ADHIYAMAAN COLLEGE OF ENGINEERING

[An Autonomous Institution Affiliated to Anna University, Chennai]
[Accredited by NACC]
Dr.M.G.R Nagar, Hosur, Krishnagiri[Dt] - 635019, Tamil Nadu.

REGULATIONS 2018

CHOICE BASED CREDIT SYSTEM

B.Tech - INFORMATION TECHNOLOGY

VISION

To become a globally recognized centre of excellence in the field of Information Technology, providing technology excellence that advances learning, teaching, research to produce budding IT professionals, researchers, innovators and entrepreneurs.

MISSION

M1: To produce competent IT professionals with the potential of Programming and Problem solving skills.

M2: To facilitate the students to work with modern tools, inventive technologies and innovative research capabilities.

M3: To build leadership abilities by inculcating the spirit of ethical values.

PROGRAM EDUCATIONAL OBJECTIVES [PEOs]

PEO1: Graduates will be able to analyze and solve computing problems by applying the principles of mathematics, information technology and engineering.

PEO2: Graduates will be globally competent to use recent information technologies to Design quality software systems that are economically feasible and socially acceptable through their innovations.

PEO3: Graduates will be excellent in their career or higher education by acquiring communication and interpersonal skills to work in team ethically by engaging in lifelong learning.

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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.

PO4 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.

PO5 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.

PO6 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.

PO7 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.

PO8 Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9 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.

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PO11 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.

PROGRAM SPECIFIC OUTCOME [PSO]

PSO-1: Professional Skills: Ability to identify, analyze, design, model, develop, test and manage complex software and information management systems.

PSO-2: Web Designing Skill: Possess knowledge of software design process using open ended programming and to use the web designing skill to establish new solutions for the societal needs.

PSO-3: Successful Career and Entrepreneurship: Capable of adapting to new technologies and constantly upgrade their skills with an attitude towards lifelong learning.

MAPPING OF PEOs with POs AND PSO

PROGRAMME EDUCATIONAL OBJECTIVES	PROGRAMME OUTCOMES												PROGRAMME SPECIFIC OUTCOMES		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
PEO1	3	2	2				1	1	3				3		
PEO2			2	3	3	2	2	1	3	2	3			3	
PEO3			3		3	2		2		3		3			3

MAPPING OF PSO WITH POs

PROGRAMME SPECIFIC OUTCOMES	PROGRAMME OUTCOMES											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PSO1	3	3				1	2	2	3			
PSO2			3	3	3	2	1		1			
PSO3								2	3	3	3	3

Contribution 1: Reasonable (L) 2: Significant (M) 3: Strong (H)

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Department of Information Technology

Program Attriculation Matrix - R 2018

Course Code	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
118ENT01	Technical English								2	3	3	2	2	2		3
118MAT02	Engineering Mathematics-I	3	3	3						2			2	2	2	
118PHT03	Engineering Physics	3	3	3	1			2					1	3		2
118CYT04	Engineering Chemistry	3	2	2				3					1	3	2	3
118PPT05	Problem Solving And Python Programming		3	3	2	3					2		2	3	3	2
118ESE06	Basic Electrical Electronics and Instrumentation Engineering	3	2			3		2		3	2	1		2		2
118PHP07	Engineering Physics Laboratory	3	3										2	3		2
118PPP08	Problem Solving and Python Programming Laboratory	3	3	3	2	3							2	2	3	1
218ENT01	Communicative English								2	3	3	2	2	1		3
218MAT02	Engineering Mathematics-II	3	3	3						2			2	2	2	
218GET03	Environmental Science and Engineering	2	1	2			2	3			3					
218EGT04	Engineering Graphics		3	3			2			1			2			
218CPT05	Programming in C		3	3	3	2			1		1		2	3	3	3
218BSE09	Physics for Information Science	3	3	2	2			2	1		2		2			
218CYP07	Engineering Chemistry Laboratory	3	3					2								
218EPP08	Engineering Practice Laboratory	3	3				3						1			
218CPP09	Programming in C Laboratory	3	3	3		2							2	3	3	3
318MAT01	Engineering Mathematics III	3	1	3	2		1			2				2	2	
318CIT02	Digital Electronics	3	2	2	3	1								3	2	2
318ITT03	Communication Engineering	3	3	2	1		2							3	2	2
318CIT04	Object Oriented Programming in C++	2	2	3	2	3								3	3	2
318CIT05	Data Structures	3	3	3	2									3	3	3
318CIT06	Computer Organization	3	2	3	2	2								3	3	
318CIP07	Digital Electronics Laboratory	3		3	3	2								3		2
318ITP08	Object Oriented Programming Laboratory	3	2	3		3								2	3	2
318ITP09	Data Structures Laboratory	3	3	3		2								3	3	3
418DMT01	Discrete Mathematics	3	3	2									2	3	3	3
418CIT02	Design and Analysis of Algorithms	3	3	2	3	2								3	3	3
418CIT03	Java Programming	2	3	3	3	3	1	2					3	3	3	3
418CIT04	Operating System	2	3	3	2	2								3	3	3
418ITT05	Database Management Systems	3	2	2	3	2	2							3	3	3
418CIT06	Software Engineering		3	3	2	2					3			3	2	3
418CIP07	Java Programming Laboratory		3	3		3							3	3	3	3
418CIP08	Operating System Laboratory	3	1	3	2									3	2	2
418ITP09	Database Management System Laboratory	3	2	3		2								3	2	2
518PST01	Probability and Statistics	3	3	2	2	1							2	2	2	2
518CIT02	Micro Processor and Microcontroller	2	2	3	2	2								2	1	3
518ITT03	Computer Networks	3	1	2	2	2								3	3	0
518ITT04	Computational Intelligence	3	3	3	3	3	2	1						3	2	3
518CIE01	C# AND .NET Programming		2	3	2	3	2	2						3	2	2
518ITE02	Theory of Computation	3	3	3	3		2							2	1	2
518CIE03	Advanced Java Programming	3	2	3		3								3	3	3
518ITE04	Real Time Systems	3	3	3	3		2							1	2	3
518CIE05	Computer Graphics and Multimedia Systems	3		3		2								2	2	2
518BAO03	Engineering Ethics and Human Values							2	3	2		1		1	2	2
518CIP07	Micro Processor and Microcontroller Laboratory	3	2	3										2	1	3
518ITP08	Computer Networks Laboratory	3	1	2		2								3	3	
518CIP09	Employability Skills Laboratory									3	3	2	3			3
618ITT01	Scripting Languages		2	3	2	3	2				3			2	3	3
618ITT02	Compiler Engineering	3	2	2	3						2				3	3
618CIT03	Data warehousing and Data Mining		3	3	2	2				2				3	2	3
618ITT04	Object Oriented Modeling and Design	2	3	3	2				2	1	2	2		3	3	3
615CIE01	Multi core Architecture	3	3	3		3								1	2	
618ITE02	Soft Computing	2	3	3	3										2	2
618ITE03	Social Network Analysis	3	3	3	3									1		3
618ITE04	Mobile Communication	1	3	2	2	2		2					2	2	2	3
618ITE05	Embedded Systems	2	2	3			2	3						2	2	2

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118ENT01	Technical English								**2**	**3**	**3**	**2**	**2**	**2**		**3**
618ECO03	Satellite Communication		**3**	**2**	**3**			**2**						**1**	**2**	
618ITP07	Scripting Languages Laboratory	**3**	**3**	**3**		**3**					**2**	**1**	**2**	**3**	**3**	
618ITP08	Compiler Engineering Laboratory	**3**		**3**		**3**		**2**							**3**	**3**
618ITP09	Object Oriented Modeling and Design Laboratory	**3**	**3**	**3**	**2**	**3**		**2**						**3**	**3**	**3**
718CIT01	Cryptography and Security in Computing	**3**	**3**	**3**	**2**		**3**	**2**						**2**	**2**	**3**
718ITT02	Fundamentals of Machine Learning	**3**	**3**	**3**	**2**	**3**	**2**			**2**				**2**	**2**	**2**
718ITT03	Mobile Application Development		**2**	**3**	**3**	**3**	**3**	**1**	**1**					**1**	**3**	**3**
718ITT04	Web Programming		**3**	**3**	**3**	**3**	**2**				**1**	**1**	**1**	**2**	**3**	**3**
718CIE01	Internet of Things		**2**	**3**	**3**	**2**	**3**		**2**	**2**	**2**			**3**	**3**	**3**
718CIE02	Building Enterprise Application	**3**		**3**		**3**	**3**		**2**	**3**				**2**	**3**	**3**
718CIE03	Business Intelligence and Its Applications	**3**	**2**	**3**		**3**	**3**		**2**	**3**				**2**	**2**	**3**
718CIE04	Information Storage Management	**3**	**3**									**1**			**2**	**2**
718CIE05	Agile Software Development	**3**				**3**				**3**	**3**	**3**		**2**	**3**	**3**
7 18CIE06	Cyber Security and Law	**3**	**3**	**3**	**3**			**1**	**2**					**1**	**2**	**3**
718ITE07	Ad Hoc and Sensor Networks	**3**	**3**	**3**			**1**						**1**	**2**	**3**	**3**
718ITE08	Cloud Computing	**2**	**3**	**2**	**2**	**3**	**3**	**3**						**3**	**3**	**3**
718ITE09	Advanced Java Scripting Language	**2**		**3**		**3**						**2**		**3**	**3**	**3**
718ITE10	Software Testing	**2**	**3**	**2**	**3**	**3**						**2**		**3**	**3**	**2**
718ITP07	Mobile Application Development Laboratory	**1**		**2**	**2**	**3**		**2**		**1**	**2**			**2**	**3**	**3**
718ITP08	Web Programming Laboratory	**2**		**3**	**2**	**3**								**2**	**3**	**3**
718ITP09	Mini Project	**2**	**3**	**3**	**3**	**3**		**2**	**1**	**3**	**3**	**3**	**2**	**3**	**3**	**3**
818CIT01	Big Data Analytics	**2**	**2**	**3**	**3**	**2**							**2**	**3**	**3**	**3**
818CIE01	Software Defined Networks	**3**	**1**	**2**										**2**	**3**	**3**
818ITE02	Information Security		**2**	**3**	**3**		**2**	**1**	**2**					**2**	**3**	**3**
818ITE03	Swarm Intelligence	**2**	**3**	**3**	**3**									**2**	**3**	
818ITE04	Green Computing	**3**	**3**	**3**			**3**	**3**	**1**					**2**	**3**	**2**
818ITE05	Computer Forensics	**3**	**3**	**3**	**3**									**2**	**3**	
818ITE06	Software Project Management		**2**	**3**	**2**	**2**	**1**	**1**	**2**	**3**	**3**	**3**		**3**	**3**	**2**
818CIE07	Service Oriented Architecture	**3**	**3**	**3**			**2**	**2**						**2**	**2**	**3**
818ITE08	Virtual and Augmented Reality	**3**	**3**	**3**			**2**	**1**						**2**	**3**	**2**
818ITT09	Deep Learning	**3**	**3**	**3**			**3**							**2**	**3**	**3**
818ITE10	Information Visualization	**3**	**3**	**3**	**3**		**2**							**2**	**3**	
818ITP01	Project Work & Viva Voce		**3**	**3**	**3**	**3**		**2**	**1**	**3**	**3**	**3**	**2**	**3**	**3**	**3**

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CURRICULA AND SYLLABI FOR SEMESTER I TO VIII

SEMESTER I

S. No	CODE NO.	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 Python Programming Laboratory	ES	0	0	2	2	1
TOTAL				**16**	**0**	**4**	**20**	**18**

ELECTIVE (GROUP1)

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

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SEMESTER II

S. No	CODE NO.	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	ES	2	0	4	4	4
5	218CPT05	Programming in C	ES	3	0	0	3	3
6	**218BSE0X**	**ELECTIVE (GROUP 2)**	**BS**	**2**	**0**	**0**	**2**	**2**
PRACTICALS								
7	218CYP07	Engineering Chemistry Laboratory	BS	0	0	2	2	1
8	218EPP08	Engineering Practice Laboratory	ES	0	0	2	2	1
9	218CPP09	Programming in C Laboratory	ES	0	0	2	2	1
TOTAL				**14**	**1**	**12**	**24**	**21**

ELECTIVE (GROUP 2)

S. No	CODE NO.	COURSE TITLE	CATEGORY	L	T	P	TOTAL CONTACT PERIODS	CREDITS
1	218BSE03	Chemistry for Technologists	BS	2	0	0	2	2
2	218BSE04	Energy Storage Devices and Fuel Cells	BS	2	0	0	2	2
3	218BSE07	Semiconductor Physics	BS	2	0	0	2	2
4	218BSE09	Physics for Information Science	BS	2	0	0	2	2

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SEMESTER III

S. No	CODE NO.	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	318MAT01	Engineering Mathematics III	BS	3	1	0	4	4
2	318CIT02	Digital Electronics	ES	3	0	0	3	3
3	318ITT03	Communication Engineering	ES	3	0	0	3	3
4	318CIT04	Object Oriented Programming in C++	PC	3	0	0	3	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	318ITP08	Object Oriented Programming Laboratory	PC	0	0	2	2	1
9	318ITP09	Data Structures Laboratory	PC	0	0	2	2	1
TOTAL				**18**	**1**	**6**	**25**	**22**

SEMESTER IV

S. No	CODE NO.	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	418DMT01	Discrete Mathematics	BS	3	1	0	4	4
2	418CIT02	Design and Analysis of Algorithms	PC	3	0	0	3	3
3	418CIT03	Java Programming	PC	3	0	0	3	3
4	418CIT04	Operating System	PC	3	0	0	3	3
5	418ITT05 / 318CST03	Database Management Systems	PC	3	0	0	3	3
6	418CIT06	Software Engineering	PC	3	0	0	**3**	3
PRACTICALS								
7	418CIP07	Java Programming Laboratory	PC	0	0	2	2	1
8	418CIP08	Operating System Laboratory	PC	0	0	2	2	1
9	418ITP09	Database Management System Laboratory	PC	0	0	2	2	1
TOTAL				**18**	**1**	**6**	**25**	**22**

