code for traffic using various tools.

CO4: Analyze the performance of protocols in different layers.

CO5: Implement error detection and correction methods.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PSO3
CO1	3	2	2	2	2	-	-	-	2	-	-	3	3	2	2
CO2	3	2	2	2	2	-	-	-	2	-	-	3	3	2	2
CO3	3	2	2	2	2	-	-	-	2	-	-	3	3	2	2
CO4	3	2	2	2	1	-	-	-	2	-	-	3	3	2	2
CO5	3	2	2	1	1	-	-	-	2	-	-	2	3	2	2
AVG	3	2	2	1.8	1.6	-	-	-	2	-	-	2.8	3	2	2

3-HIGH, 2 MODERATE, 1-LOW, '-' NO CORRELATION

SEMESTER – V

S.No	Course Code	Course Title	Category	Periods Per Week			Total Contact Periods	Credits
				L	T	P		
1	518PQT01	Probability and Queuing Theory	BS	3	1	0	2	4
2	518CIT02	Micro-Processor and Microcontrollers with Applications	ES	3	0	0	2	3
3	518CST03	Object Oriented Analysis and Design	PC	3	0	0	2	3
4	518CIT04	Theory of Computation	PC	3	1	0	2	4
5	518CSE02	Scripting Language	OE	3	0	0	3	3
6	518BAO03	Engineering Ethics and Human Values	PE	3	0	0	3	3
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

		L	T	P	C
518PQT01	**PROBABILITY AD QUEUING THEORY**	**3**	**1**	**0**	**4**

Course Objectives

- To impart the knowledge of basic probabilistic theory.
- To learn one dimensional discrete and continuous probability distributions occurring in natural phenomena.
- To extend the probability theory to two dimensional random variables and to study the statistical measures.
- To study the classification and analysis of few random process.
- To acquire the skills to analyse queuing models.

UNIT I PROBABILITY AND RANDOM VARIABLE 9+3

Axioms of probability - Conditional probability - Total probability – Bayes' 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-Markovian Queues Pollaczek-Khinchin formula(statement and applications only) - **(M/G/1): (∞ /GD).**

TOTAL: 45 + 15 = 60 PERIODS

Course Outcomes

On successful completion of the course the students 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 evolves with respect to time in a probabilistic approach.

CO 5: Construct and solve queuing models that are suitable for practical problems encountered in daily life.

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 publishing company Limited, New Delhi, 2014.
3. Kandasamy.P, Thilagavathy, K., &Gunavathi.K., "Probability, Statistics and Queueing Theory"., S. Chand& Company Ltd., New Delhi, 2014.
4. Gupta.S.C., &Kapoor, V.K., "Fundamentals of mathematical statistics", 10th edition(Reprint), Sultan Chand & Sons publishers, New Delhi, 2002.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	3		-	-	-	-	-	1	1	-	1	-	-	3
CO2	3	3	2	-	-	-	-	-	1	1	-	1	-	-	3
CO3	3	3	1	-	-	-	-	-	1	1	-	1	-	1	3
CO4	3	3	2	-	-	-	-	-	1	1	-	1	-	-	3
CO5	3	3	2	-	-	-	-	-	1	1	-	1	2	-	3
Avg	3	3	1.75	-	-	-	-	-	1	1	-	1	2	1	3

3-HIGH 2-MODERATE 1-LOW '- '- NO CORRELATION

518CIT02 **MICROPROCESSORS AND MICROCONTROLLERS WITH APPLICATIONS**

L	T	P	C
3	0	2	3

Course Objectives:

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

- Summarize the architecture and assembly language programming of microprocessors
- Defend the architecture and assembly language programming of microcontrollers
- 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 processors.

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

TOTAL: 45 PERIODS

Course Outcomes:

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

CO1: Recognize the basic Microprocessor architecture and its concepts.

CO2: Outline the concepts of peripheral interfacing mechanisms.

CO3: Design various assembly language programming using microprocessors and microcontroller.

CO4: Extend the real world interfacing with microcontroller

CO5: Extrapolate the architectural features of 801XX with 8086 processors.

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' second edition , Penram international.

3 Mohamed Ali Mazidi, Janice GillispieMazidi," 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.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	1	3	-	-	-	1	1	3	2	3	1	3
CO2	3	2	3	1	3	-	-	-	1	1	3	2	3	1	3
CO3	3	2	3	1	3	-	-	-	1	1	3	2	3	1	3
CO4	3	2	3	1	3	-	-	-	1	1	3	2	3	1	3
CO5	3	2	3	1	3	-	-	-	1	1	3	2	3	1	3
Avg	3	2	3	1	3	-	-	-	1	1	3	2	3	1	3

3-HIGH 2-MODERATE 1-LOW '- '- NO CORRELATION

		L	T	P	C
518CST03	**OBJECT ORIENTED ANALYSIS AND DESIGN**	**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 **12**

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.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Remember Object Oriented Methodologies and Unified Modelling Approach to develop a system model.

CO2: Understand 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.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	3	3	2	-	-	-	-	-	-	3	3	3	2
CO2	2	2	3	3	2	-	-	-	-	-	-	3	3	3	2
CO3	2	2	3	2	2	-	-	-	-	-	-	3	3	3	2
CO4	2	2	3	2	2	-	-	-	-	-	-	3	3	3	2
CO5	2	2	3	2	2	-	-	-	-	-	-	3	3	3	2
Avg	2	2	3	2.4	2	-	-	-	-	-	-	3	3	3	2

3-HIGH 2-MODERATE 1-LOW '- ' - NO CORRELATION

-

		L	T	P	C
518CIT04	**THEORY OF COMPUTATION**	**3**	**1**	**0**	**4**

OBJECTIVE(S):

- Design a deterministic and non-deterministic finite automaton.
- Construct automata for any given 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– Deterministic Finite 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 LANGUAGES 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 properties of Regular Language, Equivalence and Minimization of Automata.

UNIT– III CONTEXT FREE LANGUAGES AND PUSH DOWN AUTOMATA 9

Context Free Grammar (CFG) – Derivation trees – Ambiguity-Normal Forms, Chomsky Normal Form (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.

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-MP CP to PCP Undesirability of PCP.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Understand 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**:** Evaluate whether a problem is decidable or not

TEXT BOOKS:

1. John E. Hopcroft and Rajeev Motwani and Jeffrey D. Ullman, "Introduction to Automata Theory, 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 McGraw-Hill Education Pvt. Ltd., New Delhi, 2010.

REFERENCE BOOKS:

1. S.N. Sivanadam, M. JanakiMeena, "Theory of Computation", I.K. International Publishing House Pvt. 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.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	3	3	2	2	-	-	-	-	-	-	2	3	3	3
CO2	3	3	3	2	2	-	-	-	-	-	-	2	3	3	3
CO3	3	3	3	2	2	-	-	-	-	-	-	2	3	3	3
CO4	3	3	3	2	2	-	-	-	-	-	-	2	3	3	3
CO5	3	3	3	2	2	-	-	-	-	-	-	2	3	3	3
Avg	3	3	3	2	2	-	-	-	-	-	-	2	3	3	3

3-HIGH 2-MODERATE 1-LOW '-' - NO CORRELATION

		L	T	P	C
518CIP06	**Microprocessor and Microcontroller Laboratory**	**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 and microcontroller
- 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 microcontrollers. 8. Searching Largest Number and smallest number in an array using 8051. 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. 13.ADC and DAC interfacing

TOTAL: 30 PERIODS

Course Outcomes:

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

CO1: Generate the code for arithmetic operations in assembly language

CO2: Generalize the developed code using 8086 processors and 8051 controllers.

CO3: Reorganize the Interfacing peripherals with microprocessor and microcontroller

CO4: Interpolate the peripherals for real world applications.

CO5: Propose the various ALU for analysis of microprocessor and microcontroller

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	2	3	1	3	-	-	-	2	1	1	1	3	-	-
CO2	3	2	3	1	3	-	-	-	2	1	1	1	3	-	1
CO3	3	2	3	1	3	-	-	-	2	1	1	1	3	-	-
CO4	3	2	3	1	3	-	-	-	2	1	1	1	3	2	-
CO5	3	2	3	1	3	-	-	-	2	1	1	1	3	-	-
Avg	3	2	3	1	3	-	-	-	2	1	1	1	3	2	1

3-HIGH 2-MODERATE 1-LOW '- ' - NO CORRELATION

		L	T	P	C
518CSP07	**OBJECT ORIENTED ANALYSIS AND DESIGN LABORATORY**	**0**	**0**	**2**	**1**

OBJECTIVE(S):

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, and 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

TOTAL: 30 HOURS

COURSE OUTCOMES:

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

CO1: Prepare a project plan by analyzing project scope and objectives by using OO concepts.

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

CO3: Design & develop UML diagrams.

CO4: Construct UML diagrams using Argo UML tool

CO5**:** Evaluate application project by preparing test cases

LIST OF EQUIPMENTS AND SOFTWARE FOR A BATCH OF 36 STUDENTS

PC : 36 Nos.

OS : Windows 2000/ Windows XP/ NT (or) Higher

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

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	3	3	-	2	-	-	-	1	-	-	3	2	2	3
CO2	2	2	3	-	2	-	-	-	1	-	-	3	2	2	3
CO3	1	3	3	-	2	-	-	-	1	-	-	3	2	2	3
CO4	1	3	3	-	2	-	-	-	1	-	-	3	2	2	3
CO5	1	3	3	-	2	-	-	-	1	-	-	3	2	2	3
Avg	1.2	2.8	3	-	2	-	-	-	1	-	-	3	2	2	3

3-HIGH 2-MODERATE 1-LOW '- '- NO CORRELATION

		L	T	P	C
518CIP08	**EMPLOYABILITY SKILLS LABORATORY**	**0**	**0**	**2**	**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 corporates and 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.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	1	1	3	1	2	-	-	-	2	-	-	3	3	2	3
CO2	1	1	2	1	2	-	-	-	2	-	-	3	3	2	3
CO3	1	1	2	1	2	-	-	-	2	-	-	3	3	2	3
CO4	1	1	2	1	2	-	-	-	2	-	-	3	3	2	3
CO5	1	1	2	1	2	-	-	-	2	-	-	3	3	2	3
Avg	1	1	2.2	1	2	-	-	-	2	-	-	3	3	2	3

3-HIGH 2-MODERATE 1-LOW '-'-NO CORRELATION

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 Behaviours 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 LAMDA EXPRESSION 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 - Lamdas Expression.

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 Status Strips - Working with Tool Strips - Building an MDI Application - Basic Controls.

UNIT-V ADO.NET AND 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:

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

CO1: Understand anatomy of C# Programming

CO2: llustrate Console application using object oriented concepts

CO3: Develop Console application using object oriented concepts, advanced features in C#.

CO4: Develop Window form application with Database connectivity.

CO5**:** Build Applications using ADO.NET and ASP.NET**.**

TEXT BOOKS:

1. Andrew Troelsen, "Pro C# 5.0 and the .NET 4.5 Framework" A press, Sixth Edition,2012 ISBN: 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.
4. Michael Schmalz "C# Database Basics" O'Reilly Media ISBN:978-1-4493-0998-5, 2012

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	-	3		1	-	-	-	-	-	-	-	3	1		2
CO2	-	3	2	2	3	-	-	-	-	-	-	3	1	1	1
CO3	-	3	2	2	3	-	-	-	-	-	-	3	1	1	1
CO4	-	2	2	1	2	-	-	-	2	1	2	3	1	1	1
CO5	-	2	2	1	2	-	-	-	2	1	2	3	2	1	2
Avg	-	2.6	1.6	1.4	2	-	-	-	.8	.4	.8	3	1.2	.8	1.4

3-HIGH 2-MODERATE 1-LOW '- '-NO CORRELATION

		L	T	P	C
518CSE02	**SCRIPTING LANGUAGE**	**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 web pages to communicate with PHP – Handling Form Controls -PHP and MySQL database - PHP Connectivity - Sending and receiving E-mails - Debugging and error handling - PHP Frameworks: Countersign – 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 – File Input/Output.

TOTAL HOURS: 45 HOURS

COURSE OUTCOMES:

On successful completion of the course the students will 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 OO DB application development

CO5: 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.
4. Paul Barry, "Head First Python", O'Reilly Media, 2010.
5. Garrett Grolemund, "Hands-On Programming with R", Paperback Edition, O'Reilly Media, 2016.
6. Colin Gillespie and Robin Lovelace, "Efficient R Programming", First Release, O'Reilly, 2016.

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./

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	2	3	2	2	3	1	1	-	2	1	1	1	2	3	2
CO2	2	3	3	2	2	1	1	-	2	1	1	1	2	3	2
CO3	2	3	3	2	3	1	1	-	2	1	1	1	2	3	2
CO4	2	3	3	2	3	1	1	-	2	1	1	1	2	3	2
CO5	2	3	3	2	3	1	1		2	1	1	1	2	3	2
Avg	2	3	2.8	2	2.8	1	1	-	2	1	1	1	2	3	2

3-HIGH 2-MODERATE 1-LOW '-'-NO CORRELATION

		L	T	P	C
518CIE03	**ADVANCED JAVA PROGRAMMING**	**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 JDBC in 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 java mail 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 info bus - 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 Java mail 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 Java mail-Components-Java mail API-Integrating into J2EE-Understanding Java Messaging Services- Transactions

TOTAL: 45 PERIODS

Course Outcomes:

On successful completion of the course the 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 java mail 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. Adatia,Y. Fain, 2003, J2EE 1.4 Bible, Wiley-dreamtech India Pvt. Ltd, New Delhi

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.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	3	3	-	2	2	1	-	-	-	-	3	-	-	2
CO2	-	3	3	-	2	2	1	-	-	-	-	3	-	-	2
CO3	-	3	3	-	2	2	1	-	-	-	-	3	-	-	2
CO4	-	3	3	-	2	2	1	-	-	-	-	3	2	-	2
CO5	1	3	3	-	2	2	1	-	-	-	-	3	2	-	2
Avg	1.2	3	3	-	2	2	1	-	-	-	-	3	2	-	2

3-HIGH 2-MODERATE 1-LOW ' - '-NO CORRELATION

		L	T	P	C
518CSE04	**SOFTWARE TESTING**	**3**	**0**	**0**	**3**

PREREQUISITES: NIL

OBJECTIVES:

The student should be made to:

0. To learn the criteria for test cases.
1. To learn the design of test cases.
2. To understand test management and test automation techniques.
3. 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. **Case Study: 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

On successful completion 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 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.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	3	3	2	3	1	1	-	3	3	1	2	3	3	2
CO2	2	3	3	2	3	1	1	-	3	3	1	2	3	3	2
CO3	2	3	3	2	2	1	1	-	3	3	2	2	3	3	3
CO4	2	3	3	2	2	1	1	-	3	3	2	2	3	3	3
CO5	2	2	3	2	3	1	1	-	3	1	1	2	3	2	3
Avg	2.2	3	3	2	2.6	1	1	-	3	2.6	1.4	2	3	2.8	2.6

3-HIGH 2-MODERATE 1-LOW '-'-NO CORRELATION

		L	T	P	C
518CSE05	**COMPUTER GRAPHICS AND MULTIMEDIA SYSTEMS**	**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 - Indexing Audio 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: 45 PERIODS

COURSE OUTCOMES:

On successful completion of 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:

1. Donald D. Hearn, M. Pauline Baker and Warren Carithers, "Computer Graphics with OpenGL", Fourth Edition, Prentice Hall, 2010.
2. V.S. Subramanian, "Principles of Multimedia Database Systems", Harcourt India Pvt Ltd., 2001
3. Prabhat K Andleigh, KiranThakrar, "Multimedia Systems Design", First Edition, PHI, 2008.

REFERENCES:

1. Ze-Nian Li and Mark S Drew, "Fundamentals of Multimedia", Pearson Prentice Hall, 2004.
2. Ralf Steinmetz, Klara Steinmetz, "Multimedia Computing, Communications and Applications", Pearson Education, 2009.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	3	3	1	3		1	1	-	1	-	3	2	1	1
CO2	3	3	3	1	3	1	-	1	-	-	-	3	2	1	1
CO3	3	3	3	1	3	1	-		1		-	3	2	1	1
CO4	3	3	3	1	3		1	1		1	-	3	2	1	1
CO5	3	3	3	1	3	1	1		1	-	-	3	2	1	1
Avg	3	3	3	1	3	.6	6	.6	.4	.4	-	3	2	1	1

3-HIGH 2-MODERATE 1-LOW '-'-NO CORRELATION

SEMESTER – VI

S.No	Course Code	Course Title	Category	Periods Per Week			Total Contact Periods	Credits
				L	T	P		
1	618CST01	Mobile Application Development	PC	3	0	0	2	3
2	618CST02	Compiler Design	PC	3	0	0	2	3
3	618CIT03	Data Warehousing and Data Mining	PC	3	0	0	2	3
4	618CST04	Web Programming	PC	3	0	0	2	3
5	618CST05	Artificial Intelligence	PC	3	0	0	3	3
6	618CSE05	Software Project Management	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

		L	T	P	C
618CST01	**MOBILE APPLICATION DEVELOPMENT**	**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 PERIODS

COURSE OUTCOMES:

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

CO1: Familiarize with Mobile apps development aspects.

CO2: Demonstrate 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: Evaluate 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", First Edition, Wiley India, (2011)
2. Lauren Darcey, Shane Conder, "Teach Yourself Android Application Development in 24 Hours", Second Edition, Wiley India, (2012)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PSO3
CO1	3	2	3	1	3	2	-	-	-	-	-	3	3	3	2
CO2	3	2	3	1	1	2	-	-	-	-	-	3	3	3	2
CO3	3	2	3	1	1	2	-	-	-	-	-	3	3	3	2
CO4	3	2	3	1	1	2	-	-	-	-	-	3	3	3	2
CO5	3	2	3	2	1	2	-	-	-	-	-	3	3	3	2
Avg	3	2	3	1.2	1.4	2	-	-	-	-	-	3	3	3	2

3-HIGH 2-MODERATE 1-LOW '- '- NO CORRELATION

		L	T	P	C
618CST02	**COMPILER DESIGN**	**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-Attributed Definitions – 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

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

CO1: Recognize tokens from language specification:

CO2: Contrast the Parse generated tokens using top down and bottom up parsers

CO3: Build semantic rules into a parser that performs attribution while parsing

CO4: Analyze to simplify the intermediate code for the source languages

CO5**:** Evaluate the various optimization techniques

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, Macmillan India 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

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PSO3
CO1	3	2	2	2	2	-	-	-	-	-	-	3	3	2	2
CO2	3	3	2	2	2	-	-	-	-	-	-	3	3	2	2
CO3	3	2	2	2	3	-	-	-	-	-	-	3	3	2	2
CO4	3	3	2	2	2	-	-	-	-	-	-	3	3	2	2
CO5	3	3	2	2	2	-	-	-	-	-	-	3	3	2	2
Avg	3	2.6	2	2	2.2	-	-	-	-	-	-	3	3	2	2

3-HIGH 2-MODERATE 1-LOW ‘- ‘- NO CORRELATION

		L	T	P	C
618CIT03	**DATA WAREHOUSING AND DATA MINING**	**3**	**0**	**0**	**3**

PREREQUISITES: 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 PERIODS

COURSE OUTCOMES:

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

CO1: Gain Knowledge on Data Warehouse Concepts.

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

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

CO4: Compare and contrast the various classifiers.

CO5: Design and develop data mining 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 Edition, Tenth Reprint 2007.
2. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, "Introduction to Data Mining", Pearson Education, 2007.
3. K.P. Soman, Shyam Diwakar and V. Ajay, "Insight into Data Mining Theory and Practice", Easter Economy Edition, Prentice Hall of India, 2006.
4. G. K. Gupta, "Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2006.
5. Daniel T. Larose, "Data Mining Methods and Models", Wile-Interscience, 2006.