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SEMESTER V

S. No	CODE NO.	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	518PST01	Probability and Statistics	PC	3	1	0	4	4
2	518CIT02	Micro Processor and Microcontroller	PC	3	0	0	3	3
3	518ITT03/ 418CST05	Computer Networks	PC	3	0	0	3	3
4	518ITT04	Computational Intelligence	ES	3	0	0	3	3
5	518XXX	**Professional Elective –I**	PE	3	1	0	3	4
6	518XXX	**Open Elective -I**	OE	3	0	0	**3**	3
PRACTICALS								
7	518CIP07	Micro Processor and Microcontroller Laboratory	PC	0	0	2	2	1
8	518ITP08	Computer Networks Laboratory	ES	0	0	2	2	1
9	518CIP09	Employability Skills Laboratory	EEC	0	0	2	2	1
TOTAL				**18**	**1**	**6**	**25**	**23**

SEMESTER VI

S. No	CODE NO.	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	618ITT01/ 518CSE02	Scripting Languages	PC	3	0	0	3	3
2	618ITT02	Compiler Engineering	PC	3	1	0	4	3
3	618CIT03	Data warehousing and Data Mining	PC	3	0	0	3	3
4	618ITT04	Object Oriented Modeling and Design	PC	3	0	0	3	3
5	618XXX	**Professional Elective - II**	PE	3	0	0	3	3
6	618XXX	**Open Elective –II**	OE	3	0	0	**3**	3
PRACTICALS								
7	618ITP07	Scripting Languages Laboratory	PC	0	0	2	2	1
8	618ITP08	Compiler Engineering Laboratory	PC	0	0	2	2	1
9	618ITP09	Object Oriented Modeling and Design Laboratory	PC	0	0	2	2	1
TOTAL				**18**	**1**	**6**	**25**	**21**

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SEMESTER VII

S. No	CODE NO.	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	718CIT01	Cryptography and Security in Computing	PC	3	0	0	3	3
2	718ITT02	Fundamentals of Machine Learning	PC	3	0	0	3	3
3	718ITT03/ 618CST01	Mobile Application Development	PC	3	0	0	3	3
4	718ITT04/ 618CST04	Web Programming	PC	3	0	0	3	3
5	718XXX	**Professional Elective- III**	PE	3	0	0	3	3
6	718XXX	**Professional Elective- IV**	PE	3	0	0	**3**	3
PRACTICALS								
7	718ITP07	Mobile Application Development Laboratory	PC	0	0	2	2	1
8	718ITP08	Web Programming Laboratory	PC	0	0	2	2	1
9	718ITP09	Mini Project	EEC	0	0	4	4	2
TOTAL				**18**	**0**	**8**	**26**	**24**

SEMESTER VIII

S. No	CODE NO.	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	818CIT01	Big Data Analytics	PC	3	0	0	3	3
2	818XXX	**Professional Elective- V**	PE	3	0	0	3	3
3	818XXX	**Professional Elective- VI**	PE	3	0	0	3	3
PRACTICALS								
4	818ITP01	Project Work & Viva Voce	EEC	0	0	12	12	6
TOTAL				**9**	**0**	**12**	**21**	**15**

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LIST OF PROFESSIONAL ELECTIVES

SI. No	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CONTACT PERIODS	C
1	518CIE01	C# and .NET Framework	PE	3	1	0	4	4
2	518ITE02 / 518CST04	Theory of Computation	PE	3	1	0	4	4
3	518CIE03	Advanced Java Programming	PE	3	1	0	4	4
4	518ITE04	Real Time Systems	PE	3	1	0	4	4
5	518CIE05	Computer Graphics and Multimedia Systems	PE	3	1	0	4	4
6	618CIE01	Multi Core Architecture	PE	3	0	0	3	3
7	618ITE02	Soft Computing	PE	3	0	0	3	3
8	618ITE03	Social Network Analysis	PE	3	0	0	3	3
9	618ITE04	Mobile Communication	PE	3	0	0	3	3
10	618ITE05	Embedded Systems	PE	3	0	0	3	3
11	718CIE01	Internet of Things	PE	3	0	0	3	3
12	718CIE02	Building Enterprise Application	PE	3	0	0	3	3
13	718CIE03	Business Intelligence and its Applications	PE	3	0	0	3	3
14	718CIE04	Information Storage Management	PE	3	0	0	3	3
15	718CIE05	Agile Software Development	PE	3	0	0	3	3
16	718CIE06	Cyber Security and Law	PE	3	0	0	3	3
17	718ITE07	Adhoc and Sensor Network	PE	3	0	0	3	3
18	718ITE08 / 718CST04	Cloud Computing	PE	3	0	0	3	3
19	718ITE09 / 618CSE06	Advanced Java Scripting Language	PE	3	0	0	3	3
20	718ITE10 / 518CSE04	Software Testing	PE	3	0	0	3	3
21	818CIE01	Software Defined Networks	PE	3	0	0	3	3
22	818ITE02	Information Security	PE	3	0	0	3	3
23	818ITE03	Swarm Intelligence	PE	3	0	0	3	3
24	818CIE04	Green Computing	PE	3	0	0	3	3
25	818ITE05	Computer Forensics	PE	3	0	0	3	3

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Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CONTACT PERIODS	C
26	818ITE06 / 618CSE05	Software Project Management	PE	3	0	0	3	3
27	818CIE07	Service Oriented Architecture	PE	3	0	0	3	3
28	818ITE08	Virtual and Augmented Reality	PE	3	0	0	3	3
29	818ITE09	Deep Learning	PE	3	0	0	3	3
30	818ITE10	Information Visualization	PE	3	0	0	3	3

HS COURSES

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CONTACT PERIODS	C
1	118ENT01	Technical English	HS	2	0	0	2	2
2	218ENT01	Communicative English	HS	2	0	2	3	3
3	218GET03	Environmental Science and Engineering	HS	2	0	0	2	2

BASIC SCIENCE COURSES

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CONTACT PERIODS	C
1	118MAT02	Engineering Mathematics-I	BS	3	0	0	3	3
2	118PHT03	Engineering Physics	BS	2	0	0	2	2
3	118CYT04	Engineering Chemistry	BS	3	0	0	3	3
4	118PHP07	Engineering Physics Laboratory	BS	0	0	2	2	1
5	218BSE03	Chemistry for Technologists	BS	2	0	0	2	2
6	218BSE04	Energy Storage Devices and Fuel Cells	BS	2	0	0	2	2
7	218BSE07	Semiconductor Physics	BS	2	0	0	2	2

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8	218BSE09	Physics for Information Science	BS	2	0	0	2	2
9	318MAT01	Engineering Mathematics III	BS	3	1	0	4	4
10	418DMT01	Discrete Mathematics	BS	3	1	0	4	4

ENGINEERING SCIENCE COURSES

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CONTACT PERIODS	C
1	118PPT05	Problem Solving And Python Programming	ES	3	0	0	3	3
2	118PPP08	Problem Solving and Python Programming Laboratory	ES	0	0	2	2	1
3	118ESE01	Basic Civil and Mechanical Engineering	ES	3	0	0	3	3
4	118ESE05	Basic Mechanical Electrical and Instrumentation Engineering	ES	3	0	0	3	3
5	118ESE06	Basic Electrical Electronics and Instrumentation Engineering	ES	3	0	0	3	3
6	118ESE07	Biology For Engineers	ES	3	0	0	3	3
7	218EGT04	Engineering Graphics	ES	2	0	4	4	4
8	218CPT05	Programming in C	ES	3	0	0	3	3
9	218EPP08	Engineering Practice Laboratory	ES	0	0	2	2	1
10	218CPP09	Programming in C Laboratory	ES	0	0	2	2	1
11	318CIT02	Digital Electronics	ES	3	0	0	3	3

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12	318ITT03	Communication Engineering	ES	3	0	0	3	3
13	518ITT04	Computational Intelligence	ES	3	0	0	3	3

PROFESSIONAL CORE COURSES

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CONTACT PERIODS	C
1	318CIT04	Object Oriented Programming in C++	PC	3	0	0	3	3
2	318CIT05	Data Structures	PC	3	0	0	3	3
3	318CIT06	Computer Organization	PC	3	0	0	**3**	3
4	318ITP08	Object Oriented Programming Laboratory	PC	0	0	2	2	1
5	318ITP09	Data Structures Laboratory	PC	0	0	2	2	1
6	418CIT02	Design and Analysis of Algorithms	PC	3	0	0	3	3
7	418CIT03	Java Programming	PC	3	0	0	3	3
8	418CIT04	Operating System	PC	3	0	0	3	3
9	418ITT05 / 318CST03	Database Management Systems	PC	3	0	0	3	3
10	418CIT06	Software Engineering	PC	3	0	0	**3**	3
11	418CIP07	Java Programming Laboratory	PC	0	0	2	2	1
12	418CIP08	Operating System Laboratory	PC	0	0	2	2	1
13	418ITP09	Database Management System Laboratory	PC	0	0	2	2	1

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14	518PST01	Probability and Statistics	PC	3	1	0	4	4
15	518CIT02	Micro Processor and Microcontroller	PC	3	0	0	3	3
16	518ITT03/ 418CST05	Computer Networks	PC	3	0	0	3	3
17	518CIP07	Micro Processor and Microcontroller Laboratory	PC	0	0	2	2	1
18	618ITT01/ 518CSE02	Scripting Languages	PC	3	0	0	3	3
19	618ITT02	Compiler Engineering	PC	3	1	0	4	3
20	618CIT03	Data warehousing and Data Mining	PC	3	0	0	3	3
21	618ITT04	Object Oriented Modeling and Design	PC	3	0	0	3	3
22	618ITP07	Scripting Languages Laboratory	PC	0	0	2	2	1
23	618ITP08	Compiler Engineering Laboratory	PC	0	0	2	2	1
24	618ITP09	Object Oriented Modeling and Design Laboratory	PC	0	0	2	2	1
25	718CIT01	Cryptography and Security in Computing	PC	3	0	0	3	3
26	718ITT02	Fundamentals of Machine Learning	PC	3	0	0	3	3
27	718ITT03/ 618CST01	Mobile Application Development	PC	3	0	0	3	3
28	718ITT04/ 618CST04	Web Programming	PC	3	0	0	3	3
29	718ITP07	Mobile Application	PC	0	0	2	2	1

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		Development Laboratory						
30	718ITP08	Web Programming Laboratory	PC	0	0	2	2	1
31	818CIT01	Big Data Analytics	PC	3	0	0	3	3

EEC COURSES

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CONTACT PERIODS	C
1	518CIP09	Employability Skills Laboratory	EEC	0	0	2	2	1
2	718ITP09	Mini Project	EEC	0	0	4	4	2
3	818ITP01	Project Work & Viva Voce	EEC	0	0	12	12	6

List of Open Electives

S. No	CODE NO.	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
V Semester-Open Elective-I								
1	518BAO03/ 518BAE03	Engineering Ethics and Human Values	OE	3	0	0	3	3
2	518BAO06/ 218BAT06	Management Information Systems	OE	3	0	0	3	3
3	518BAO02/ 118BAT02	Management Concepts and Practices	OE	3	0	0	3	3
4	518MEO10/ 818MET10	Total Quality Management	OE	3	0	0	3	3
5	518BMO04/ 718BMT04	Medical Informatics	OE	3	0	0	3	3
6	518EIO04/ 718EIE04	Robotics And Automation	OE	3	0	0	3	3

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7	518CEO01 718CET01	Disaster Mitigation and Management	OE	3	0	0	3	3
VI Semester – Open Elective – II								
1	61ECO01/ 518ECT01	Digital Signal Processing	OE	3	0	0	3	3
2	618ECO02/ 618ECE01	Digital Image Processing	OE	3	0	0	3	3
3	618ECO03/ 818ECE08	Satellite Communication	OE	3	0	0	3	3
4	618ECO04/ 318ECT02	Signals and Systems	OE	3	0	0	3	3
5	618MAO01	Applied Statistics and Numerical Methods	OE	3	0	0	3	3
6	618MAO02	Algebra and Number Theory	OE	3	0	0	3	3
7	618MAO03	Resource Management Techniques	OE	3	0	0	3	3
8	618MAO04	Graph Theory and its Application	OE	3	0	0	3	3

B.TECH. INFORMATION TECHNOLOGY

S.No.	Subject Area	Credits per Semester								Credits Total
		I	II	III	IV	V	VI	VII	VIII	
1	HS	2	5	-	-	-	-	-	-	**7**
2	BS	9	7	4	4	-	-	-	-	**24**
3	ES	7	9	7	-	4	-	-		**27**
4	PC	-	-	11	18	11	15	14	3	**72**
5	PE	-	-	-	-	4	3	6	6	**19**
6	OE	-	-	-	-	3	3	-	-	**6**
7	EEC	-	-	-	-	1	-	2	6	**9**
	TOTAL CREDIT	**18**	**21**	**22**	**22**	**23**	**21**	**22**	**12**	**164**

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Syllabus

Regulations 2018

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

OBJECTIVE(S):

The Course prepares first semester Engineering and Technology students to:

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

UNIT I **09**

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

UNIT II **09**

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

UNIT III **09**

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

UNIT IV **09**

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

UNIT V **09**

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

TOTAL HOURS: 45 PERIODS

COURSE OUTCOMES:

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

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

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

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

CO4: Understand the basic grammatical structures and its applications.

CO5: Write reports and winning job applications.

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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.