Outcomes:

- Design a Data warehouse system and perform business analysis with OLAP tools.
- Apply suitable pre-processing and visualization techniques for data analysis
- Apply frequent pattern and association rule mining techniques for data analysis
- Apply appropriate classification and clustering techniques for data analysis

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PSO3
CO1	3	2	1	1	1	-	-	-	-	-	-	3	3	2	2
CO2	3	3	2	3	3	-	-	-	-	-	-	3	3	3	2
CO3	3	3	2	3	3	-	-	-	-	-	-	3	3	3	2
CO4	3	3	2	3	3	-	-	-	-	-	-	3	3	3	2
CO5	3	3	2	3	3	-	-	-	-	-	-	3	3	3	2
Avg	3	2.8	1.8	2.6	2.6	-	-	-	-	-	-	3	3	2.8	2

3-HIGH 2-MODERATE 1-LOW '- '-NO CORRELATION

		L	T	P	C
618CST04	**WEB PROGRAMMING**	**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. I 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, and and Case Study: Developing and deploying web services.

TOTAL HOURS: 45

COURSE OUTCOMES

On successful completion of the course the students will 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: Develop 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, Fifth Edition, 2012
4. Achyut S Godbole and AtulKahate, “Web Technologies”, Second Edition, Tata McGraw Hill, 2012.
5. Bates, “Developing Web Applications”, Wiley, 2006.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PSO3
CO1	3	3	2	3	3	-	-	-	-	-	-	3	3	3	2
CO2	3	3	2	3	3	-	-	-	-	-	-	3	3	3	2
CO3	3	2	2	3	3	-	-	-	-	-	-	3	3	3	2
CO4	3	2	1	3	3	-	-	-	-	-	-	3	3	3	1
CO5	2	2	2	3	3	-	-	-	-	-	-	3	3	3	2
Avg	2.8	2.4	1.8	3	3	-	-	-	-	-	-	3	3	3	1.8

3-HIGH 2-MODERATE 1-LOW ‘ - ‘- NO CORRELATION

		L	T	P	C
618CST05	**ARTIFICIAL INTELLIGENCE**	**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:

On successful completion of the course the students will 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", Third Edition, Prentice Hall of India/ Pearson Education, New Delhi, 2015.

REFERENCE BOOKS:

1. M. Tim Jones, "Artificial Intelligence: A Systems Approach (Computer Science)", Jones and Barlett 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 ISO Standard", Fifth edition, Springer, 2003.
4. Eaine Rich, Kevin Knight, Shivashankar B. Nair, "Artificial Intelligence", Third Edition, Tata McGraw-Hill Education, 2008.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PSO3
CO1	3	2	3	2	1	2	1	-	-	-	-	3	3	3	2
CO2	3	2	2	2	1	2	1	-	-	-	-	3	3	3	2
CO3	3	2	2	2	1	2	1	-	-	-	-	3	3	3	2
CO4	3	2	2	2	1	2	1	-	-	-	-	3	3	3	2
CO5	3	2	2	2	1	2	1	-	-	-	-	3	3	3	2
Avg	3	2	2.2	2	1	2	1	-	-	-	-	3	3	3	2

3-HIGH 2-MODERATE 1-LOW ' - '-NO CORRELATION

		L	T	P	C
618CSP07	**MOBILE APPLICATION DEVELOPMENT LABORATORY**	**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 Colors
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: 30 HOURS

COURSE OUTCOMES:

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

CO1: Design and Implement various mobile applications using emulators.

CO2: Construct applications to hand-held devices

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

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

CO5**:** Implement a mobile application for alarm clock.

LIST OF EQUIPMENTS:

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

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PSO3
CO1	3	2	3	2	2	-	-	-	2	-	-	3	3	3	3
CO2	1	2	1	2	2	-	-	-	2	-	-	3	3	3	3
CO3	3	2	2	2	2	-	-	-	2	-	-	3	3	3	3
CO4	2	2	3	2	2	-	-	-	2	-	-	3	3	3	3
CO5	3	2	3	2	2	-	-	-	2	-	-	3	3	3	3
Avg	2.4	2	2.4	2	2	-	-	-	2	-	-	3	3	3	3

3-HIGH 2-MODERATE 1-LOW ' - '-NO CORRELATION

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.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

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

CO1: Design Data warehouse and populate Data

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

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

CO4: Apply mining techniques for realistic data.

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

LAB REQUIREMENTS:

SOFTWARE : WEKA, Python Libraries
HARDWARE : Standalone desktops

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PSO3
CO1	1	3	1	2	2	1	-	-	1	1	2	3	1	1	1
CO2	1	1	1	2	1	1	-	-	1	1	2	3	1	1	1
CO3	1	2	-	2	1	1	-	-	1	1	2	3	2	1	1
CO4	1	2	-	2	3	1	-	-	1	1	2	3	1	1	1
CO5	1	2	3	2	1	1	-	-	1	1	2	3	1	1	1
Avg	1	2	1.66	2	1.6	1	-	-	1	1	2	3	1.2	1	1

3-HIGH 2-MODERATE 1-LOW ' - '-NO CORRELATION

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, text color, an image, 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 customer's 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 markup 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 or not.
9. Create a program to change the content of the web page using AJAX.

TOTAL HOURS: 30

COURSE OUTCOMES

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

CO1: Design Web pages using HTML/DHTML and style sheets

CO2: Design Client side validation using scripting languages.

CO3: 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
Backend: MYSQL / SQLite

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PSO3
CO1	3	3	2	2	2	-	-	-	1	-	-	3	3	3	2
CO2	3	1	2	2	2	-	-	-	1	-	-	3	3	3	2
CO3	3	2	2	2	2	-	-	-	1	-	-	3	3	3	2
CO4	3	2	2	2	2	-	-	-	1	-	-	3	3	3	2
CO5	3	2	2	2	2	-	-	-	1	-	-	3	3	3	2
Avg	3	3	2	2	2	-	-	-	1	-	-	3	3	3	2

3-HIGH 2-MODERATE 1-LOW ' - '- NO CORRELATION

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

PREREQUISITES: Computer Architecture

OBJECTIVES

- To understand the recent trends in the field of Computer Architecture and identify performance 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 Computer Design – Classes of Parallelism - ILP, DLP, TLP and RLP - Multithreading - SMT and CMP Architectures – 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 Processing Units- 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

On successful completion of the course the students will 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", Prentice Hall, 2011.
3. David E. Culler, Jaswinder Pal Singh, "Parallel Computing Architecture: A Hardware/ Software Approach", Morgan Kaufmann / Elsevier, 1997.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	-	-	-	3	-	-	-
CO2	3	2	-	-	-	-	3	-	-	-	-	3	-	1	-
CO3	2		-	3	1	-	3	-	-	-	-	3	-	-	-
CO4	-	-	-	2	3	-	2		-	-	-	3	2	-	-
CO5	-	3	-		2	-		-	-	-	-	3	-	1	-
Avg	1.6	1.6	-	1	1.2	-	1.6	-	-	-	-	3	0.4	0.4	-

3-HIGH 2-MODERATE 1-LOW '- '-NO CORRELATION

618CSE02	PARALLEL AND DISTRIBUTED COMPUTING	L	T	P	C
		3	0	0	3

PREREQUISITES: Design and Analysis of Algorithm, Computer Networks, 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- Open MP: 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

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. AnanthGrama, Anshul Gupta, George KarypisandVipin Kumar, "Introduction to Parallel Computing", Second Edition, Pearson Education, 2009.
2. George Coulouris, Jean Dollimore and Tim Kindberg, Distributed Systems, Concepts and Design, Perason Education, 3rd Edition 2011.
3. HaggitAttiya 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.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	3	1	-	-	1	1	-	1	3	3	3	-
CO2	3	1	-	3	1	-	-	1	1	-	1	3	3	-	-
CO3	3	-	2	-	2	-	-	2	1	-	1	3	3	2	1
CO4	3	-	2	1	2	-	-	1	1	1	-	3	3	1	-
CO5	3	1	3	1	3	-	-	2	1	1	1	3	3	-	-
Avg	3	0.6	1.6	1.6	1.8	-	-	1.4	1	0.4	.8	3	3	1.2	0.2

3-HIGH 2-MODERATE 1-LOW ' - '- NO CORRELATION

		L	T	P	C
618MAE03/618MAO01	**APPLIED STATISTICS AND NUMERICAL METHODS**	**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 techniques useful 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 and numerical integration.

UNIT I DESCRIPTIVE STATISTICS 9 + 3

Measures of Central tendency - Arithmetic 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 - *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

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

CO 1: Apply the basic Statistical measures of Central Tendency and Dispersion and represent statistical data 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 control limits of a sample.

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

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

TEXT BOOKS

1. Gupta.S.C., &Kapoor, V.K., "Fundamentals of mathematical statistics", 11th edition, Sultan Chand & 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 publishing company Limited, New Delhi, 2014.
2. R.E. Walpole, R.H. Myers, S.L. Myers, and K Ye, "Probability and Statistics for Engineers and Scientists", Pearson Education, Asia, 8th edition, 2007.
3. Miller and Freund., "Probability and Statistics for Engineers", Pearson Education, Asia, 7th edition, 2012.
4. Kandasamy.P, Thilagavathy, K. &Gunavathi.K., "Numerical Methods"., S. Chand& Company Ltd., New Delhi, 2014.
5. S.S. Sastry, "Introductory Methods of Numerical Analysis", 5th Edition, Prentice Hall of India Private Ltd., New Delhi, 2012.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	-	-	-	3	-	-	1
CO2	3	3	2	3	-	-	-	-	-	-		3	-	-	2
CO3	3	3	2	3	-	-	-	-	-	-	-	3	-	1	2
CO4	3	3	2	2	-	-	-	-	-	-	-	3	-	-	2
CO5	3	3	2	2	-	-	-	-	-	-	-	3	2	-	-
Avg	3	3	1.6	1.8	-	-	-	-	-	-	-	3	0.4	0.2	1.4

3-HIGH 2-MODERATE 1-LOW '-'- NO CORRELATION

		L	T	P	C
618CSE04	**NETWORK DESIGN AND MANAGEMENT**	**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 study the 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.