REFERENCES:

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.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
Co1	Read technical texts and write area- specific texts effortlessly.				2				1	1	3	1		1	1	
Co2	Listen and comprehend lectures and talks in their area of specialization successfully.				1	1				2	3	1		1		
Co3	Speak appropriately and effectively in varied formal and informal contexts.									2	3					
Co4	Understand the basic grammatical structures and its applications.										2					
Co5	Write reports and winning job applications.				2					1	2	1		1	1	1

118MAT02 **ENGINEERING MATHEMATICS-I**

L	T	P	C
3	0	0	3

Course Objectives

- To understand the eigen value problems.
- To solve differential equations of certain types, including systems of differential equations that they might encounter in the same or higher semesters.
- To understand the concepts of curvatures, evolutes and envelopes and to study the maxima and minima of any function.
- To learn the partial derivatives and apply the same to find maxima and minima.
- 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 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 (without proof) – Laplace Transform of elementary functions, derivatives and integrals, unit step function and impulse functions, periodic functions. Definition of Inverse Laplace transform – Convolution theorem (Statement and applications only) – Initial and final value theorems (Statement and applications only) – Solution of linear ordinary differential equations of second order with constant coefficients using Laplace transform techniques.

TOTAL HOURS: 45 PERIODS

COURSE OUTCOMES

After completing this course, the student will be able to

CO1: Develop the knowledge of basic linear algebraic concepts.

CO2: Determine the solutions of ordinary differential equations by various methods which have an application in their core subjects.

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", 43rd Edition, Khanna Publications, Delhi, 2014.

REFERENCES

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.

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Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
Co1	Develop the knowledge of linear algebraic concepts.	3	2											3		
Co2	Use the differential calculus tools application to seek solutions for many problems in engineering subjects.	3	3											3		
Co3	Acquire the knowledge of partial differential concepts and apply to find maxima and minima of a function.	3	3											3		
Co4	Determine the solutions of ordinary differential equations by various methods which have an application in their core subjects.	3	3											3		
Co5	Apply Laplace transform techniques to solve ordinary differential equations which have an application in many engineering fields.	3	3											3		

118PHT03 **ENGINEERING PHYSICS**

L	T	P	C
2	0	0	2

Course objectives:

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

UNIT-I PROPERTIES OF MATTER **9**

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

UNIT-II ACOUSTICS AND ULTRASONICS **9**

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

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

UNIT-III QUANTUM PHYSICS **9**

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

UNIT-IV LASER **9**

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

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

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

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

TOTAL HOURS: 45 PERIODS

COURSE OUTCOMES:

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

CO1: To understand properties of solids with different types of moduli and to gain knowledge about absorption coefficients of solids and different surfaces.

CO2: To understand basic concepts of high frequency sound waves and its applications.

CO3: To understand basic concepts of quantum mechanical behavior of wave and particle along with applications.

CO4: To understand the concepts of production of laser and its behavior with diffraction principle of interference.

CO5: To apply the concept of polarization phenomenon and thereby its applications in fiber optic communication.

Text Books:

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

Books for reference:

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

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
Co1	To understand properties of solids with different types of moduli and to gain knowledge about absorption coefficients of solids and different surfaces.	3	2	1	3									3		1
Co2	To understand basic concepts of high frequency sound waves and its applications.	3	2	1	3									3		1
Co3	To understand basic concepts of quantum mechanical behavior of wave and particle along with applications.	3	2		1									3		3
Co4	To understand the concepts of production of laser and its behavior with diffraction principle of interference.	3	2	2	2									3		2
Co5	To apply the concept of polarization phenomenon and thereby its applications in fiber optic communication.	3	2	1	1									3		2

118CYT04 **ENGINEERING CHEMISTRY**

L	T	P	C
3	0	0	3

OBJECTIVES:

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

UNIT I WATER AND ITS TREATMENT **9**

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

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

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

UNIT III CORROSION SCIENCE **9**

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

UNIT IV POLYMERS AND ITS PROCESSING **9**

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

UNIT V FUELS AND COMBUSTION **9**

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

TOTAL HOURS: 45 PERIODS

COURSE OUTCOMES:

At the end of the course, the student 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.

REFERENCES:

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

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
Co1	Attribute the internal and external treatment methods for the removal of hardness in water for domestic and industrial applications.	3			2	2					1			3	2	3
Co2	Construct an electrochemical cell and Identify the components and processes in batteries and infer the selection criteria for commercial battery systems with respect to different applications.	3				2								3	2	3
Co3	Utilize electrochemical data to formulate an electrochemical half-cell and cell reactions for corrosion control processes.	3	1											3	2	3
Co4	Differentiate the polymers used in day to day life based on its source, properties and applications.	3		1	1									3	2	3
Co5	Analyse the three types of fuels based on calorific value for selected application.	3				2					2			3	2	3

118PPT05 **PROBLEM SOLVING AND PYTHON PROGRAMMING**

L	T	P	C
3	0	0	3

OBJECTIVE(S):

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

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Prerequisite: Nil

UNIT I ALGORITHMIC PROBLEM SOLVING 9

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

UNIT II DATA, EXPRESSIONS, STATEMENTS 9

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

UNIT III CONTROL FLOW, FUNCTIONS 9

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

UNIT IV LISTS, TUPLES, DICTIONARIES 9

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

UNIT V FILES, MODULES, PACKAGES 9

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

TOTAL HOURS: 45 PERIODS

COURSE OUTCOMES:

Upon completion of the course, students will be able to

CO1: Develop algorithmic solutions to simple computational problems
CO2: Read, write, execute by hand simple Python programs.
CO3: Structure simple Python programs for solving problems.
CO4: Decompose a Python program into functions.
CO5: Represent compound data using Python lists, tuples, dictionaries and Read and write data from/to files in Python Programs.

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 and updated for Python 3.2, Network Theory Ltd., 2011.

REFERENCES:

1. John V Guttag, —Introduction to Computation and Programming Using Python'', Revised and expanded Edition, MIT Press, 2013
2. Robert Sedgewick, Kevin Wayne, Robert Dondero, —Introduction to Programming in Python: An Inter-Disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.
3. Timothy A. Budd, —Exploring Python‖, Mc-Graw Hill Education (India) Private Ltd., 2015.

4. Kenneth A. Lambert, —Fundamentals of Python: First Programs||, CENGAGE Learning, 2012.
5. Charles Dierbach, —Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS 01	PS 02	PS 03
Co1	Develop algorithmic solutions to simple computational problems		3													
Co2	Read, write, execute by hand simple Python programs.					2							2	2		
Co3	Structure simple Python programs for solving problems.			3											3	
Co4	Decompose a Python program into functions.		2			3					2		1			
Co5	Represent compound data using Python lists, tuples, dictionaries and Read and write data from/to files in Python Programs.		1	3		2										3

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

TOTAL HOURS: 45 PERIODS

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COURSE OUTCOMES:

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

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

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

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

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

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Understanding the moduli of elasticity by determining Young's modulus and Rigidity modulus of a beam and cylinder respectively.	3	3	3	3	3								3		3
CO2	Understanding the phenomenon of diffraction, dispersion and interference of light using optical component	3	3	3	3	3								3		3
CO3	Acquiring knowledge of viscosity by determining coefficient of viscosity of a liquid and measuring the parameters of ultrasound propagating through a liquid	3	3	3	3	3								3		3
CO4	Understanding the phenomenon of heat transfer through conductors and bad conductors by determining thermal conductivity.	3	3	3	3	3								3		3

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

OBJECTIVE(S):

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

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LIST OF PROGRAMS:

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

PLATFORM NEEDED

Python 3 interpreter for Windows/Linux

TOTAL HOURS: 45 PERIODS

COURSE OUTCOMES:

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

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

CO2: Implement Python programs with conditionals and loops.

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

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

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

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
Co1	Write, test, and debug simple Python programs.		2													
Co2	Implement Python programs with conditionals and loops.			2		2							1	2		
Co3	Develop Python programs step-wise by defining functions and calling them.			3	2										3	
Co4	Use Python lists, tuples, dictionaries for representing compound data.		2			3					2		1			
Co5	Read and write data from/to files in Python.		1	3		2										1

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118ESE01	BASIC CIVIL AND MECHANICAL ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVES:

1. To gain the knowledge on civil works like masonry, roofing, flooring and plastering.
2. To gain the knowledge on stress, strain of various building and foundations.
3. The students should familiar with foundry, welding and forging processes.
4. The students should familiar working principle of IC engines and its types.
5. To gain the knowledge about various energy recourses and refrigeration air condition systems.

A – CIVIL ENGINEERING

UNIT I SURVEYING AND CIVIL ENGINEERING MATERIALS 9

Surveying: Objects, types, classification, principles, measurements of distances, angles, leveling, determination of areas, illustrative examples. **Civil Engineering Materials:** Bricks, stones, sand, cement, concrete, steel sections.

UNIT II BUILDING COMPONENTS AND STRUCTURES 10

Foundations: Types, Bearing capacity, Requirement of good foundations. **Superstructure:** Brick masonry, stone masonry, beams, columns, lintels, roofing, flooring, plastering, Mechanics, Internal and external forces, Stress, Strain, Elasticity, Types of Bridges and Dams, Basics of Interior Design and Landscaping.

B – MECHANICAL ENGINEERING

UNIT III FOUNDRY WELDING AND FORGING 10

Foundry: Introduction - Patterns –materials. Types of pattern and pattern allowances. Molding sand, types and properties, Molding procedure. **Welding:** Definition and Classification, Gas welding, Oxy Acetylene welding, Types of flames, advantages and disadvantages of gas welding. Resistance welding - Classification, Spot welding and Seam welding. Soldering, Definition and Classification. Brazing – Definition and Classification. **Forging:** Types of Forging, Differences between Hot working and Cold working processes.

UNIT IV I C ENGINES& BOILERS 8

Internal combustion engines, Working principle of Petrol and Diesel Engines, Four stroke and Two stroke cycles, Comparison of four stroke and two stroke engines, Boilers: Introduction of boilers, classification, Lancashire boiler, Babcock and Wilcox boiler, list of boiler mountings and accessories and applications (no sketches).

UNIT V SOURCE OF ENERGY&REFRIGERATION 8

Sources of energy: Introduction, conventional and non-conventional sources of energy, examples, solar energy, hydro power plant. Introduction to refrigeration and air-conditioning, COP, properties of refrigerants and types of refrigerants, working principle of vapour compression & vapour absorption refrigeration system, Layout of typical domestic refrigerator, Window and Split type room Air conditioner.

TOTAL HOURS: 45 PERIODS

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COURSE OUTCOMES:

The students are able to understand

CO1: The usage of surveying and properties of construction materials.

CO2: The stress strain of various building and material such as substructure, road transport and bridge.

CO3: The concept of manufacturing methods encountered in engineering practice such as foundry, welding and forging processes.

CO4: The working of internal combustion engines and its types.

CO5: The concept of energy conservation in practical, power plant refrigeration air condition and its types.

TEXT BOOKS:

1. Ranganath G and Channankaiah, "Basic Engineering Civil & Mechanical", S.S.Publishers, 2014.
2. Shanmugam G and Palanichamy M S, "Basic Civil and Mechanical Engineering", Tata McGraw Hill Publishing Co., New Delhi, 3rd Edition, 2012.

REFERENCE BOOKS:

1. Venugopal.K and PrabhuRaja.V, "Basic Mechanical Engineering", Anuradha Publishers, Kumbakonam, 2015.
2. Ramamrutham. S, "Basic Civil Engineering", Dhanpat Rai Publishing Co. (P) Ltd, 3rd Edition reprint, 2013.
3. Shanmugasundaram. S and Mylsamy. K, "Basics of Civil and Mechanical Engineering", Cenage Learning India Pvt.Ltd, NewDelhi, 2012.
4. Khanna O.P, Foundry Technology, Dhanpat Rai Publishing Co. (P) Ltd, 2011.
5. Shanmugam G., "Basic Mechanical Engineering", Tata McGraw Hill Publishing Co., New Delhi, 2010.
6. Gopalakrishna K R, "Elements of Mechanical Engineering", Subhas Publications, Bangalore, 2008.
7. Shantha Kumar S R J, "Basic Mechanical Engineering", Hi-Tech Publications, Mayiladuthurai, 2001.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
Co1	The usage of surveying and properties of construction materials.													2		
Co2	The stress strain of various building and material such as substructure, road transport and bridge.		2							1	2				2	
Co3	he concept of manufacturing methods encountered in engineering practice such as foundry, welding and forging processes.	2										3			3	
Co4	The working of internal combustion engines and its types.		3					2		1				2		
Co5	The concept of energy conservation in practical, power plant refrigeration air condition and its types.		2											1	3	1

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118ESE05	BASIC MECHANICAL ELECTRICAL AND INSTRUMENTATION ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVES:

1. The students should familiar with foundry and welding processes.
2. The students should familiar with working principle of IC engines and to gain the knowledge about various energy resources, refrigeration and air conditioning systems.
3. To learn the basics of electrical elements.
4. To introduce the fundamental concepts of DC and AC circuits.
5. To understand the principles of measurement systems and transducers

PART-A (MECHANICAL)

UNIT – I INTRODUCTION TO FOUNDRY AND WELDING 8

Foundry: Introduction - Patterns –materials. Types of pattern and pattern allowances. Molding sand, types and properties, Molding procedure. Welding: Definition and Classification, Gas welding, Oxy Acetylene welding, Types of flames, advantages and disadvantages of gas welding. Resistance welding - Classification, Spot welding and Seam welding. Soldering - Definition and Classification. Brazing – Definition and Classification.

UNIT - II I C ENGINES, SOURCE OF ENERGY & REFRIGERATION 10

Internal combustion engines, Working principle of Petrol and Diesel Engines, Four stroke and Two stroke cycles, Comparison of four stroke and two stroke engines.

Sources of energy: Introduction, conventional and non-conventional sources of energy, examples, solar energy. Introduction to refrigeration and air-conditioning, COP, properties of refrigerants and types of refrigerants, working principle of vapour compression & vapour absorption refrigeration system, Layout of typical domestic refrigerator, Window and Split type room Air conditioner.