TOTALHOURS: 45 HOURS

COURSE OUTCOMES:

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

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 the managing 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.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	-	-	-	3	-		-
CO2	3	3		-		-	2		-	-	-	3	-	1	-
CO3	-	-	3	-	-	-	2	1	-	-	-	3	2	-	-
CO4	-	-	3	-	3	-	2	2	-	-	-	3	-	1	-
CO5	3	1	-	-	2	-	-	3	-	-	-	3	-	-	-
Avg	1.8	1.4	1.2	-	1	-	1.2	1.2	-	-	-	3	0.4	0.4	-

3-HIGH 2 -MODERATE 1 -LOW '-'- NO CORRELATION

		L	T	P	C
618CSE05	**SOFTWARE PROJECT MANAGEMENT**	**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 HOURS: 45 HOURS

COURSE OUTCOMES:

On successful completion of the course the students will 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 McGraw Hill, 2011.
2. Walker Royce," Software Project Management a Unified Framework", Pearson Education, 2004.
3. 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.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	-	-	-	3	-	-	-
CO2	2	-	-	-	-	-	-	-	-	-	-	3	-	-	-
CO3	-	-	-	3	3		3	-	-	-	-	3	-	-	-
CO4	-	-	-	2	2		3		3	-	-	3		1	-
CO5	3	3			2				3	-	-	3	1	-	-
Avg	2.8	2.6	2.2	2.2	2.2	1.6	2	-	2.75	2	1.2	3	2.6	1.6	1

3-HIGH 2-MODERATE 1-LOW '-' - NO CORRELATION

		L	T	P	C
618CSE06	**ADVANCED JAVASCRIPT LANGUAGE**	**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 with AJAX – 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 HOURS: 45 HOURS

COURSE OUTCOMES

On successful completion of the course the students will 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: Implement a Component Lifecycle and Redundancy JS.

REFERENCES

1. Thomas Powell, Fritz Schneider, "The Javascript Completer Reference", Third Edition, McGraw-Hill Publication, 2015
2. Andrew Grant, "Beginning Angular JS", A press 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 with React", 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", Third Edition, 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

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	3	-	-	-	-	-	-	-	3	-	-	-
CO2	2	-	-	-	-	3	-	-	-	-	-	3	-	-	-
CO3	2	-	-	-	-	1	-	-	-	-	-	3	-	1	-
CO4	2	-	-	2	-	-	-	-	3	-	-	3	-	1	-
CO5	1	3	-	-	-	1	-	-	2	-	-	3	2	-	-
Avg	2	1.2	-	1	-	1	-	-	1	-	-	3	0.4	0.4	-

3-HIGH 2-MODERATE 1-LOW ' - '- NO CORRELATION

SEMESTER – VII

S.No	Course Code	Course Title	Category	Periods Per Week			Total Contact Periods	Credits
				L	T	P		
1	718CIT01	Cryptography and Security in Computing	PC	3	0	0	2	3
2	718CST02	Machine Learning Techniques	PC	3	0	0	2	3
3	718CST03	Mobile Computing	PC	3	0	0	2	3
4	718CST04	Cloud Computing	PC	3	0	0	2	3
5	718CIE06	Cyber Security and Law	PC	3	0	0	3	3
6	718CSExx	Management Information System	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	Professional Readiness for Innovation Employability and Entrepreneurship	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	Pervasive Computing	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

718CIT01 CRPTOGRAPHY AND SECURITY IN COMPUTING L P T C
3 0 0 3

COURSE OBJECTIVES:

- Learn the fundamentals of Cryptography.
- Comprehend the Mathematical Foundations of Security Principles.
- Describe the principles of Public Key Cryptosystem, Hash Function, Key Management and Internet Security.
- Gain knowledge about Security in Network and Program.

UNIT I SYMMETRI 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 – Public Key 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 – Non malicious Program Errors - Viruses and other Malicious Code – Targeted Malicious Code - Control against Program Threats.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Use classical and symmetric encryption techniques to convert plain text to cipher text.

CO2: Illustrate number theory concepts and algorithms of public key cryptosystems to perform encryption and decryption.

CO3: Apply key management and authentication techniques to provide secure Communication.

CO4: Discover the importance of firewalls and intrusion Detection Systems.

CO5: Deduct abnormalities within the network caused by worms, viruses and program threats.

TEXT BOOKS:

1. William Stallings, “Cryptography and Network Security, Seventh Edition, Prentice Hall, New Delhi, 2017.
2. Charles P. Pfleeger, Shari Lawrence Pfleeger, “Security in Computing”, Fifth Edition, Prentice Hall, 2018.

REFERENCE BOOKS:

1. Behrouz A Frozen, “Cryptography and Network Security”, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2010.
2. Atul Kahate,” Cryptography and Network Security”, Third Edition, McGraw Hill Education Pvt. Ltd., New Delhi, 2013.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	2	1	1	2	2	-	1	1	-	-	-	3	3	3	2
CO2	3	3	2	2	2	-	1	1	-	-	-	3	3	3	2
CO3	2	3	2	2	2	-	1	1	-	-	-	3	3	3	2
CO4	3	2	2	2	2	-	1	1	-	-	-	3	3	3	2
CO5	2	3	1	1	2	-	1	1	-	-	-	3	3	3	2
Avg	2.4	2.4	1.6	1.8	2	-	1	1	-	-	-	3	3	3	2

3-HIGH 2-MODERATE 1-LOW ‘-’ - NO CORRELATION

718CST02 **MACHINE LEARNING TECHNIQUES** **L T P C**
3 0 0 3

COURSE 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 Reparability – 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 Neighbour 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 – Iso map – 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:

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

CO1: Distinguish between, supervised, unsupervised and semi-supervised learning

CO2: Identify the suitable machine learning strategy to real-world applications.

CO3: Analyze and apply 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

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 of Data, 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.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	2	2	2	2	-	2	-	-	-	-	3	3	3	2
CO2	3	2	2	2	2	-	2	-	-	-	-	3	3	3	2
CO3	3	2	2	2	2	-	2	-	-	-	-	3	3	3	2
CO4	3	2	2	2	2	-	2	-	-	-	-	3	3	3	2
CO5	3	2	2	2	2	-	2	-	-	-	-	3	3	3	2
Avg	3	2	2	2	2	-	2	-	-	-	-	3	3	3	2

3-HIGH 2-MODERATE 1-LOW '-' - NO CORRELATION

718CST03 **MOBILE COMPUTING** **L T P C**

3 0 0 3

COURSE 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 of Mobile 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 – WTA Architecture– 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 – Commerce Structure – Pros & Cons – Mobile Payment System – Security Issues

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Understand the working principles of wireless and mobile communication networks.

CO2: Apply data communicating methods and networking protocols for mobile and wireless network environments.

CO3: Design of various soft computing based networks and controllers

CO4: Explain the functionality of Transport and Application layers.

CO5: Determine and integrate various soft computing techniques.

TEXT BOOKS:

1. Jochen Schiller, —Mobile Communications‖, PHI, Second Edition, 2003.
2. Prasant Kumar Pattnaik, Rajib Mall, —Fundamentals of Mobile Computing‖, PHI Learning Pvt.Ltd, New Delhi – 2012

REFERENCE BOOKS:

1. Dharma Prakash Agarval, Qing and a Zeng, "Introduction to Wireless and Mobile systems", Thomson Asia Pvt Ltd, 2005.
2. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, —Principles of Mobile Computing‖, Springer, 2003.
3. William.C.Y. Lee, —Mobile Cellular Telecommunications-Analog and Digital Systems‖, Second Edition, Tata McGraw Hill Edition ,2006.
4. C.K. Toh, —AdHoc Mobile Wireless Networks‖, First Edition, Pearson Education, 2002.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	2	2	2	3	3	3	1	-	-	-	-	3	3	2	2
CO2	2	2	2	3	3	3	1	-	-	-	-	3	2	2	2
CO3	2	2	2	3	3	3	1	-	-	-	-	3	3	2	2
CO4	2	2	2	3	3	3	1	-	-	-	-	3	1	2	2
CO5	2	2	2	3	3	3	1	-	-	-	-	3	2	2	2
Avg	2	2	2	3	3	3	1	-	-	-	-	3	2.2	2	2

3-HIGH 2-MODERATE 1-LOW '-' - NO CORRELATION

718CST04 **CLOUD COMPUTING** **L T P C**
3 0 0 3

COURSE 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-

UNIT III CLOUD COMPUTING MEACHNISM **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 MAP REDUCES **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: 45 PERIODS

COURSE OUTCOMES:

On successful 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, Technology and 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.John Rittenhouse and James Ransome, Cloud Computing, Implementation, Management and Strategy, CRC

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	2	2	3	3	3	1	-	-	-	-	3	3	3	3
CO2	3	2	2	3	3	3	1	-	-	-	-	3	3	3	3
CO3	3	2	2	3	3	3	1	-	-	-	-	3	3	3	3
CO4	3	2	2	3	3	3	1	-	-	-	-	3	3	3	3
CO5	3	2	2	3	3	3	1	-	-	-	-	3	3	3	3
Avg	3	2	2	3	3	3	1	-	-	-	-	3	3	3	3

3-HIGH 2-MODERATE 1-LOW '-' - NO CORRELATION

718CSP07	MACHINE LEARNING TECHNIQUES LABORATORY	L	T	P	C
		0	0	2	1

COURSE OBJECTIVES:

- 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 of 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. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set (You can use Java/Python ML library classes/API).
7. 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).
8. 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: 30 PERIODS

COURSE OUTCOMES:

On successful completion of the course the 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: Identify appropriate data sets to the Machine Learning algorithms

CO4: Analyze various Machine Learning algorithms to solve real world problems.