PART-B (ELECTRICAL & INSTRUMENTATION)

UNIT – III INTRODUCTION TO BASIC ELECTRICAL ELEMENTS 9

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

UNIT - IV FUNDAMENTALS OF DC AND AC CIRCUITS 9

DC Circuits: Sources of Electrical Energy - Independent and Dependent Source, Source Conversion - Star – Delta conversion- Mesh and Nodal Analysis.

AC Circuits: Generation of sinusoidal - voltage, average - RMS value, form factor and peak factor- Phasor diagrams of R, L, C, combination of R-L, R-C and R-L-C circuits

UNIT – V MEASUREMENT SYSTEMS AND TRANSDUCERS 9

Measurements-Significance of measurements-Methods of Measurement-Direct methods, indirect methods-Instrument and measurement systems-Mechanical, Electrical and Electronic instruments-Classification of instruments- characteristics of instruments and measurement systems-Errors-Type of Errors –Units and Standards. Moving coil and moving iron meters, Energy meter and watt meter. Transducers- RTD, Strain gauge, LVDT.

TOTAL HOURS: 45 PERIODS

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COURSE OUTCOMES:

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

CO1: Learn the concept of manufacturing methods encountered in engineering practice such as foundry and welding processes

CO2: Know the working of internal combustion engines and the concept of sources of energy, working principle of refrigeration and air conditioning

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: Understand the principles of measurement systems and transducers.

TEXT BOOKS:

1. Ranganath G and Channankaiah, "Basic Engineering Civil & Mechanical", S.S.Publishers, 2014.
2. Shanmugam G., "Basic Mechanical Engineering", Tata McGraw Hill Publishing Co., New Delhi, 2010.
3. Muthusubramanian R, Salivahanan S, "Basic Electrical and Electronics Engineering", Tata McGraw Hill Education Private Limited, 2010.
4. A.K.Sawhney,"A course in Electrical and Electronic Measurements and Instrumentation"Dhanpat Rai & Co,2016.

REFERENCE BOOKS:

1. Shanmugasundaram. S and Mylsamy. K, "Basics of Civil and Mechanical Engineering", Cenage Learning India Pvt.Ltd, NewDelhi, 2012.
2. Shanmugam G and Palanichamy M S, "Basic Civil and Mechanical Engineering", Tata McGraw Hill Publishing Co., New Delhi, 3rd Edition, 2012.
3. Venugopal.K and PrabhuRaja.V, "Basic Mechanical Engineering", Anuradha Publishers, Kumbakonam, 2015.
4. B.L.Theraja, A.K.Theraja, "A Text Book of Electrical Technology, Volume I ", S.Chand and company Ltd., 2006.

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Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
Co1	Learn the concept of manufacturing methods encountered in engineering practice such as foundry and welding processes													2		
Co2	Know the working of internal combustion engines and the concept of sources of energy, working principle of refrigeration and air conditioning		2							1	2				2	
Co3	Recognize the different combinations of circuit elements and solving the circuit by applying basic circuital laws.	2										3			3	
Co4	Acquire a good understanding of DC and AC circuits.		3					2		1				2		
Co5	Understand the principles of measurement systems and transducers.		2											1	3	1

118ESE06 **BASIC ELECTRICAL ELECTRONICS AND INSTRUMENTATION ENGINEERING** **L 3 T 0 P 0 C 3**

OBJECTIVES:

1. To learn the basics of electrical elements.
2. To introduce the fundamental concepts of DC and AC circuits.
3. To interpret the principle and characteristics of semiconductor devices.
4. To analyze the various logic gates and switching theory.
5. To understand the principles of measurement systems and transducers.

UNIT – I 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 - II FUNDAMENTALS OF DC AND AC CIRCUITS **9**

DC Circuits: Sources of Electrical Energy - Independent and Dependent Source, Source Conversion - Star –Delta conversion- Mesh and Nodal Analysis.

AC Circuits: Generation of sinusoidal - voltage, average - RMS value, form factor and peak factor- Phasor diagrams of R, L, C, combination of R-L, R-C and R-L-C circuits.

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UNIT – III SEMICONDUCTOR DEVICES AND APPLICATIONS 9

Characteristics of PN Junction Diode – Zener Effect – Zener Diode and its Characteristics – Half wave and Full wave Rectifiers – Voltage Regulation. Bipolar Junction Transistor – CB, CE, CC Configurations and Characteristics – Elementary Treatment of Small Signal Amplifier.

UNIT – IV DIGITAL ELECTRONICS 9

Binary Number System – Logic Gates – Boolean Algebra – Half and Full Adders – Flip-Flops – Registers and Counters – A/D and D/A Conversion (single concepts).

UNIT – V MEASUREMENT SYSTEMS AND TRANSDUCERS 9

Measurements-Significance of Measurements-Methods of Measurement-Direct methods, indirect methods-Instrument and measurement systems-Mechanical, Electrical and Electronic instruments-Classification of instruments- characteristics of instruments and measurement systems-Errors-Type of Errors –Units and Standards. Moving coil and moving iron meters, Energy meter and watt meter. Transducers- RTD, Strain gauge, LVDT.

TOTAL HOURS: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Recognize the different combinations of circuit elements and solving the circuit by applying basic circuital laws.

CO2: Acquire a good understanding of DC and AC circuits.

CO3: Demonstrate the characteristics of semiconductor devices.

CO4: Design the various logic gates for switching applications.

CO5: Understand the principles of measurement systems and transducers.

TEXT BOOKS:

1. Muthusubramanian R, Salivahanan S, "Basic Electrical and Electronics Engineering", Tata McGraw Hill Education Private Limited, 2010.
2. M. Morris Mano, Digital Design, 3rd Edition, Prentice Hall of India Pvt. Ltd., 2003 / Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003.
3. Robert L. Boylestad and Louis Nashelsky, Electronic Devices and Circuit Theory, 9thEdition, Pearson Education / PHI, 2007.
4. A.K.Sawhney, "A course in Electrical and Electronic Measurements and Instrumentation" DhanpatRai & Co, 2016.

REFERENCE BOOKS:

1. B.L.Theraja, A.K.Theraja, "A Text Book of Electrical Technology, Volume I ", S.Chand and company Ltd., 2006.

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Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
Co1	Recognize the different combinations of circuit elements and solving the circuit by applying basic circuital laws.													2		
Co2	Acquire a good understanding of DC and AC circuits.		2							1	2				2	
Co3	Demonstrate the characteristics of semiconductor devices.	2										3			3	
Co4	Design the various logic gates for switching applications.		3					2		1				2		
Co5	Understand the principles of measurement systems and transducers.		2											1		1

118ESE07 **BIOLOGY FOR ENGINEERS** **L T P C**
3 0 0 3

COURSE OBJECTIVES

1. To familiarize the basic organization of organisms and subsequent building to a living being
2. To provide knowledge about biological problems that require engineering expertise to solve them
3. To understand the concepts of enzymes and its industrial applications
4. To impart an understanding about the machinery of the cell functions that is ultimately responsible for various daily activities.
5. To know about the nervous system, immune system and cell signaling

UNIT I BASIC CELL BIOLOGY **9**

Introduction: Methods of Science-Living Organisms: Cells and Cell theory Cell Structure and Function, Genetic information, protein synthesis, and protein structure, transcription, translation, Cell metabolism-Homoeostasis-Cell growth, reproduction, and differentiation

UNIT II BIOCHEMISTRY AND MOLECULAR ASPECTS OF LIFE **9**

Biological Diversity --Chemistry of life: chemical bonds--Biochemistry and Human biology--Protein synthesis- Protein Folding- Bioinformatics- Disease detection – PCR and electrophoresis- clone and DNA sequencing -Stem cells and Tissue engineering

UNIT III ENZYMES AND INDUSTRIAL APPLICATIONS **9**

Enzymes: Biological catalysts, Proteases, Carbonic anhydrase, Restriction enzymes, and Nucleoside monophosphate kinases – Photosynthesis, DNA replication, protein synthesis

UNIT IV MECHANOCHEMISTRY **9**

Molecular Machines/Motors – Cytoskeleton – Bioremediation- phytoremediation, mycoremediation – Biosensors-Principle, Immobilization of biological components, Molecular recognition –Biological recognition agents, Application of Biosensors-Biosensors for Clinical Chemistry.

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UNIT V NERVOUS SYSTEM, IMMUNE SYSTEM AND CELL SIGNALING 9

Nervous system- central Nervous system, Peripheral, Nervous system. Immune system- innate immune system, Adaptive immune system, Neuroimmune system - General principles of cell signaling- classification, Signal Pathway

TOTAL HOURS: 45 PERIODS

COOURSE OUTCOMES:

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

CO1: To familiarize the basic organization of organisms and subsequent building to a living being

CO2: To provide knowledge about biological problems that require engineering expertise to solve Them.

CO3: To understand the concepts of enzymes and its industrial applications

CO4: To impart an understanding about the machinery of the cell functions that is ultimately responsible for various daily activities.

CO5: To know about the nervous system, immune system and cell signaling

TEXT BOOK

1. ThyagaRajan S, Selvamurugan N, Rajesh M. P, Nazeer, Richard Thilagaraj R.A, Barathi. W.S and. Jaganthan. M. K "Biology for Engineers," Tata McGraw-Hill, New Delhi, 2012.

REFERENCES

1. Jeremy M, Berg John.L, Tymoczko and Lubert Stryer, "Biochemistry," W.H. Freeman and Co. Ltd., 6th Ed., 2006.
2. Robert Weaver, "Molecular Biology," MCGraw-Hill, 5th Edition, 2012.
3. Jon Cooper, "Biosensors A Practical Approach" Bellwether Books, 2004.
4. Martin Alexander, "Biodegradation and Bioremediation," Academic Press,1994.
5. Kenneth Murphy, "Janeway's Immunobiology," Garland Science; 8th edition, 2011.
6. Eric. R, Kandel, James.H, Schwartz, Thomas. M, Jessell, "Principles of Neural Science", Mc-Graw Hill, 5th Edition, 2012.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
Co1	To familiarize the basic organization of organisms and subsequent building to a living being		1								2					
Co2	To provide knowledge about biological problems that require engineering expertise to solve them						1	2				2		2		
Co3	To understand the concepts of enzymes and its industrial applications								3			3	2			
Co4	To impart an understanding about the machinery of the cell functions that is ultimately responsible for various daily activities.				2		1				2			3		
Co5	To know about the nervous system, immune system and cell signaling						3				1			2		1

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

OBJECTIVE(S):

The Course prepares first semester Engineering and Technology students:

- To help learners develop their listening skills which will enable them listen to lecturesand 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 technologystudents.
- To help learners develop grammar and vocabulary of a general kind by developing theirreading skills

UNIT I **09**

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

UNIT II **09**

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

UNIT III **09**

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

UNIT IV **09**

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

UNIT V **09**

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

TOTAL HOURS:45 PERIODS

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

CO1: Comprehend conversations and talks delivered in English.

CO2: CO1: 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.

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TEXT BOOKS:

1. Board of Editors. Using English A Coursebook for Undergarduate Engineers andTechnologists. 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.

REFERENCES

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. CengageLearning, USA: 2007.
5. Redston, Chris & Gillies Cunningham. Face2Face (Pre-intermediate Student's Book &Workbook). Cambridge University Press, New Delhi: 2005.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
Co1	Comprehend conversations and talks delivered in English.				1					2	3	1		1		
Co2	Participate effectively in formal and informal conversations; introduce themselves and their friends and express opinions in English.									1	3	1				
Co3	Read short stories, magazines, novels and other printed texts of a general kind.									1	1	1				
Co4	Write short paragraphs, essays, letters and develop hints in English.									1	3					1

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.

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- To grasp the basics of complex integration and application to contour integration which is important for evaluation of certain integrals encountered in engineering problems.

UNIT-I INTEGRAL CALCULUS 12

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

UNIT-II MULTIPLE INTEGRALS 12

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

UNIT-III VECTOR CALCULUS 12

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

UNIT-IV ANALYTIC FUNCTIONS 12

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

UNIT-V COMPLEX INTEGRATION 12

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

TOTAL HOURS: 60 PERIODS

COURSE OUTCOMES:

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

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

TEXT BOOK

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

REFERENCE BOOKS

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

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Course Outcome		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Apply the basic integration concepts and solve problems.	3	2											3	3	2
CO2	Determine the area and volume in 2-dimension and 3-dimension respectively using multiple integrals.	3	3											3	3	3
CO3	Expertise the concept of vector calculus and apply in core subjects.	3	3											3	3	3
CO4	Construct the analytic functions and conformal transformations of complex functions.	3	2											3	3	2
CO5	Evaluate the integrals using complex integration.	3	3											3	3	3

218GET03 ENVIRONMENTAL SCIENCE AND ENGINEERING

L	T	P	C
2	0	0	2

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 ECOSYSTEMSANDBIODIVERSITY 8

Concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers –energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India – value of biodiversity: consumptive use, productive

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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.

UNITV 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:

At the end of the course the student 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 ', 2ndedition, Pearson Education, 2004.
3. Dr. G. Ranganath, Environmental Science and Engineering, Sahana Publishers, 2018edition.

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REFERENCES:

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

Course Outcome		PSO1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Environmental Pollution or problems cannot be solved by mere laws. Public participationis an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course.	3			2	2		3			1			3	2	
CO2	Public awareness of environmental is at infant stage.	3				2		3						3	2	
CO3	Ignorance and incomplete knowledge has led to misconceptions	3	1					3						3	2	
CO4	Development and improvement in std. of living has led to serious environmentaldisasters	3		1	1			3						3	2	

218EGT04 **ENGINEERING GRAPHICS** **L T P C 2 0 4 3**

OBJECTIVES:

1. To understand the graphical skills for drawing the object and the principle of free-hand sketchingtechniques.
2. To understand the principle of orthographic projection of points, lines and plane surfaces.
3. To study the principle of simple solids.
4. To understand the principle of section and development of solids.
5. 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 andspecifications – 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.