CO5**:** Build the Neural Networks concept for appropriate problems

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	3	3	2	3	-	1	-	2	-	-	3	3	3	3
CO2	3	3	3	2	3	-	1	-	2	-	-	3	3	3	3
CO3	3	3	3	2	3	-	1	-	2	-	-	3	3	3	3
CO4	3	3	3	2	3	-	1	-	2	-	-	3	3	3	3
CO5	3	3	3	2	3	-	1	-	1	-	-	3	3	3	3
Avg	3	3	3	2	3	-	1	-	1.8	-	-	3	3	3	3

3-HIGH 2-MODERATE 1-LOW '-' - NO CORRELATION

718CSP08	CLOUD COMPUTING LABORATORY	L T P C 0 0 2 1

COURSE OBJECTIVES:

- 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) and host. 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 data store.
12. Case Study of Microsoft Azure.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

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

CO1: Design and develop highly scalable cloud-based applications by creating and configuring virtualmachines 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 to map reduce incloud 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

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO1 0	PO1 1	PO1 2	PS O1	PS O 2	PSO 3
CO1	3	3	2	3	3	3	2	-	3	-	-	3	3	2	3
CO2	3	3	2	3	3	3	2	-	3	-	-	3	3	2	3
CO3	3	3	3	3	2	3	2	-	3	-	-	3	3	2	3
CO4	3	3	2	3	2	3	2	-	3	-	-	3	3	2	3
CO5	3	3	1	3	2	3	2	-	3	-	-	3	3	2	3
Avg	3	3	2	3	2.4	3	2	-	3	-	-	3	3	2	3

3-HIGH 2-MODERATE 1-LOW '-' - NO CORRELATION

718CIE01	INTERNET OF THINGS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- 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.

UNIT I INTRODUCTION **9**

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 METHODOLOGY

9

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

9

Python Packages of Interest for IoT-JSON, XML, HTTP Lib & URL Lib, SMTP Lib, 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-pc Duino, Beagle Bone Black, Cubie board.

UNIT IV IOT PHYSICAL SERVERS & CLOUD OFFERINGS

9

IoT Physical Servers & Cloud Offerings, WAMP – Auto Bahn 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 Auto Scaling, Amazon S3, Amazon RDS Amazon Dynamo DB, Amazon Kinesis, Amazon SQS, Amazon EMR, Sky Net IoT 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, Apache Spark, Apache Storm, setting up a Storm Cluster, Using Apache Storm for Real-time Data Analysis, REST-based approach, Web Socket-based approach. Case Studies Illustrating IoT Design-Smart Lighting, Smart Parking, Weather Monitoring System-Weather Reporting Bot, Smart Irrigation, IoT Printer, Tools for IoT-Chef, Puppet.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Compare and analyse 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. Arshdeep Bagha, Vijay Madisetti, Internet of Things (A Hands-On-Approach), University Press, 2015.

REFERENCE BOOKS:

1. Dieter Ackermann, 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 and Protocols, Wiley, 2012
5. The Evolution of Internet of Things-Texas Instruments. (http://www.ti.com/lit/ml/swrb028/swrb028.pdf)

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO3
CO1	1	-	3	1	-	1	1	-	-	1	-	3	-	-	3
CO2	-	3	3	-	-	-	2	2	-	-	1	3	-	1	-
CO3	-	-	2	-	1	-	-	-	-	-	-	3	-	1	-
CO4	-	2	-	2	-	1	-	1	3	-	2	3	2	-	-
CO5	-	1	-	3	-	-	-	-	2	-	-	3	-	-	-
Avg	0.2	2	2.6	2	0.2	0.4	1.5	1.5	2.5	0.2	1.5	3	0.4	0.4	0.6

3-HIGH 2-MODERATE 1-LOW '-' - NO CORRELATION

718CIE02	BUILDING ENTERPRISE APPLICATION	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- 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

9

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 APPLICATION **9**

Inception of Enterprise Applications, Enterprise Analysis, Business Modelling, Requirements Elicitation, Use Case Modelling, 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 PERIODS

COURSE OUTCOMES:

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

CO1: Understand the fundamental of Enterprise applications and key determinants to measure The 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

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	-	-	-	-	-	-	-	-	-	-	3	-	-	-
CO2	2	2	-	2	-	-	-	-	-	-	-	3	-	-	-
CO3	3	1	3	-	-	-	-	3	-	-	-	3	-	1	-
CO4	1	3	2	2	-	-	-	2	3	-	-	3	-	1	-
CO5	3	-	-	3	-	-	-	-	-	-	-	3	2	-	-
Avg	2.4	1.2	1	1.4	-	-	-	2.5	0.6	-	-	3	0.4	0.4	-

3-HIGH 2-MODERATE 1-LOW '-' - NO CORRELATION

718CIE03	BUSINESS INTELLIGENCE AND ITS APPLICATION	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To understand the BI concept and framework
- 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, BIRoles&Responsibilities, Business Applications of BI, BIbestpractices.

UNIT II BASICS OF DATA INTEGRATION (EXTRACTION TRANSFORMATIONLOADING) 9

Concepts of data integration, needs and advantages of using data integration, introduction to command at a 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 modelling, multidimensional data model, ER Modelling vs. multi-dimensional modelling, 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 score card, enterprise dashboard, balanced scorecard vs. enterprise dashboard, enterprise reporting using MS Access/ MS Excel, best practices in the design of enterprise dashboards.

UNIT V BIANDMOBILITY 9

Understanding BI and Mobility, BI and Cloud Computing, Business Intelligence for ERP systems, Social CR Mand BI, Case Study-Good Food Restaurants, tento Ten Retails stores.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Understand the fundamental of business intelligence and key determinants to measure the success.

CO2: Demonstrate an understanding of different modelling techniques used to design business applications And Ingratiation.

CO3: Develop knowledge in multidimensional data model

CO4: Construct Enterprise applications by understanding the design.

CO5**:** Understanding BI and Mobility and Cloud Computing.

TEXTBOOKS:

1. Business Intelligence by David Loshin
2. Business intelligence for the enterprise by Mike Biere.
3. Fundamentals of Business Analytics by R.N. Prasadand Seema Acharya Wiley India, 2011.

REFERENCE BOOKS:

1. Business intelligence road map 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.

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO3
CO1	3	3	-	-	-	-	-	-	-	-	-	3	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	3	-	1	-
CO3	2	2	3	-	3	-	-	-	-	-	-	3	-	1	-
CO4	1	1	2	-	1	-	-	-	-	-	-	3	2	-	-
CO5	3	1	-	-	2	-	-	-	-	-	-	3	-	-	-
Avg	2.4	2	1	-	1.2	-	-	-	-	-	-	3	0.4	0.4	-

3-HIGH 2-MODERATE 1-LOW '-' - NO CORRELATION

718CIE04	INFORMATION STORAGE MANAGEMENT	L T P C
		3 0 0 3

COURSE OBJECTIVES:

- 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 disaster recovery and business continuity capabilities.
- To gain knowledge in information security and identify different storage virtualization technologies**.**

UNIT I INTRODUCTIONTO STORAGETECHNOLOGY 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 centre 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.

UNITIII INTRODUCTION TONETWORKEDSTORAGE 9

Evolution of networked storage, Architecture, components, and topologies of FC -SAN, NAS, and IP-SAN, Foe, 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.

UNIT IV INFORMATIONAVAILABILITY, MONITORING & MANAGING DATA CENTER 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 SECURINGSTORAGEANDSTORAGEVIRTUALIZATION 9

Information security, Critical security attributes for information systems, Storage security domains, List and analyses the common threats in each domain, Virtualization technologies, block-level and file-level virtualization technologies and processes.

TOTAL: 45PERIODS

COURSEOUTCOMES:

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

CO1: Ability to identify the key requirements of data canter.

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 role in Providing disaster recovery and business continuity capabilities.

CO5**:** Ability to identify and analyse the common threats in different domains.

REFERENCEBOOKS:

1. EMC Corporation, Information Storage and Management, Wiley, India, 2ndEdition, 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.

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	3	-	-	-	-	-	-	-	-	-	3	-	-	-
CO2	2	3	-	3	3	-	-	-	3	-	-	3	-	-	-
CO3	1	-	-	-	1	-	-	-	2	-	-	3	-	1	-
CO4	-	2	-	2	-	-	-	-	-	-	-	3	-	1	-
CO5	3	1	-	-	2	-	-	-	-	-	-	3	2	-	-
Avg	1.6	1.8	-	1	1.4	-	-	-	1	-	-	3	0.4	0.4	-

1- HIGH 2-MODERATE 1-LOW '-' - NO CORRELATION

718CIE05	AGILE SOFTWARE DEVELOPMENT	L	T	P	C
		3	0	0	3

COURSE 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 METHODOLOG **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.

UNITII AGILEPROCESSES **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 – Earless 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 Modelling 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:

On successful 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 execut 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.

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.

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	3	-	-	-	-	-	-	-	-		3	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	3	-	-	-
CO3	2	2	3		3	-	-		3	-	-	3		1	-
CO4	1	2	2		1	-	-		1	-	-	3		1	-
CO5	1	-	-		2				1	-	-	3	2	-	-
Avg	2	1.4	1	-	1.2	-	-	-	0.8	-		3	0.4	0.4	-

3-HIGH 2-MODERATE 1-LOW '-' - NO CORRELATION

718CIE06	CYBER SECURITY AND LAW	L	T	P	C
		3	0	0	3

PREREQUSISITES: 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 IINTRODUCTION 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 IICYBERCRIME: 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 IIITOOLS 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, IdentityThef(I Theft).

UNIT IVUNDERSTANDING 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

COURSE OUTCOMES:

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

CO1: Discriminate and analyse 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 issue

TEXT BOOKS:

1. SunitBelapure and Nina God bole, "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
2. James Graham, Ryan Olson, Rick Howard, "Cyber Security Essentials", CRC Press, 15-Dec- 2010

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO3
CO1	3	3	-		1	-	-	-	-	1	-	3	-		1
CO2	-	3	-		1	-	-	-	-	-	-	3	-	1	-
CO3	-	1	-	3	1	-	2	1	-	2	1	3	-	1	-
CO4	-	1	-	2		-	3	2	-	-	-	3	2	-	-
CO5	3	-	-	-	2	-	1	2		-	-	3	-	-	1
Avg	3	2	-	2.5	1.25	-	2	1.6	-	1.5	0.2	3	0.4	0.4	0.4

3-HIGH 2-MODERATE 1-LOW '-'- NO CORRELATION

718CSP09 **MINI PROJECT** **L T P C**

0 0 2 1

COURSE OBJECTIVES:

- To identify societal or real world problems that require computerization
- To suggest creative solutions to societal problems
- To explore possible alternative solutions
- To estimate risk and develop a prototype

The course aims to prompt students to identify mini-projects that foster creativity, innovation, and tackle societal challenges. These projects can be application-focused and completed within a short duration. Students are expected to conduct independent or group research on approved domains and problems. Each student selects a topic aligned with their specialization and follows a prescribed methodology. Students are required to complete their projects and present either a working model or a prototype. At the end of the semester, students prepare a comprehensive report. This report includes problem identification, literature review or related work, methodology, findings, discussions, conclusion, and references, adhering strictly to university formatting guidelines. The students will be evaluated based on the report and viva-voce examination by a panel of examiners.

1. Internal - Assessment
    a. First Review
        i. Block Diagram of the proposed solution for a societal / creative problem
        ii. New Contribution in terms of modifications to existing algorithm or suggestion of new ones
        iii. Detailed Design of each module
        iv. Evaluation Metrics
    b. Second Review
        i. Implementation - Justifying pros and Cons
        ii. Coding - highlighting what has been reused and what is being written
    c. Third Review
        i. Test cases and Test Runs
        ii. Performance Evaluation based on Metrics
        iii. Project Documentation
2. External-Assessment
    Presentation, Viva-Voce, Report submission.

COURSE OUTCOMES:

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

CO1: Gain Domain knowledge and technical skill set required for solving industry /research problems

CO2: Provide solution architecture, module level designs, algorithms

CO3: Identify the methodology suitable for the proposed solution

CO4: Implement, test and deploy the solution as prototype or working model

CO5: Prepare detailed technical report, demonstrate and present the work

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	3	3	3	3	2	1	1	2	3	3	3	3	1	3
CO2	1	3	3	3	3	2	1	1	2	3	3	3	3	1	3
CO3	1	3	3	3	3	2	1	1	2	3	3	3	3	1	3
CO4	1	3	3	3	3	2	1	1	2	3	3	3	3	1	3
CO5	1	3	3	3	3	2	1	1	2	3	3	3	3	1	3
Avg	1	3	3	3	3	2	1	1	2	3	3	3	3	1	3

3 – HIGH 2 - MODERATE 1- LOW '- '- NO CORRELATION

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	818CIE08	Augmented Reality and Virtual Reality	PC	3	0	0	2	3
3	818CSE11	Software Quality Assurance	PC	3	0	0	2	3
PRACTICALS								
4	818CSP01	Project Work & Viva Voce	PC	0	0	0	8	8
	TOTAL			9	0	0	14	17

VIII Semester-Professional Elective- IV

S.No	Course Code	Course Title	Category	Periods Per Week			Total Contact Periods	Credits
				L	T	P		
THEORY								
1	818CIE01	Software Defined Networks	PE	3	0	0	3	3
2	818CSE02	Social Network Analysis	PE	3	0	0	3	3
3	818CIE08	Augmented Reality and Virtual Reality Development	PE	3	0	0	3	3
4	818CIE04	Green Computing	PE	3	0	0	3	3
5	818CSE05	Adhoc and Sensor networks	PE	3	0	0	3	3
	TOTAL			0	0	0	15	15

VIII Semester-Professional Elective- V

S.No	Course Code	Course Title	Category	Periods Per Week			Total Contact Periods	Credits
				L	T	P		
THEORY								
1	818CSE11	Software Quality Assurance	PE	3	0	0	3	3
2	818CIE07	Service Oriented Architecture	PE	3	0	0	3	3
3	818CSE08	Digital Forensics	PE	3	0	0	3	3
4	818CIE09	Deep Learning	PE	3	0	0	3	3
5	818CSE10	Visualization Techniques	PE	3	0	0	3	3
6	818CSE12	Web Mining	PE	3	3	3	3	3
	TOTAL			0	0	0	18	18

818CIT01	BIG DATA ANALYTICS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- Understand the terminologies, analytics and processing concepts of Big Data.
- Learn various Big Data Analytic techniques.
- Explore the Data Streams processing concepts
- Familiarize with Hadoop Ecosystem, HIVE and 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 STREAMMEMORY 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 Mongo DB–Terms used in RDBMS and Mongo DB–Data Types in Mongo DB –Mongo DB Query Language. Case Studies: Big data for E-Commerce-Big data for Blogs.

UNIT V BIGDATAFRAMEWORK 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

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

CO1: Understand the fundamentals of big data, its storage and processing concepts.

CO2: Apply analytics for various big data-based problems.

CO3: Identify the appropriate solution to data streams related problems.

CO4: Develop applications using No SQLDB.

CO5: Explore on big data applications using big data framework.

TEXTBOOKS:

1) Thomas Erl, Wajid Khattak, Paul Buhler, "Big Data Fundamentals: Concepts, Drivers &Techniques",PrenticeHall,2015
2) Anand Rajaraman, Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.
3) Seema Acharya, ubhashini Chellappan, "Big Data Analytics", Wiley India Private Limited, First Edition, 2018.

REFERENCEBOOKS:

1) DavidLoshin, MorganKaufman, "BigDataAnalytics: FromStrategicPlanningtoEnterpriseIntegrationwithTools, Techniques, NoSQL, and Graph", Elsevier Publishers, 2013.
2) BartBaesens, "AnalyticsinaBigDataWorld: The Essential Guide to Data Science and its Applications", Wiley Publishers, 2015.
3) Tom White, "Hadoop The definitive Guide", O'ReillyPublishers, 4thEdition, 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, A press Publishers, 3rdEdition, 2015.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	3	3	1	2	-	-	-	-	-	-	1	3	2	3
CO2	2	3	1	1	2	-	-	-	-	-	-	1	2	3	3
CO3	2	3	2	1	2	-	-	-	-	-	-	1	1	3	3
CO4	2	1	3	1	3	-	-	-	-	-	-	1	2	2	3
CO5	1	-	3	1	3	-	-	-	-	-	-	1	2	2	3
Avg	2	2.5	2.4	1	2.4	-	-	-	-	-	-	1	2	2.4	3

3– HIGH 2 - MODERATE 1- LOW '- '- NO CORRELATION

		L	T	P	C
818CIE01	**SOFTWARE DEFINED NETWORKS**	**3**	**0**	**0**	**3**

COURSE OBJECTIVES:

- 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)–ModernDataCentre–TraditionalSwitchArchitecture–NeedForSDN: Evolution of SwitchesAndControlPlanes–WorkingOfSDN–FundamentalCharacteristicsOf SDN, SD Operation, SDN Devices, SDN Controller.

UNIT II OPENFLOWANDSDNCONTROLLERS **10**

Open flow Overview: The Open flow Switch, The Open flow Controller, The Open flow Protocol, The Controller-Switch Secure Channel, Open flow 1.0 and Open flow basic – SDN Controller Models – SDNProtocolModels–Application Models–Approaches to SDN Security .

UNIT IIIDATACENTRES **9**

Data Centre: Demands Of 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 PROGRAMMINGANDAPPLICATIONS **10**

Network Function Virtualization –SDN Vs NFV– Types of Applications - SDN Controllers – Controller Considerations –Network Device Considerations – Creating Network Virtualization Tunnels – OffloadingFlowsInDataCentre–AccessControlforCampus–TrafficEngineeringForServiceProviders.

UNIT V SDN OPENSOURCE **7**

Openflow–SwitchImplementation–ControllerImplementation–OrchestrationAndNetworkVirtualization–Simulation, Testing and Tools – Open-Source Cloud Software: Open Stack, Cloud Stack–Juniper SDN Framework–IETF SDN Framework–Open Day light Controller.

TOTAL HOURS: 45

COURSE OUTCOMES:

On successful completion of the course the students will 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 center.

CO4: Design and develop various applications of SDN.

CO5: Demonstrate the SDN open source frame work and software.

TEXT BOOK:

1. Paul Goransson and Chuck Black, “Software Defined Networks: A Comprehensive Approach”, second Edition, Morgan Kaufmann, 2016.

2. Thomas D. Nadeau, Ken Gray, “SDN: Software Defined Networks”, O’Reilly Media, 2013.

REFERENCE BOOKS:

1. Seamark Azodolmolky, “Software Defined Networking with Open Flow”, Packet Publishing, second edition, 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 an design”, CRC

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	1	-	2		-	3	-	-	-	-	-	3	-	-	-
CO2	-	2	-	3	-	2	-	-	-	-	-	3	-	-	-
CO3	-	-	3	-	-	-	-	-	3	-	-	3	-	1	-
CO4	3	-	2	-	-	3	-	-	3	-	-	3	-	1	-
CO5	2	3	-	2	-	-	-	-	-	-	-	-	3	2	-
Avg	1.2	1	1.4	1	-	1.6	-	-	1.2	-	-	2.4	0.6	0.8	-

3 – HIGH 2 - MODERATE 1- LOW ‘- ‘- NO CORRECLATION

		L	T	P	C
818CSE02	**SOCIAL NETWORK ANALYSIS**	**3**	**0**	**0**	**3**

COURSE 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, onto logical 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 HOURS: 45

COURSE OUTCOMES:

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

CO1: Understand basic principles behind network analysis algorithms and develop Practical skills of network analysis

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. Guangdong Xu, Yanchun Zhang, Lin Li, "Web Mining and Social Networking Techniques and Applications", Springer, 2011.