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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 andtrue 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 onereference 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, truncatedprisms, pyramids, cylinders and cones.

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

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

The student will be able to

CO1: Recognize the conventions and apply dimensioning concepts while drafting simple objects.

CO2: Draw the orthographic projection of points, line, and plane surfaces.

CO3: Draw the orthographic projection of simple solids.

CO4: Draw the section of solid drawings and development of surfaces of the given objects.

CO5: apply the concepts of isometric and perspective projection in engineering practice.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Dhananjay A.Jolhe, “Engineering Drawing with an introduction to AutoCAD” Tata McGraw HillPublishing 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.

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Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
Co1	Recognize the conventions and apply dimensioning concepts while drafting simple objects.		2		1								1	1		1
Co2	Draw the orthographic projection of points, line, and plane surfaces.	2	1		1								1		2	
Co3	Draw the orthographic projection of simple solids.	2	2		2								1		3	
Co4	Draw the section of solid drawings and development of surfaces of the given objects.		1		2								2			2
Co5	Apply the concepts of isometric and perspective projection in engineering practice.	1	1	1							2					1

218CPT05 **PROGRAMMING IN C** **L T P C**
3 0 0 3

OBJECTIVE(S):

- 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-Preprocessor 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 Constant - Pointer Operators - Pointers Arithmetic - **Pointer to an array: Pointers and one dimensional array -Pointers and Multi-Dimensional array - Pointer to Pointer - Void Pointer – Null Pointer - Pointer to Function - Pointer and Strings** - Dynamic memory allocation.

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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 HOURS:45 PERIODS

COURSE OUTCOMES:

At the end of the course, the student should 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-Hill Publishing Company Limited, 2008.

REFERENCE BOOKS:

1. Pradip Dey, Manas Ghoush, -"Programming in C", Oxford University Press, 2012.
2. Byron Gottfried, - "Programming with C", 2nd Edition, (Indian Adapted Edition), TMH Publications, 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 Education Inc., 2005.
5. Behrouz A.Forouzan and Richard.F.Gilberg, - "Computer Science A Structured Programming Approach using C" 3rd Edition, Cengage Publications, 2013

Course Outcome		PSO1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Co1	Develop simple applications in C basics		3	3	3								3	3		3
Co2	Design and implement applications using arrays and strings		2	3	2	2							2	3	3	3
Co3	Develop and implement applications in C using functions and structures.		2	3	2								2	3	3	3
Co4	Develop applications in C using pointers.		2	3	2	3					2		2	3		3
Co5	Design applications using sequential and random access file processing.		1	3	3	2							3	3	2	3

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218BSE09	PHYSICS FOR INFORMATION SCIENCE	L	T	P	C
		2	0	0	2

OBJECTIVES:

1. To study the basic theory of structure of crystalline materials.
2. To understand the essential principles of electrical properties of materials.
3. To get the better knowledge of Physics of semiconductor materials.
4. Become proficient in optical properties of materials.
5. To understand the essential concepts of quantum structures and their applications

UNIT I CRYSTALLOGRAPHY 9

Crystal structures- Parameters- Bravais lattice - Calculation of number of atoms per unit cell - Atomic radius - Coordination number - Packing factor for SC, BCC, FCC, HCP and Diamond cubic structure - NaCl, ZnS structures (qualitative). Miller indices- unit cell approach.

UNIT II ELECTRICAL PROPERTIES OF MATERIALS 9

Classical free electron theory-Expression for electrical conductivity-Thermal conductivity, Expression-Wiedemann-Franz law-Success and failures-Quantum free electron theory-Particle ina finite potential well-Tunneling-Particle in a three dimensional box-degenerate States-Fermi-Dirac statistics-Density of energy states-Energy bands in solids.

UNIT III SEMICONDUCTORS AND TRANSPORT PHYSICS 9

Intrinsic Semiconductors-Energy band diagram-direct and indirect band gap semiconductors - Carrier concentration in intrinsic semiconductors-extrinsic semiconductors-Carrier concentration in N-type & P-type semiconductors (qualitative) -Variation of carrier concentration with temperature -Hall effect and devices-Ohmic contacts-Schottky diode.

UNIT IV OPTICAL PROPERTIES OF MATERIALS 9

Classification of optical materials - Absorption emission and scattering of light in metals, insulators and semiconductors (concepts only) – photo current in a P-N diode – solar cell – LED –Organic LED – Laser diodes – Optical data storage techniques.

UNIT V QUANTUM DEVICES 9

Particle in a rectangular box and sphere: wave function and energy- quantum confinement-quantum structures- tunneling – single electron phenomena- single electron translator states-classical bits- multiple quits-block sphere- quantum gates-advantage of quantum computation.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

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

CO1: Have the necessary understanding on the functioning of crystalline in solids of materials.

CO2: Gain knowledge on classical and quantum electron theories, and energy band structures,

CO3: Acquire knowledge on basics of semiconductor physics and its applications in various devices,

CO4: Have the necessary understanding on the functioning of optical materials for optoelectronics,

CO5: Understand the basics of quantum structures and their applications.

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TEXT BOOKS:

1. Jasprit Singh, —Semiconductor Devices: Basic Principles‖, Wiley 2012.
2. Kasap, S.O. —Principles of Electronic Materials and Devices‖, McGraw-Hill Education,2007.
3. Kittel, C. —Introduction to Solid State Physics‖. Wiley, 2005.

REFERENCES:

1. Garcia, N. & Damask, A. —Physics for Computer Science Students‖. Springer-Verlag,2012.
2. Hanson, G.W. —Fundamentals of Nanoelectronics‖. Pearson Education, 2009.
3. Rogers, B., Adams, J. & Pennathur, S. —Nanotechnology: Understanding Small Systems‖.CRC Press, 2014.

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

218CYP07 **ENGINEERING CHEMISTRY LABORATORY** **L T P C**
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OBJECTIVES:

Students will be conversant with the estimation of various compounds using volumetric andinstrumental 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)

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8. Conduct metric titration (Simple acid base)
9. Conduct metric titration (Mixture of weak and strong acids)
10. Conduct metric titration using BaCl2vs Na2 SO4
11. Potentiometric Titration (Fe^{2+} / KMnO4 or K2Cr2O7)
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:

At the end of the course, the students will 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 their skills in the field of engineering.

CO3: Understand the principle and handling of electrochemical instruments and Spectrophotometer.

CO4: Apply their knowledge for protection of different metals from corrosion by using different inhibitors

REFERENCE(S):

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

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

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218EPP08	ENGINEERING PRACTICE LABORATORY	L	T	P	C
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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 EXPERIMENTSWELDING:

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-JointDEMONSTRATION ON:

ELECTRICAL ENGINEERING PRACTICE

Study of Electrical components and equipment's

Residential house wiring using switches, fuse, indicator, lamp and energy meter.**ELECTRONICS ENGINEERING PRACTICE**

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

Soldering practice –components soldering in simple electric circuit & testing continuity**COMPUTER HARDWARE AND SOFTWARE PRACTICE**

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

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

The students will be able to

CO1: Prepare simple Lap, Butt and T- joints using arc welding equipment's.

CO2: Prepare the rectangular trays and funnels by conducting sheet metal operation.

CO3: Prepare the pipe connections and identify the various components used in plumbing.

CO4: Prepare simple wooden joints using wood working tools.

CO5: Demonstrate basic electrical, electronic and computer components based on their physicalparameters and dimensions.

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TEXT BOOKS:

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

REFERENCE BOOKS:

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

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
Co1	Prepare simple Lap, Butt and T- joints using arc welding equipment.	3								3	3			3	3	3
Co2	Prepare the rectangular trays and funnels by conducting sheet metal operation.	2	2							2	3	3		2	3	3
Co3	Prepare the pipe connections and identify the various components used in plumbing.	2								2	3	3		2	3	3
Co4	Prepare simple wooden joints using wood working tools.	2	3					2		2	3			2	3	3
Co5	Demonstrate basic electrical, electronic and computer components based on their physical parameters and dimensions.	3	2							3	3	2		1	3	3

218CPP08	**PROGRAMMING IN C LABORATORY**	**L**	**T**	**P**	**C**
		0	**0**	**2**	**1**

OBJECTIVE(S):

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

Prerequisite: Programming in C

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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. Programs for scientific and statistical problem.
6. Programs using string functions
7. Programs using user defined functions.
8. Programs using Recursion and call by value and call by reference
9. Program to sort the list of numbers using pass by reference.
10. Programs using structures and Union.
11. Program using structures and pointers.
12. Program using i) Sequential access file.
    ii) Random access file.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

At the end 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: Develop C programs involving functions, recursion, pointers, and structures.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
Co1	Write and compile programs using C-Language.	3	3							3	3			3	3	3
Co2	Develop programs in C for any computing problems	3	3							3	3			3	3	3
Co3	Implement program using control statements.	3	3							3				3	2	
Co4	Handle arrays and strings.	3	3					2		3				2	1	
Co5	Develop C programs involving functions, recursion, pointers, and structures.	3	2							3	3			2	3	3

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318MAT01 **ENGINEERING MATHEMATICS – III**

L	T	P	C
3	1	0	4

OBJECTIVE(S):

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

UNIT-I PARTIAL DIFFERENTIAL EQUATIONS 9+3

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

UNIT-II FOURIER SERIES 9+3

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

UNIT-III BOUNDARY VALUE PROBLEMS 9+3

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

UNIT-IV FOURIER TRANSFORM 9+3

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

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.

. **L: 45 + T: 15 TOTAL HOURS:60 PERIODS**

COURSE OUTCOMES:

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

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

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

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

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

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

TEXT BOOK:

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

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REFERENCE BOOKS:

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.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Know the methods to solve partial differential equations occurring in various physical and engineering problems	3	1		2								3			
CO2	Describe an oscillating function which appear in a variety of physical problems by Fourier series helps them to understand its basic nature deeply		3				2									
CO3	Acquire the knowledge to construct partial differential equations with initial and boundary conditions for various physical and engineering real time problems and obtaining solution using Fourier series methods	3		3	1											
CO4	Understand the effect of Fourier transform techniques and their applications						3								3	
CO5	Gain the concept of analysis of linear discrete system using Z-transform approach	2												3		

318CIT02 **DIGITAL ELECTRONICS**

L	T	P	C
3	0	0	3

OBJECTIVE(S):

- 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.

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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 demultiplexers – 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 HOURS:45 PERIODS**

COURSE OUTCOMES:

At the end of the course the students are 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.

CO5: Knowledge in VHDL for VLSI Design.

TEXT BOOK:

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

REFERENCE BOOKS:

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

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Solve the Postulates of Boolean algebra using different techniques	3		2										1		
CO2	Design the Combinational and sequential circuits		2	3											2	
CO3	Apply the concept of synchronous and asynchronous circuit	3	3			3									3	
CO4	Summarize the concept of memories and programmable logic devices.		2				2									
CO5	Knowledge in VHDL for VLSI Design.	3		2	3											

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318ITT03	COMMUNICATION ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVE(S):

- Understand the various modulation and demodulation schemes for Amplitude and Angle Modulation.
- Infer the basic concepts of Digital Communication systems in baseband signals.
- Summarize the design concepts and performance of sampling and pulse modulation techniques.
- Acquire knowledge about spread spectrum and multiple access techniques.
- Learn about the fundamental concepts in Satellite and Optical communication.

PREREQUISITES: Nil

UNIT-I FUNDAMENTALS OF ANALOG COMMUNICATION 9

Need for Modulation-Principles of amplitude modulation, AM envelope, frequency spectrum and bandwidth, modulation index and percentage modulation , AM power distribution, Angle modulation - FM and PM waveforms, phase deviation and modulation index, frequency deviation and percent modulation.

UNIT-II DIGITAL COMMUNICATION 9

Introduction- sampling theorem- digital modulation schemes-ASK-FSK-BPSK-QPSK-DPSK,bit rate and baud rate calculations, Quadrature Amplitude Modulation.

UNIT-III DIGITAL TRANSMISSION 9

Introduction- Pulse modulation schemes- PAM-PWM-PPM-PCM –delta modulation, adaptive delta modulation, differential pulse code modulation- pulse transmission – Inter symbol interference, eye patterns.

UNIT-IV SPREAD SPECTRUM AND MULTIPLE ACCESS TECHNIQUES 9

Introduction, PN sequences – properties – m-sequence –DSSS –Processing gain, jamming – FHSS – Multiple Access – FDMA, TDMA, CDMA.

UNIT-V SATELLITE AND OPTICAL COMMUNICATION 9

Introduction-Satellite Communication Systems-Kepler's Law, LEO and GEO Orbits, Link model-Optical Communication Systems-Elements of Optical Fiber Transmission link, Fiber Types, Losses, Optical Sources and Detectors.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

At the end of the course the students are able to

CO1: Analyze the different modulation and demodulation schemes

CO2: Apply the basic concepts of different Digital Communication Techniques.

CO3: Channelize the design concepts and performance of sampling and pulse modulation techniques.

CO4: Interpret the knowledge about spread spectrum and multiple access techniques

CO5: Gain knowledge on Satellite and Optical communication.

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TEXT BOOK:

1. Wayne Tomasi, "Advanced Electronic Communication Systems", 6/e, Pearson Education,2007.
2. Simon Haykin, "Communication Systems", 4th Edition, John Wiley & Sons., 2001.