2. Max Chevalier, Christine Julien, ChantalSoulé-Dupuy, "Collaborative and Social Information Retrieval and Access: 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.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	1	-	-	-	-	-	-	-	-	-	3	-	-	-
CO2	-	2	-	-	-	-	2	-	-	-	-	3	-	-	-
CO3	-	2	-	3	1	-	2	-	2	-	-	3	-	1	-
CO4	-	-	-	2	2	-	2	-	3	-	-	3	-	1	-
CO5	3	-	-	1	2	-	1	-	1	-	-	3	2	-	
Avg	1.2	1	-	1.2	1	-	1.4	-	1.2	-	-	3	2	1	-

3 – HIGH 2 - MODERATE 1- LOW '- '- NO CORRELATION

		L	T	P	C
818CIE08	AUGMENTED REALITY AND VIRTUAL REALITY DEVELOPMENT	3	0	0	3

COURSE OBJECTIVES:

- 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 & 3D Scanner 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 inVR.X3DStandard; Vega, Multi Gen, 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 HOURS: 45

COURSE OUTCOMES:

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

CO1: Understand the Fundamentals of Virtual Reality

CO2: Classify and Implement the software used in Virtual Reality

CO3: Develop the VR framework based on real-time

CO4: Discover various applications in Digital Entertainment

CO5: Determine 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.

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	1	3	-	3	-	-	-	-	-	-	2	-	-	-
CO2	2	2	3	-	3	-	2	-	-	-	-	-	-	1	2
CO3	2	-	3	3	3	-	2	-	2	-	-	2	2	1	3
CO4	3	-	2	2	3	-	-	-	3	-	-	3	2	-	3
CO5	3	-	2	3	2	-	-	-	1	-	1	-	1	-	3
Avg	2.6	1.5	2.6	2.6	2.8	-	2	-	2	-	1	2.33	1.6	1	2.75

3 – HIGH 2 - MODERATE 1- LOW '-'- NO CORRELATION

818CIE04	GREEN COMPUTING	L	T	P	C
		3	0	0	3

COURSE 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 its 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 GREENCOMPLIANCE **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 HOURS: 45

COURSE OUTCOMES:

On successful completion of the course the students will 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 Society

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, June2011

REFERENCES:

1. Alin Gales, Michael Schaefer, and Mike Ebbers, —Green Data Center: Steps for the Journey‖, Shoff/ IBM rebook, 2011.
2. Carl Speshocky, —Empowering Green Initiatives withIT‖, 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.

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	2	2	-	-	-	-	-	-	-	-	-	3	-	-	-
CO2	1	-	-	-	-	-	1	-	-	-	-	3	-	-	-
CO3	-	2	-	-	3	-	2	-	-	-	-	3	-	1	-
CO4	-	1	-	-	-	-	1	-	-	-	-	3	-	1	-
CO5	3	1	-	-	2	-	1	-	-	-	-	3	2	-	-
Avg	1.2	1.2	-	-	1	-	1	-	-	-	-	3	2	1	-

3 – HIGH 2 - MODERATE 1- LOW '-'- NO CORRELATION

		L	T	P	C
818CSE05	**WIRELESS AD HOC AND SENSOR NETWORKS**	**3**	**0**	**0**	**3**

COURSE OBJECTIVES:

- 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 Ad hoc 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 ad hoc 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–Sensornetworkarchitecture–MACProtocols 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 HOURS: 45

COURSE OUTCOMES:

On successful completion of the course the students will 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 BOOK:

1) C. Siva Ram Murthy and B.S.manoj, "Ad Hoc Wireless Networks–Architectures and Protocols", Pearson Education, 2012.
2) CarlosdeMoraisCordeiro, 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, TG Basavaraju, C Puttamadappa, —Ad Hoc Mobile Wireless Networks, Auerbach Publications, 2008.
2. Carlos De MoraisCordeiro, Dharma Prakash Agrawal, —Ad Hoc and Sensor Networks: Theory and Applications (2ndEdition), World Scientific Publishing, 2011.
3. WaltenegusDargie, 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, 1227th edition, Cambridge university Press, 2008.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	-	3	-	-	-	-	-	-	-	-	-	3	-	-	-
CO2	-	2	-	3	-	-	1	-	-	-	-	3	-	1	-
CO3	3	-	-	-	-	3	2	-	-	-	-	3	-	1	-
CO4	3	1	-	2	-	2	1	-	-	-	-	3	2	-	-
CO5	3	2	-	-	-	1	1	-	-	-	-	3	-	-	-
Avg	1.8	1.6	-	1	-	1.2	1	-	-	-	-	3	2	1	-

3 – HIGH 2 - MODERATE 1- LOW '-'- NO CORRELATION

818CSE06 **BLOCK CHAIN TECHNOLOGIES**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To understand Block chain's fundamental components, and examine decentralization using block chain.
- To explain how crypto currency works, from when a transaction is created to when it is considered part of the Block chain.
- To explain the components of Ethereum and Programming Languages for Ethereum.
- To study the basics of Hyper ledger and Web3.
- To learning of solidity and de-centralized apps on Ethereum.

UNIT I INTRODUCTION TO BLOCKCHAIN **9**

History of Block chain – Types of Block chain – Consensus – Decentralization using Block chain –Block chain 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–Bit coin limitations–Name coin–Prime coin-Cash–Smart Contracts– Ricardian Contracts.

UNIT III ETHEREUM **9**

The Ethereum Network–Components of Ethereum Ecosystem–Ethereum Programming Languages: Runtime Byte Code, Blocks and Block chain, Fee Schedule –Supporting Protocols– Solidity Language.

UNIT IV WEB3 AND HYPER LEDGER **9**

Introduction to Web3 – Contract Deployment – POST Requests – Development Frameworks– Hyper ledger as a Protocol–The Reference Architecture–Hyper ledger 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 HOURS: 45

COURSE OUTCOMES:

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

CO1: Understand the technology components of Block chain and how it works behind the scenes

CO2: Analyze the consensus methods in transactions and apply block chain for different application domains.

CO3: Identify the type of ethereum accounts using solidity programming language.

CO4: Develop a program using solidity language on array, enum and inheritance.

CO5: Determine and apply hyper ledger fabric, ethereum platform to implement the block chain applications.

TEXTBOOKS:

1. Imran Bashir, "Mastering Block chain: Distributed Ledger Technology, Decentralization and Smart Contracts Explained", Second Edition, Packet Publishing,
2. Ritesh Modi," Solidity Programming Essentials: A beginner's guide to build smart contracts for Ethereum and block chain", First Edition, Packet Publishing,

REFERENCE BOOKS:

1. ArshdeepBahga, Vijay Madisetti, "Block chain Applications: A Hands on Approach", VPT, 2017.
2. Andreas Antonopoulos, Satoshi Nakamoto, "Mastering Bit coin", O'Reilly, 2014.
3. Roger Wattenhofer, "The Science of the Block chain" Create Space Independent Publishing, 2016.
4. A. Narayanan, J. Bonneau, E. Felten, A. Miller, S. Goldfeder, "Bit coin and Crypto currency Technologies: A Comprehensive Introduction", Princeton University Press, 2016.
5. Alex Levering ton, "Ethereum Programming", Packet Publishing, 2017

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	-	3	-	-	-	-	-	-	-	-	-	3	-	-	-
CO2	-	2	-	-	2	-	-	-	-	-	-	3	-	-	-
CO3	-	1	3	-	2	3	-	2	-	-	-	3	-	1	-
CO4	-	1	2	-	2	2	-	3	-	-	-	3	-	1	-
CO5	-	1	-	-	-	-	-	3	-	-	-	3	2	-	-
Avg	-	1.6	1	-	1.2	1	-	1.6	-	-	-	3	2	1	-

3 – HIGH 2 - MODERATE 1- LOW '- '- NO CORRELATION

		L	T	P	C
818CIE07	**SERVICE ORIENTED ARCHITECHTURE**	**3**	**0**	**0**	**3**

COURSE OBJECTIVES:

- To learn fundamentals of XML
- To provide an overview of Service Oriented Architecture and Web services and their importance
- 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 XML using DOM, SAX–X Path-XML Transformation and XSL– X query.

UNIT II SERVICE ORIENTED ARCHITECTURE (SOA) BASICS **9**

Characteristics of SOA, Benefits of SOA, Comparing SOA with Client-Server and Distributed architectures – 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.

TOTAL HOURS:45

COURSE OUTCOMES:

On successful completion of the course the students will 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.

TEXTBOOKS:

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's Guide”, Prentice Hall, 2004

REFERENCES:

1. James McGovern, Sameer Tyagi, Michael.E Stevens, Sunil Mathew, “Java Web Services Architecture”, Elsevier, 2003.
2. Ron Schmelzeretal, ML and Web Services”, Pearson Education, 2002.
3. Frank P. Coyle, “XML, Web Services and the Data Revolution”, Pearson Education, 2002

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	3	-	-	-	-	-	-	-	-	-	3	-	-	-
CO2	-	2	-	-	-	-	-	-	3	-	-	3	-	-	-
CO3	-	1	-	3	-	2	-	3	2	-	-	3	-	1	-
CO4	1	1	-	2	-	3	-	2	2	-	-	3	-	1	-
CO5	3	1	-	-	-	1	-	-	-	-	-	3	2	-	-
Avg	1.4	1.6	-	1	-	1.2	-	1	1.4	-	-	3	2	1	-

3 – HIGH 2 - MODERATE 1- LOW ‘-‘- NO CORRELATION

		L	T	P	C
818CSE08	**DIGITAL FORENSICS**	**3**	**0**	**0**	**3**

COURSE OBJECTIVES:

- 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.
- To learn about the types of attacks and remedial actions in the context of systems, networks, images and videos.

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 DATARECOVERY 9

File Systems – FAT, NTFS, and 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 &MacOS)–Hacking: Investigating Hacker Tools–Ethical Issues–Cybercrime. Forensic and Investigative tools–Forensic Equipment's for evidence collection–Post exploitation.

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 HOURS: 45

COURSE OUTCOMES:

On successful completion of the course the students will 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

TEXTBOOKS:

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.