REFERENCE BOOKS:

1. H.Taub,D L Schilling ,G Saha ,"Principles of Communication"3/e,2007.
2. B.P.Lathi,"Modern Analog And Digital Communication systems", 3/e, Oxford University Press, 2007
3. Blake, "Electronic Communication Systems", Thomson Delmar Publications, 2002.
4. Martin S.Roden, "Analog and Digital Communication System", 3rd Edition, PHI, 2002.
5. Gerd Keiser, "Optical Fiber Communications", Tata McGraw-Hill Education, 4th Edition, 2008

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Analyze the different modulation and demodulation schemes	3	3												2	
CO2	Apply the basic concepts of different Digital communication Techniques.	2	3											3		
CO3	Channelize the design concepts and performance of sampling and pulse modulation techniques.			3												
CO4	Interpret the knowledge about spread spectrum and multiple access techniques	3			3											
CO5	Gain knowledge on Satellite and Optical communication.		2				1								2	2

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

OBJECTIVE(S):

- 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.

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UNIT-II CLASSES AND OBJECTS 9

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

UNIT-III POLYMORPHISM AND INHERITANCE 9

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

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

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

UNIT-V FILES AND EXCEPTION HANDLING 9

C++ streams – console streams – console stream classes - formatted and unformatted console I/O operations – Manipulators. File streams classes - File modes - File pointers and Manipulations - File I/O – Exception handling - Exception handling Model – List of Exceptions – catch all Exception –uncaught Exceptions – **User Defined Exceptions**.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

At the end of the course student should be able to

CO1: Describe the important concepts of Object Oriented Programming.

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

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

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Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Describe the important concepts of Object Oriented Programming.	3	3		3									3		
CO2	Identify the relationship between the classes and link them using appropriate concepts.	3	3	3	3									2	3	
CO3	Develop solutions for given problems using Polymorphism and Inheritance concepts to	2		3											3	1
CO4	solve real world problems.		2		3			2								
CO5	Devise generic classes capable of manipulating primitive and user defined data types.	2	3		3	3								2		

318CIT05 **DATA STRUCTURES** **L T P C**
3 0 0 3

OBJECTIVE(S):

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

PREREQUISITES: Programming in C

UNIT I LINEAR DATA STRUCTURES – LIST **6**

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

UNIT II LINEAR DATA STRUCTURES – STACKS AND QUEUES **9**

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

UNIT III NON LINEAR DATA STRUCTURES – TREES **10**

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

UNIT IV NON LINEAR DATA STRUCTURES -GRAPHS **10**

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

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UNITV SEARCHING, SORTING AND HASH TECHNIQUES **10**

Searching: Linear Search - Binary Search

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

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

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

CO1: Implement List ADT to solve real time problems.

CO2: Develop applications using Stack and Queues data structures.

CO3: Design and Implement applications on trees.

CO4: Implement graph data structure for solving problems.

CO5: Develop various Sorting, Searching and Hashing algorithms to small and large data sets.

TEXT BOOKS:

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

REFERENCE BOOKS:

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

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Implement List ADT to solve real time problems	3	3	3	2									3	2	
CO2	Develop applications using Stack and Queues data structures	3	3	2	2										3	
CO3	Design and Implement applications on trees		3	3										2		
CO4	Implement graph data structure for solving problems		2	3	3										3	
CO5	Develop various Sorting, Searching and Hashing algorithms to small and large data sets		3	3	2											3

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

OBJECTIVE(S):

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

Prerequisites: Nil

UNIT-I BASIC STRUCTURE OF COMPUTER SYSTEM 9

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

UNIT-II COMPUTER ARITHMETIC AND CONTROL UNIT 9

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

UNIT-III PIPELINING 9

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

UNIT-IV MEMORY & I/O ORGANIZATION 9

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

UNIT-V PARALLELISM 9

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

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

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

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

TEXT BOOKS:

1. Carl Hamacher, ZvonkoVranesic and SafwatZaky&NaraigManjikian-"Computer 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.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Understand basic operational concepts of computers, ALU and Instructions	3	3	2										3		
CO2	Know the computer arithmetic and control unit operations	2	3	3	2										3	
CO3	Comprehend and analyze the Pipelined Execution		3	3	3	2										
CO4	Know the various Memory Systems and I/O Organization	1	2		3										2	
CO5	Understand Parallelism and Multiprocessor architectures		2		3	3								2		

318CIP07 **DIGITAL ELECTRONICS LABORATORY**

L	T	P	C
0	0	2	1

OBJECTIVE(S):

- 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

PREREQUISITES: Nil

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.

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VHDL PROGRAMMING

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

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

At the end of the course the students are 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.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Apply Digital ICs for various applications.	3	3											3		
CO2	Analyze the various combinational circuits using logic gates.	2	3													
CO3	Implement various sequential circuits using logic gates	3	3	3											3	
CO4	Write VHDL code for various combinational circuits		3	3		2									3	
CO5	Write VHDL code for various sequential circuits					3										3

318ITP08 **OBJECT ORIENTED PROGRAMMING LABORATORY** **L T P C**
0 0 2 1

OBJECTIVE(S):

- To learn object oriented programming concepts using C++ to solve problem.
- To implement various concepts of OOP using C++.

LIST OF EXPERIMENTS:

Implement the following concept using C++

1. Simple C++ Control Structures and arrays.
2. Simple class, objects and array of objects.
3. Function Recursion and Inline function.
4. Constructors, Destructors.
5. Method and Operator Overloading

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6. Inheritance, Data conversions.
7. Friend function and Friend class.
8. Virtual function and virtual base class.
9. Templates (Function and Class) and **STL**
10. File operations and Exception handling

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

At the end of the course student should be able to

CO1: Implement class, object, and constructor concepts by using object oriented programming language.
CO2: Develop programs using inheritance and polymorphism.
CO3: Develop and implement overloading concepts & various functions.
CO4: Construct generic classes using templates & STL.
CO5: Implement various file concepts, exception handling by using object oriented concepts.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Implement class, object, and constructor concepts by using object oriented programming language	2	3	3	2									3		
CO2	Develop programs using inheritance and polymorphism		2	3	3										3	
CO3	Develop and implement overloading concepts & various functions	3	2	3	1											
CO4	Construct generic classes using templates & STL		3	2												
CO5	Implement various file concepts, exception handling by using object oriented concepts			3	3	3	1								3	2

318ITP09 **DATA STRUCTURES LABORATORY**

L	T	P	C
0	0	2	1

OBJECTIVE(S):

- Efficiently implement the different Linear Data Structures
- Learn and Expose Non-Linear Data Structures.
- Build knowledge on Application of Graph
- Learn to implement Searching, Sorting and hashing Algorithms.

PREREQUISITES: Programming in C

DATA STRUCTURE USING C / C++:

1. Linked List Implementation of Singly and Doubly Linked list.
2. Polynomial Operations (Addition)
3. Linked List Implementation of Stack and Queue.
4. Applications of Linked List and Stack
5. Tree Traversal algorithms.
6. Operation of Binary Search Tree.
7. Heaps using Priority Queue.
8. Graph Traversal algorithms.

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9. Applications of Graph (Dijkstra's, Prims, Kruskal)
10. Searching Algorithms
11. Sorting Algorithms. (Insertion, Quick, Merge)
12. Hashing techniques.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

At the end of the course the students are able to

CO1: Implement programs for manipulating List, Stack and Queue ADT with its Applications.
CO2: Perform various Tree Operations
CO3: Apply and implement Graph Data Structures for Real Time Applications.
CO4: Implement various Searching and Sorting Algorithms.
CO5: Implement Hashing Algorithms.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Implement programs for manipulating List, Stack and Queue ADT with its Applications.		3	3	3									3		3
CO2	Perform various Tree Operations		3	3		1									3	
CO3	Apply and implement Graph Data Structures for Real Time Applications.			2	3	2	2									
CO4	Implement various Searching and Sorting Algorithms.		2		2									2		
CO5	Implement Hashing Algorithms.		3	3		32							2			

418DMT01 **DISCRETE MATHEMATICS**

L	T	P	C
3	1	0	4

OBJECTIVE(S):

- 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.

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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 HOURS:60 PERIODS

COURSE OUTCOMES:

At the end of the course the student 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: internalize 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.

REFERENCE BOOKS:

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.

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Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Understand and demonstrate the applications of basic concepts of an algorithm and Counting principles in combinatorial mathematics.	3		3		3								3		3
CO2	Acquaint the graph theory concepts which serves as the base for the real time applications in network analysis.	3	3		3										3	
CO3	Expertise the knowledge of logics helps to verify the correctness of computer programs and to draw conclusions from scientific experiments.	3	3	2		3									3	3
CO4	Internalize the abstract algebraic structures which provides the ability to deal the theory of sequential machines, formal languages and syntactic analysis.	2	3	3												3
CO5	Imbibe the concept of Lattices and Boolean algebra.		3			3								3		

418CIT02 **DESIGN AND ANALYSIS OF ALGORITHM**

L	T	P	C
3	0	0	3

OBJECTIVE(S):

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

Pre-requisites: Data Structures and Algorithms

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

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

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

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

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

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

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UNIT-IV BACKTRACKING AND BRANCHAND BOUND 9

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

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

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

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

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

CO1: Design Algorithms for various Computing Problems.

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

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

CO4: Analyze back tracking and Branch and Bound algorithm

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Design Algorithms for various Computing Problems.	3		3		3								3		3
CO2	Design and analyze algorithm using Divide and Conquer, Greedy Techniques	3	3		3										3	
CO3	Solve and analyze problems using Dynamic programming and iterative improvement	3	3	2		3									3	3
CO4	**A**nalyze back tracking and Branch and Bound algorithm	2	3	3												3
CO5	Identify any Problem as belonging to the Class of P and NP.		3			3								3		

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

OBJECTIVE(S):

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

Pre-requisites: Object Oriented Programming

UNIT -I INTRODUCTION TO JAVA **9**

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

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

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

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

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

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

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

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

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

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

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

CO1: Develop Java Programs using OOPs Principles

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

CO3: Implement multithreading concepts in real time scenarios.

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

CO5: Understand the usage of Utility & Generic Classes.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Shirish Chavan, "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, TataMc GrawHill, 2014.
4. Paul Deitel, Harvey Deitel, "Java How to Program",10th Edition, Pearson Education, 2016.
5. Cay S. Horstmann, "Core Java: Volume I- Fundamentals", 10thEdition, Prentice Hall, 2015.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Develop Java Programs using OOPs Principles	3	3	3										3		
CO2	Create a real-world application by applying the user defined packages, interfaces.	3	2	3	3	3	3							3	3	
CO3	Implement multithreading concepts in real time scenarios.	3	1	3	2		2									
CO4	Design a GUI-based application using Applets &Swings.	3	3	3	3			3							3	3
CO5	Understand the usage of Utility & Generic Classes.	3	2	3	3	2										

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

OBJECTIVE(S):

- 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.

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** – System Programs – 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.

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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-IV STORAGE MANAGEMENT 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 HOURS:45 PERIODS

COURSE OUTCOMES:

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

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

CO2: Evaluate various **s**cheduling algorithms and methods of dead lock handling

CO3: Compare various memory management and paging techniques.

CO4: Illustrate disk management functionalities and file systems.

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

TEXT BOOK:

1. Silberschatz, Galvin, and Gagne, "Operating System Concepts", Ninth Edition, Wiley India Pvt. Ltd., 2013.
2.

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.

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Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Gain extensive knowledge and apply the concepts of process management	3	3	3		3								3		
CO2	Evaluate various scheduling algorithms and methods of dead lock handling	3	3	3	2	3									3	3
CO3	Compare various memory management and paging techniques.	2	3	2	3	2									3	
CO4	Illustrate disk management functionalities and file systems.	2	2		2	3										3
CO5	Be familiar with I/O systems access methods and protection mechanism.	1	3	2	3									3		

418ITT05 **DATABASE MANAGEMENT SYSTEMS** **L T P C**
3 0 0 3

OBJECTIVE(S):

- 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.

Pre-requisites: 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.**

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UNIT-V STORAGE STRUCTURES **11**

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

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

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

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

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

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

CO4: Apply concurrency control and recovery mechanism.

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

TEXT BOOKS:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", 7th Edition, 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. Ramez Elmasri, Shamkant B. Navathe, "Database Systems", 6th Edition, Pearson, 2014.
2. Raghu Ramakrishnan, J.Gehrke, "Database Management Systems", 3rd Edition, McGraw Hill, 2014.
3. Shio Kumar Singh, "Database Systems Concepts, Design and Applications", 2nd Edition, Pearson, 2011.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Gain and design extensive knowledge on various data models and ER diagram.	3	3	1										3		
CO2	Recognize and develop sophisticated queries and authorization techniques to extract information from database	3	3		3								3		3	
CO3	Analyze and eliminate all kind of dependency in a database schema via normalization . techniques.	3	3	2										3		
CO4	Apply concurrency control and recovery mechanism.	2	3	3											3	
CO5	Understand the internal storage structures using different file and indexing techniques & advanced database concepts	2	2	3												3

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

OBJECTIVE(S):

- 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 maintance measures

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 MobileApp Interface Design** - **Design Evaluation.**

UNIT-IV IMPLEMENTATION & TESTING 10

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

UNIT-V 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 HOURS:45 PERIODS

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COURSE OUTCOMES:

At the end of the course the students are able to

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

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

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

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

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

TEXT BOOKS

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

REFERENCE BOOKS:

1. Shari Lawrence Pfleeger 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.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Compare and analyze the various life cycle models of software process	2	3	3	3							3		3		3
CO2	Describe the process of requirement engineering and Feasibility Studies		3	3	3	3				3		3				3
CO3	Prepare Software Requirement document and build requirement model then design the methods for software architecture	3	3	3	3	2				3		3		3	3	3
CO4	Formulate various implementation and testing strategies in a system		3	3	2							2		2		3
CO5	Familiarize various measurements for a software system and Software maintenance									3		3				3

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

OBJECTIVE(S):

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

Pre-requisite: Object Oriented Programming

LIST OF EXPERIMENTS:

Solving Simple problems using

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

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

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

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

CO2: Create &access database connection and handling exceptions.

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

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

CO5: Understand the concept of collection classes

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Write a programs that use the fundamental program constructs, including packages & Interfaces.		3	3	3	3								3	3	3
CO2	Create &access database connection and handling exceptions.		2	3	1	3								3	3	3
CO3	Design a GUI-based event handling application using Applets &Swings.		3	3	2	2								3	3	3
CO4	Understand the I/O functionality to read & write in the files.		3	2	3									3	3	3
CO5	Understand the concept of collection classes		3	3	2										3	2

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

OBJECTIVE(S):

- Learn shell programming and the use of various system calls in the UNIX environment.
- Expose to process creation, scheduling and inter process communication.
- Be familiar with implementation of page replacement algorithms file allocations, 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, umount, link, unlink, mkdir, rmdir).
3. Write programs to implement Process management system calls of UNIX operating system (fork (), wait(), execlp(), exit(), signal(sig, handler), kill(sig, pid)).
4. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for CPU scheduling algorithms (preemptive and non preemptive). For each of the Scheduling policies, compute and print the average waiting time and average turnaround time.
5. Implementation of Inter Process Communication (using pipes/ shared memory/ message queues).
6. Implement the producer consumer problem using semaphores.
7. Implementation of deadlock avoidance & prevention algorithms.
8. Implementation of Memory management algorithms**.**
9. Implementation of page replacement algorithms.
10. Implementation of file allocation methods (linked/indexed/contiguous).
11. Implementation of disk scheduling algorithms.
12. Implementation of file organization techniques.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

At the end of the course student should be able to

CO1: Implement basic services and functionalities of operating system using system call.
CO2: Implement various CPU scheduling algorithm and inter process communication and Semaphores.
CO3: Simulate Producer Consumer problem for process synchronization
CO4: Implement memory management and file allocation techniques algorithms.
CO5: Illustrate disk scheduling algorithms.

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Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Implement basic services and functionalities of operating system using system call.	2	2	3	2	3								3		
CO2	Implement various CPU scheduling algorithm and inter process communication and Semaphores.	3	2	3	3	3									2	
CO3	Simulate Producer Consumer problem for process synchronization	3	2	3	3	2									3	
CO4	Implement memory management and file allocation techniques algorithms.	3	2	3		3									2	3
CO5	Implement memory management and file allocation techniques algorithms.	2	3	2		2								3		3

418ITP09 **DATABASE MANAGEMENT SYSTEMS LABORATORY** **L T P C**
0 0 2 1

OBJECTIVE(S):

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

Pre-requisites: NIL

LIST OF EXPERIMENTS:

1. Create table for any schema & perform following operations
   A. Add new fields, modify table & fields, remove any record & empty using DDL Commands
   B. Add new record, remove old record & update fields using DML Commands
   C. Apply following constraints: Check, Default, Null, Primary & Foreign key
2. Create tables for any schema & perform Undo, Redo operations, User permission using DCL Commands
3. Create any two tables & convert into normalized form using
   A. Nested Queries
   B. Join queries
   C. Set Operations
4. Implement SQL functions such as Date, Character, general, Aggregate & number functions, etc...
5. Create trigger for update & modify database.
6. Implement PL/SQL Programs with Embedded SQL form
   A. Control structures using Loop, if-else, While & for loop
   B. Procedures to update & reflect in related tables
   C. Using Functions
7. Create Horizontal view, Vertical view & perform following operations add, remove, join, check

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view updates

8. Design any simple program using VB / VC++.
9. Develop menu design for any schema using VB.
10. Display database details with oracle reports using manual & design wizard option.
11. Design & develop any schema with front-end tools using VB/VC++ with Database connection.
12. **Study on Mongo DB.**

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

At the end of the course student should 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: Design & develop an application using advanced databases.

CO5: Develop any application using VB/VC++

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Design and implement database schema for a given problem domain.	2	3	3	3	2								3		3
CO2	Populate and query a database using SQL operations.		3	2	3	2								3		3
CO3	Prepare reports.		2	3	3	3								2	3	2
CO4	Design & develop an application using advanced databases.	1	1	3	2	3									3	3
CO5	Develop any application using VB/VC++			1	2	2								3	2	3

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518PST01	PROBABILITY AND STATISTICS	L	T	P	C
		3	1	0	4

OBJECTIVE(S):

- 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 variable and to study the statistical measures.
- To introduce the notion of sampling distributions and have acquired knowledge of statistical techniques useful in making rational decision in management problems.
- To expose to statistical methods designed to contribute to the process of making scientific judgments in the face of uncertainty and variation.

UNIT I PROBABILITY AND RANDOM VARIABLE **9 + 3**

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

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 TESTING OF HYPOTHESIS **9 + 3**

Sampling distributions - Tests for single mean, Proportion, Difference of means (large and small samples) – Tests for single variance and equality of variances – Chi-square test for goodness of fit – Independence of attributes.

UNIT V DESIGN OF EXPERIMENTS **9 + 3**

Analysis of variance – Completely Randomized Design (CRD) -one way classification – Randomized Block Design (RBD) -two way classification - Latin Square Design (LSD) – Factorial Designs- 2^2 Factorial designs- Control charts for measurements - $\bar{x}$ chart, R-chart, *p* - chart and *np* – chart.

TOTAL HOURS:60 PERIODS

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

COURSE OUTCOMES

CO 1: Imbibing the knowledge of basic probability improves the quality of interpretation and decision making in real time problems of uncertainty.

CO 2: Understanding the real time application of probability distributions.

CO 3: Learning the concept of two dimensional random variables helps to understand and analyse the Statistical measures which describe an outcome of a random experiment.

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CO 4: Drawing inference & decision making through hypothesis testing.
CO 5: Acquainting the knowledge of analysis of variance and control limits.

TEXT BOOKS

1. Miller and Freund., "Probability and Statistics for Engineers", Pearson Education, Asia, 7th edition, 2012.

REFERENCES

1. Spiegel, M.R, Schiller, J and Alu Srinivasan, R, "Schaum's Outlines Probability and Statistics", Tata McGraw-Hill Publishing Company Ltd. New Delhi , 2010.
2. Gupta.S.C., & Kapoor,V.K., "Fundamentals of mathematical statistics", 11th edition, Sultan Chand & Sons publishers, New Delhi, 2013.
3. Ibe, O.C.,"Fundamentals of Applied Probability and Random Processes", Elsevier, U.P., 1st Indian Reprint, 2007.
4. Veerarajan.T., "Probability, Statistics and Random Processes", Tata McGraw-Hill publishing company Limited, New Delhi, 2014.
5. Kandasamy.P,Thilagavathy,K.,&Gunavathi.K., "Probability, Statistics and Queueing Theory"., S.Chand & Company Ltd., New Delhi, 2014.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
Co1	Imbibing the knowledge of basic probability improves the quality of interpretation and decision making in real time problems of uncertainty	3	2	3	3	3							3	3	2	
Co2	Understanding the real time application of probability distributions.	3	3	2	3	3							3		3	3
Co3	Learning the concept of two dimensional random variables helps to understand and analyse the Statistical measures which describe an outcome of a random experiment.	3	3	3	1	3								2	3	3
Co4	Drawing inference & decision making through hypothesis testing.	3	2	2	3	3							3			3
Co5	Acquainting the knowledge of analysis of variance and control limits.	3		3	2								3	2		3

518CIT02 **MICROPROCESSORS AND MICROCONTROLLERS**

L	T	P	C
3	0	0	3

OBJECTIVE(S):

- Summarize the architecture and assembly language programming of microprocessors

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- 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 processor

UNIT I 8086 MICROPROCESSOR

9

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

UNIT II MEMORY AND I/O INTERFACING

9

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

UNIT III 8051 MICROCONTROLLERS

9

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

UNIT IV INTERFACING WITH 8051

9

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

UNIT V MICROPROCESSOR TECHNOLOGY

9

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

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES

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 processor.

Text Books

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

2 Kenneth J. Ayala, 'The 8051 microcontroller Architecture, Programming and applications' second edition , Penram international.

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

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

Reference Books

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

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

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

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Recognize the basic Microprocessor architecture and its concepts.	3	2	3	3		2							3		
CO2	Outline the concepts of peripheral interfacing mechanisms.	2	3	2	3		3							2		3
CO3	Design various assembly language programming using microprocessors and microcontroller.	3	3	2											3	
CO4	Extend the real world interfacing with microcontroller	3	3	3		3	3								3	
CO5	Extrapolate the architectural features of 801XX with 8086 processor.				2											3

518ITT03 **COMPUTER NETWORKS**

L	T	P	C
3	0	0	3

OBJECTIVES:

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

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- 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 – PC cards.

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 IV TRANSPORT LAYER 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 APPLICATION LAYER 8

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

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

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

CO1: Understand the basic layers and its functions in computer networks

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CO2: Explore various flow and error control protocols in data link layer.

CO3: Understand and evaluate the performance of various routing algorithms.

CO4: Analyze flow control and congestion control algorithm for QoS at end to end level.

CO5: Explore the features and working of various application layer protocols.

TEXT BOOK:

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

REFERENCE BOOKS:

1. Andrew S. Tanenbaum, "Computer Networks", Fifth Edition PHI Learning, NewDelhi, 2016.
2. William Stallings, "Data and Computer Communication", Tenth Edition, Pearson Education, New Delhi 2014.
3. Alberto Leon Garcia and Indra Widjaja, "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 Delhi 2012.
5. Larry L.Peterson and Peter S. Davie, "Computer Networks", Fifth Edition Harcourt Asia Pvt. Ltd.,USA, 2011.
6. Prakash C Gupta, "Data Communications and Computer Networks", Second Edition, PHI Learning Pvt. Ltd., New Delhi, 2009.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
Co1	Understand the basic layers and its functions in computer networks.	3	3	3	3									3		
Co2	Explore various flow and error control protocols in data link layer.	3	2	3	3	3										
Co3	Understand and evaluate the performance of various routing algorithms.	3	3	2	3	3									3	
Co4	Analyze flow control and congestion control algorithm for QoS at end to end level.	3	3	3	2											
Co5	Explore the features and working of various application layer protocols.	3	2	2		3								3	3	

518ITT04 **COMPUTATIONAL INTELLIGENCE** **T P C**
3 0 0 3

OBJECTIVE(S):

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- To understand the various characteristics of Intelligent agent
- To learn the different search strategies in CI
- To learn to represent knowledge in solving CI problems
- To know about the various applications of CI

Pre-requisites: Nil

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 9

Problem solving Methods – Search Strategies- Uninformed – Informed – Heuristics – Local Search Algorithms and Optimization Problems– Constraint Satisfaction Problems – Backtracking Search – Game Playing – Optimal Decisions in Games – Alpha – Beta Pruning

UNIT-III KNOWLEDGE REPRESENTATION AND LOGICAL REASONING 10

First Order Predicate Logic – Prolog Programming – Unification – Forward Chaining-Backward Chaining – Resolution – Knowledge Representation- Ontological Engineering-Categories and Objects – Events - Mental Events and Mental Objects - Reasoning Systems for Categories - Reasoning with Default Information

UNIT-IV PLANNING, UNCERTAIN KNOWLEDGE AND PROBABILISTIC REASONING 9

Planning with state-space search-Partial-order planning-Conditional Planning, Multi agent planning, planning graphs-uncertainty-probabilistic reasoning-Bayesian networks-Temporal Model-Hidden Markov model.

UNIT-V LEARNING AND APPLICATIONS 9

Learning from observation-Inductive learning-Decision trees-statistical learning methods-Reinforcement Learning.Applications–Computational Intelligence in medicine-industrial automation-– Natural Language Processing – Speech Recognition – Robotics.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

At the end of the course the students are able to

CO1: Understand the fundamentals and various characteristics of artificial intelligence.

CO2: Use appropriate search algorithms for any AI problem.

CO3: Represent a problem using first order and predicate logic.

CO4: Solve uncertainty problems and acquire decision making capability based on reasoning.

CO5: Apply intelligent techniques for problem solving.

TEXT BOOKS:

1. Stuart Russell, Peter Norvig, —Artificial Intelligence: A Modern Approach, Third Edition, Pearson Publishers , 2015.
2. Elaine Rich and Kevin Knight, —Artificial Intelligence, Third Edition, Tata McGraw-Hill, 2010.

REFERENCES:

1.Patrick H. Winston. "Artificial Intelligence", Third edition, Pearson Edition, 2006.
2. Dan W.Patterson, —Introduction to Artificial Intelligence and Expert Systems, PHI, 2006.

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3. Nils J. Nilsson, —Artificial Intelligence: A new Synthesis, Morgan Kaufmaan Publishers Inc; Second Edition, 2003.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO 1	Understand the fundamentals and various characteristics of artificial intelligence.		3	2	3	3	3							3	3	3
CO 2	Use appropriate search algorithms for any AI problem.		3	2	3	3	3							3		
CO 3	Represent a problem using first order and predicate logic.		3	2	3	3									2	3
CO 4	Solve uncertainty problems and acquire decision making capability based on reasoning.			3	3	3	2	2						3		
CO 5	Apply intelligent techniques for problem solving .		2	2	2	3	1							2	3	3

518CIP07 MICROPROCESSORS AND MICROCONTROLLERS LABORATORY

L	T	P	C
0	0	2	1

OBJECTIVE(S):

- 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.

1.8086 based Experiments

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

2. 8051 based experiments

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

3. Interfacing Experiments with 8086/8051

- Traffic light controller
- Stepper motor interfacing
- 8279 keyboard/display controller
- ADC and DAC interfacing

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES

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.