REFERENCES:

1. John R. Vacca, "Computer Forensics", Firewall Media, 2009.
2. Rafay Baloch, "Ethical Hacking and Penetration Testing Guide", Auerbach Publications, First Edition, 2014.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	1	3	3	-	2	2	1	-	1	1	-	3	1	1	2
CO2	2	2	3	3	2	1	2	-	-	1	1	3	2	1	2
CO3	1	3	3	-	2	2	1	-	-	2	1	3	1	1	2
CO4	1	3	3	-	2	2	1	-	-	2	1	3	1	1	2
CO5	1	3	3	-	2	2	1	-	-	2	1	3	2	1	2
Avg	1.2	2.8	3	1.6	2	1.8	1.2	-	-	1.6	1.8	3	1.4	1	-

3 – HIGH 2 - MODERATE 1- LOW '-'- NO CORRELATION

		L	T	P	C
818CSE09	**DEEP LEARNING TECHNIQUES**	**3**	**0**	**0**	**3**

COURSE 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 I Introduction to Deep Learning and Activation Functions **9**

Historical Trends in Deep Learning-Activation Functions: Sigmoid, ReLU, Hyperbolic Functions, SoftMax, Artificial Neural Networks: Introduction, Perception Training Rule - XOR Gate, Gradient Descent Rule.

UNIT II Deep Feed Forward Networks **9**

Gradient Descent and Back propagation: Gradient Based Learning, Stochastic Gradient Descent, Back propagation, Some problems in ANN Optimization and Regularization: Over fitting and Capacity, Cross Validation, Feature Selection, Regularization, Hyper parameters

UNIT III Convolution Neural Networks **9**

Introduction to Convolution Neural Networks: Introduction to CNNs, Kernel filter, Principles behind CNNs, Multiple Filters, CNN applications Introduction to Recurrent Neural Networks: Unfolded RNNs, Bidirectional RNNs, Deep RNNs, RNN applications.

UNIT IV Introduction to Tensor Flow **9**

Introduction to Tensor Flow: Computational Graph, Key highlights, creating a Graph, Regression example, Gradient Descent, Tensor Board, Modularity, Sharing Variables, Keras.

UNIT V Applications **9**

Deep learning applications: Large Scale Deep Learning-Image Processing, Natural Language Processing, Speech Recognition, Video Analytics.

TOTAL HOURS: 45

COURSE OUTCOMES

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

CO1: Understand the fundamentals of deep learning and activation functions.

CO2: Apply back propagation network model for real world problems.

CO3: Design model using CNN and RNN.

CO4: Develop applications using Tensor flow.

CO5: Explore deep learning model for different applications.

Text Book

1. Good fellow. I, BengioY, 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, BostjanKaluza, Soares and Alan M. F. Souza, "Deep Learning: Practical Neural Networks with Java", PACKT Publishing, UK, 2017.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-
CO2	2	2	-	-	-	-	-	2	-	-	-	3	-	1	-
CO3	1	3	-	2	-	-	3	2	-	2	-	3	-	1	-
CO4	3	2	-	2	-	-	3	2	-	1	-	3	2	-	-
CO5	3	2	-	-	-	-	1	-	-	2	-	3	-	-	-
Avg	1.8	1.8	-	0.8	-	-	1.4	1.2	-	1	-	3	2	1	-

3 – HIGH 2 - MODERATE 1- LOW ‘-‘- NO CORRELATION

		L	T	P	C
818CSE10	**VIRTUALIZATION TECHNIQUES**	**3**	**0**	**0**	**3**

COURSE 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 DATAVISUALIZATION 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-Photorealistic Computer Graphics–Interaction Facilities and High-Level Support 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 HOURS: 45

COURSE OUTCOMES:

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

CO1: Define and characterize data science, apply basic data visualization techniques in different ways.

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.

TEXTBOOK

1. Colin Ware "Information Visualization Perception for Design", 3rd edition, Morgan Kaufman, 2012.

2. Stuart. K. Card, Jock. D. Mack inlay and Ben Shneiderman "Readings in Information Visualization Using Vision to think", Morgan Kaufmann Publishers, 1999.

2. Thomas Strothotte, "Computer Visualization–Graphics Abstraction and Interactivity", Springer Verlag, Berlin, Heidelberg, 1998.

REFERENCES

1. Chaomei Chan, "Information Visualization", Beyond the horizon, 2nd edition, Springer Verlag, 2004.

2. Pauline Wills, "Visualization: A Beginner's Guide", Hodder and Stoughton, 1999.3.

Benedict's, "Cyberspace: Footsteps'", MIT Press,1991.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-
CO2	2	2	-	-	-	-	-	2	-	-	-	3	-	1	-
CO3	1	3	-	2	-	-	3	2	-	-	-	3	-	1	-
CO4	3	2	-	2	-	-	3	2	-	-	-	3	2	-	-
CO5	3	2	-	2	-	-	1	-	-	-	-	3	-	-	-
Avg	1.8	1.8	-	1.2	-	-	1.4	1.2	-	-	-	3	2	1	-

3 – HIGH 2 - MODERATE 1- LOW '-'- NO CORRELATION

		L	T	P	C
818CSE11	**SOFTWARE QUALITY ASSURANCE**	**3**	**0**	**0**	**3**

COURSE OBJECTIVES:

- 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 SystemandArchitecture–SoftwareProjectLifeCycleComponents–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 design Review – Peer Review – Quality of Software Maintenance Components– Pre-Maintenance Software Quality Components – Maintenance Software Quality Assurance Tools – Assuring the Quality of External participant's 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 HOURS:45

COURSE OUTCOMES:

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

CO1: Understand the document and control software quality with the aid of tools and standards.

CO2: Analyze various software components of software lifecycle.

CO3: Design software quality infrastructure.

CO4: Measure and assess software quality through process and product metrics.

CO5: Explore various software quality standards and certifications.

TEXTBOOKS:

1. Daniel Galin, "Software Quality Assurance: From Theory to Implementation", Pearson Education, 2004.

REFERENCES:

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.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	3	-	-	-	-	-	-	3	-	-	-
CO2	3	-	3	-	-	-	-	-	-	-	-	3	3	-	1
CO3	1	1	-	3	2	-	-	-	2	-	-	3	-	1	2
CO4	1	1	2	2	3	-	-	-	-	--	-	3	3	-	2
CO5	2	-	2	-	3	-	-	-	-	1	-	2	1	-	3
Avg	2	1.6	2.3	2.5	2.75	-	-	-	2	1	-	2.8	2.3	1	2

3 – HIGH 2 - MODERATE 1- LOW '-'- NO CORRELATION

		L	T	P	C
818CSE012	**WEB MINING**	**3**	**0**	**0**	**3**

COURSE 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- Topical Crawlers-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 LDA Models.

TOTAL: 45Hrs

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 Recommender systems.

CO4: Analyze social media data using appropriate data / web mining techniques

CO5: Build a simple search engine using available open source tools

TEXTBOOKS:

1. G. Sreedhar-Web Data Mining and the Development of Knowledge-Based Decision Support Systems IGI Global; 1st edition, March, 2017.
2. MaiAyad-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.

REFERENCES:

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 in Web Content, Structure, and Usage‖, John Wiley & Sons, Inc., 2007
3. SoumenChakrabarti, —Mining the Web: Discovering Knowledge from Hypertext Data

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	3	-	-	-	-	-	-	-	-	-	3	-	-	-
CO2	-	3	-	3	-	-	3	-	-	-	-	3	-	1	-
CO3	-	-	-	-	2	-	3	-	-	-	-	3	-	1	-
CO4	3	-	-	2	2	-	1	-	-	-	-	3	2	-	-
CO5	3	1	-	-	2	-	-	-	-	-	-	3	-	-	-
Avg	1.8	1.4	-	1	1.2	-	1.4	-	-	-	-	3	0.4	0.8	-

3 – HIGH 2 - MODERATE 1- LOW '-'- NO CORRELATION

818CSP01	PROJECT WORK and VIVA-VOCE	L	T	P	C
		0	0	16	8

COURSE OBJECTIVES:

- To identify societal or real world problems that require computerization
- To suggest creative solutions to societal problems
- To explore possible alternative solutions
- To estimate risk and develop a prototype

The primary objective of this course is to stimulate students to identify projects aimed at exploring variables that foster creativity and innovation, while also addressing societal problems or challenges. The projects may be application-focused or research-driven. Students are expected to engage in independent or group research focused on domains and associated problems approved by the Department. Each student is empowered to select a topic relevant to their specialization within the program, and subsequently, to pursue the work on the chosen topic in accordance with a formulated methodology. At the end of the semester, subsequent to fulfilling the requirements to the contentment of the supervisor and the members of the panel, it is requisite to prepare a comprehensive report. This report should encompass a precise description of the identified problem, an exhaustive review of relevant literature within the area of study, a delineation of the methodology employed in conducting the research, an exposition of the findings and subsequent discussions, a succinct conclusion, and a comprehensive list of references. This report must adhere strictly to the formatting guidelines stipulated by the University and be submitted to the Head of the department The students will be evaluated based on the report and viva-voce examination by a panel of examiners as per the Regulations.

1. Internal - Assessment
    a. First Review
        i. Block Diagram of the proposed solution for a societal / creative problem
        ii. New Contribution in terms of modifications to existing algorithm or suggestion of new ones
        iii. Detailed Design of each module
        iv. Evaluation Metrics
    b. Second Review
        i. Implementation - Justifying pros and Cons
        ii. Coding - highlighting what has been reused and what is being written
    c. Third Review
        i. Test cases and Test Runs
        ii. Performance Evaluation based on Metrics
        iii. Project Documentation
2. External-Assessment
    Presentation, Viva-Voce, Report submission.

TOTAL: 240 PERIODS

COURSE OUTCOMES:

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

CO1: Gain Domain knowledge and technical skill set required for solving industry /research problems

CO2: Provide solution architecture, module level designs, algorithms

CO3: Identify the methodology suitable for the proposed solution

CO4: Implement, test and deploy the solution for the target platform

CO5: Prepare detailed technical report, demonstrate and present the work

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	3	2	1	2	3	3	3	3	3	3	2
CO2	3	3	3	2	3	2	1	2	3	3	3	3	3	3	2
CO3	3	3	3	2	3	2	1	2	3	3	3	3	3	3	2
CO4	3	3	3	2	3	2	1	2	3	3	3	3	3	3	2
CO5	3	3	3	2	3	2	1	2	3	3	3	3	3	3	2
Avg	3	3	3	2	3	2	1	2	3	3	3	3	3	3	2

3-HIGH 2-MODERAT 1-LOW '- '- NO CORRELATION