Course Outcome		PO 1	PO 2	PO 3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO1	Generate the code for arithmetic operations in assembly language	3	2	3	3		2							3		
CO2	Generalize the developed code using 8086 processors and 8051 controllers.	2	3	2	3		3							2		3
CO3	Reorganize the Interfacing peripherals with microprocessor and microcontroller	3	3	2											3	
CO4	Interpolate the peripherals for real world applications.	3	3	3		3	3								3	
CO5	Propose the various ALU for analysis of microprocessor and microcontroller				2											3

518ITP08 **COMPUTER NETWORKS LABORATORY** **L T P C**
0 0 2 1

OBJECTIVE(S):

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

Prerequisite: Programming in C , Object Oriented Programming.

LIST OF EXPERIMENTS:

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

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

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

Implement the following experiments using simulator:

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

9. Using NS2 Network Simulation,
   i) Initialize & Network simulator object.
   ii) Group of Nodes to form a LAN
   iii) Delay of Link
   iv) Bandwidth of Link.

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

11 Simulate a wired network and measure the following performance metrics

a. Throughput ii) Delay iii) Packet Loss

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

a. Throughput ii) Delay iii) Packet Loss

13 Experiment on packet capture and network traffic using wire shark tool.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

At the end of the course student should be able to

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

CO2: Implement data link protocols.

CO3: Analyze and implement various routing algorithms.

CO4: Simulate networks and analyze traffic using various tools.

CO5: Analyze the performance of protocols in different layers.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
Co1	Generate the code for arithmetic operations in assembly language	1	1											1		
Co2	Implement data link protocols.		2	2												
Co3	Analyze and implement various routing algorithms.					3									2	
Co4	Simulate networks and analyze traffic using various tools.		1			3									2	
Co5	Analyze the performance of protocols in different layers.			2		2										

518CIP09 **EMPLOYABILITY SKILLS LABORATORY**

L	T	P	C
0	0	2	1

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.

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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 HOURS: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.

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Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
Co1	Comprehend the various strategies of listening and its significance.									3	3	3	3			3
Co2	Articulate their views clearly and concisely with self-confidence and persuasiveness.									3	3	3	3			3
Co3	Understand the prevailing practices of testing in the recruitment process by the corporates and the institutional selection processes.									3	3	3	3			3
Co4	Communicate the corporate and social requirements in an impressive written mode.									3	3	3	3			3
Co5	Enhance their verbal skills in the screening tests competently both for recruitment and pursuing higher studies as well.									3	3	3	3			3

618ITT01 **SCRIPTING LANGUAGES** **L T P C**
3 0 0 3

OBJECTIVES:

- Understand versatile open source software tools
- 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.

PREREQUISITE: Programming in C and Object Oriented 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 9

Setting up webpages to communicate with PHP – Handling Form Controls -PHP and MySQL database - PHP Connectivity - Sending and receiving E-mails - Debugging and error handling - PHP Frameworks: Codeignter – Laravel.

UNIT IV OOC AND DB INTEGRATION IN PYTHON 9

Python Basics - Introduction to OOC – Classes and Instances **–** Static and Class Methods – Composition – Inheritance – Built-in Functions – Integrated Web Applications in Python - Python and MySQL Database Integration: Connect Database – Create and Insert Operations – Parameter Passing – Retrieving data from Database. Case Study on SciPy, Django, Open CV.

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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 PERIODS

COURSE OUTCOMES:

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

CO1: Apply Perl scripts in application development and data analysis
CO2: Create and run simple web applications using PHP
CO3: Develop Web based application using PHP and MySQL
CO4: Design and implement short and efficient Python scripts for longer constructs.
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./

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
Co1	Understand the construction of deterministic and nondeterministic automata.		3	3	2	3	2							2	3	
Co2	Understand the concept of lexical analysis and various phases of a compiler		2	2	3	3	3				3			1	3	3
Co3	Parse the generated tokens using top down and bottom up parsers.		3	3	3	3	3				3				3	3
Co4	Represent the intermediate code for the source languages		2	3	2	3	3				3				3	3
Co5	Design and analyze code generation schemes and various optimization techniques.		2	3	2	2	2							2		2

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618ITT02	COMPILER ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVE(S):

- To learn about automata theory and regular expressions.
- To learn to design and implement a lexical analyzer.
- To learn the role of a parser and to study the different ways of parsing tokens.
- To study the process of Intermediate Code generation and its representations.
- To study the concepts of machine code generation.
- To study the concepts of Code Optimization

PREREQUISITES: Nil

UNIT-I INTRODUCTION TO AUTOMATA THEORY AND REGULAR EXPRESSIONS 9

Finite Automata – Deterministic Finite Automata – Non-deterministic Finite Automata – NFA to DFA – Finite Automata with Epsilon Transitions – Epsilon-NFA to DFA – Kleene's Theorem – Minimization of Automata – Regular Expressions – Equivalence between Regular Expression and Automata – Properties of Regular Expressions.

UNIT-II LEXICAL ANALYSIS 9

Introduction – The Structure of Compiler – Evolution of Programming Languages – Application of Compiler Technology – Programming Languages Basics – Lexical Analysis – Role of Lexical Analyzer – Specification and Recognition of Tokens – Lexical Analyzer Generators.

UNIT-III SYNTAX ANALYSIS 9

Introduction – Context Free Grammar – Top Down Parsing – Recursive Descend Parsing – Predictive Parsing – Non-Recursive Predictive Parsing – Error Recovery – Bottom Up Parsing – LR Parsers – Construction of SLR (1) Parsing Table, Canonical LR (1) Parsing Table and LALR (1) Parsing Table – Parser Generators.

UNIT-IVINTERMEDIATE CODE GENERATION 9

Symbol Table – Construction – Syntax Directed Definitions – Evaluation Orders for Syntax Directed Definitions – Applications of Syntax Directed Translation – Intermediate Code Generation – Three Address Code – Types and Declarations – Expression Translation – Type Checking – Back Patching.

UNIT-V CODE GENERATION AND OPTIMIZATION 9

Issues – Design of Code Generator – Addresses in the Target Code – Basic Blocks in Flow Graph – Simple Code Generator – Peephole Optimization – Machine Independent Optimization – Principal Sources of Optimizations – Bootstrapping a Compiler – Compiling Compilers – Full Bootstrap.

TOTAL HOURS:45 PERIODS

OUTCOMES:

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

CO1: Understand the construction of deterministic and nondeterministic automata.
CO2: Understand the concept of lexical analysis and various phases of a compiler
CO3: Parse the generated tokens using top down and bottom up parsers.
CO4: Represent the intermediate code for the source languages
CO5: Design and analyze code generation schemes and various optimization techniques.

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TEXT BOOKS:

1. Alfred V. Aho, Monica S. Lam, Ravi Sethi, and Jeffrey D. Ullman, "Compilers: Principles, Techniques, and Tools", Second Edition, Pearson Education, 2014.
2. John Hopcroft, Rajeev Motwani, Jeffrey Ullman, "Introduction To Automata Theory Languages, and Computation", Third Edition, Pearson Education, 2008.

REFERENCES:

1. Dhamdhere D M, "Compiler Construction Principles and Practice" Second edition, Macmillan India Ltd., New Delhi, 2005.
2. Torbengidius Mogensen, "Basics of Compiler Design", Springer, 2011.
3. Charles N, Ron K Cytron, Richard J LeBlanc Jr., "Crafting a Complier", Pearson Education, 2010.
4. K. D. Cooper, L. Torczon, "Engineering a Compiler", Morgan-Kaufmann, Second Edition, 2011.
5. Micheal Sipser, "Introduction to the Theory of Computation", Third Edition,2014.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
Co1	Understand the construction of deterministic and nondeterministic automata.		3	3	2	3	2							2	3	
Co2	Understand the concept of lexical analysis and various phases of a compiler		2	2	3	3	3				3			1	3	3
Co3	Parse the generated tokens using top down and bottom up parsers.		3	3	3	3	3				3				3	3
Co4	Represent the intermediate code for the source languages		2	3	2	3	3				3				3	3
Co5	Design and analyze code generation schemes and various optimization techniques.		2	3	2	2	2							2		2

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

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 understand data pre-processing and data visualization techniques.
- To study algorithms for finding hidden and interesting patterns in data.
- To familiarize with data mining algorithms and its application in various fields.

Prerequisite: Database Management Systems

UNIT-I DATA WAREHOUSE & OLAP TECHNOLOGY **8**

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

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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 **10**

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

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 **9**

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 and **Python Libraries**.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

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

CO1: Have an extensive knowledge on concepts of data warehousing Modeling and Implementation

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

CO3: Apply association rule mining techniques for data analysis.

CO4: Compare and contrast the various classifiers.

CO5: Explore different clustering techniques and data mining applications.

TEXT BOOKS:

1. Jiawei Han and Micheline Kamber, “Data Mining Concepts and Techniques”, Third Edition, Elsevier, 2012.

REFERENCES BOOKS:

1. Alex Berson and Stephen J. Smith, “Data Warehousing, Data Mining & OLAP”, Tata McGraw – Hill Edition, 35th Reprint 2016.
2. Ian H.Witten and Eibe Frank, -Data Mining: Practical Machine Learning Tools and Techniques‖, Elsevier, Second Edition.
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.

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Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
Co1	Have an extensive knowledge on concepts of data warehousing Modeling and Implementation				2					3				3	1	3
Co2	Discover and measure interesting patterns from different kinds of databases.		3	2	3	3				3				3	3	
Co3	Apply association rule mining techniques for data analysis.		3	3	3	2				3					3	3
Co4	Compare and contrast the various classifiers.		2	2	1	2				3				2		
Co5	Explore different clustering techniques and data mining applications.		2	3	2	3				3						3

618ITT04 **OBJECT ORIENTED MODELING AND DESIGN** **L T P C**
3 0 0 3

OBJECTIVES:

- Understand the fundamentals of modeling and design**.**
- Develop the OO system modeling in terms of a state and interaction modeling
- Understand the development stages of modeling and design
- Design and development of system specific design and application modeling
- Understand the design and development of implementation modeling.

PREREQUISITES: Software Engineering

UNIT - 1 INTRODUCTION, MODELING CONCEPTS, CLASS MODELING STATE MODELING **9**

What is Object Orientation? What is OO development? OO themes; Evidence for usefulness of OO development; OO modeling history. Modeling as Design Technique: Modeling; abstraction; The three models. Class Modeling: Object and class concepts; Link and associations concepts; Generalization and inheritance; A sample class model; Navigation of class models; Practical tips.

Advanced object and class concepts; Association ends; N-ary associations; Aggregation; Abstract classes; Multiple inheritance; Metadata; Reification; Constraints; Derived data; Packages; Practical tips. State Modeling: Events, States, Transitions and Conditions; State diagrams; State diagram behavior; Practical tips.

UNIT - 2 ADVANCED STATE MODELING, INTERACTION MODELING **9**

Advanced State Modeling: Nested state diagrams; Nested states; Signal generalization; Concurrency; A sample state model; Relation of class and state models; Practical tips. Interaction Modeling: Use case models; Sequence models; Activity models. Use case relationships; Procedural sequence models; Special constructs for activity models.

UNIT - 3 PROCESS OVERVIEW, SYSTEM CONCEPTION, DOMAIN ANALYSIS **9**

Process Overview: Development stages; Development life cycle. System Conception: Devising a system concept; Elaborating a concept; Preparing a problem statement. Domain Analysis: Overview of analysis; Domain class model; Domain state model; Domain interaction model; Iterating the analysis.

UNIT – 4 APPLICATION ANALYSIS, SYSTEM DESIGN **9**

Application Analysis: Application interaction model; Application class model; Application state model; Adding operations. Overview of system design; Estimating performance; Making a reuse plan; Breaking a system in to sub-systems; Identifying concurrency; Allocation of sub-systems; Management of data storage; Handling global resources; Choosing a software control strategy; Handling boundary conditions; Setting the trade-off priorities; Common architectural styles; Architecture of the ATM system as the example.

UNIT - 5 CLASS DESIGN, IMPLEMENTATION MODELING & LEGACY SYSTEMS **9**

Class Design: Overview of class design; Bridging the gap; Realizing use cases; Designing algorithms; Recursing downwards, Refactoring; Design optimization; Reification of behavior; Adjustment of inheritance; Organizing a class design; ATM example. Implementation Modeling: Overview of implementation; Fine-tuning classes; Fine-tuning generalizations; Realizing associations; Testing. Legacy Systems: Reverse engineering; Building the class models; Building the interaction model; Building the state model; Reverse engineering tips; Wrapping; Maintenance.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES

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

CO1: Apply fundamental Object Oriented (OO) modeling and design in solving complex problems and Analyze problem scenario and identify classes/ Objects, their properties and associations.

CO2: Construct various UML models (including use case diagrams, class diagrams, interaction diagrams, state chart diagrams, activity diagrams, and implementation diagrams) using the appropriate notation

CO3: Propose the appropriate strategies to incorporate standard quality parameters in the design of a system.

CO4: Construct models to show the importance of system Modeling and Design in solving complex problems.

CO5: Apply the concept of Reverse Engineering and Maintenance.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
Co1	Apply fundamental Object Oriented (OO) modeling and design in solving complex problems and Analyze problem scenario and identify classes/ Objects, their properties and associations.	3	3	3	2					3		3		3		
Co2	Construct various UML models (including use case diagrams, class diagrams, interaction diagrams, state chart diagrams, activity diagrams, and implementation diagrams) using the appropriate notation		3	2	3					3		3			3	
Co3	Propose the appropriate strategies to incorporate standard quality parameters in the design of a system.		3	2	1				3	3		3				3
Co4	Construct models to show the importance of system Modeling and Design in solving complex problems.		2	3	3					2	2	3		2		3
Co5	Apply the concept of Reverse Engineering and Maintenance.	3	3	3	2					3		3		3		

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618ITP07 **SCRIPTING LANGUAGES LABORATORY**

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0	0	2	1

OBJECTIVES

- Understand versatile open source software tools.
- Build dynamic and sustainable web applications.
- Embed general purpose scripting languages in real time application.

PREREQUISITE: Object Oriented and Java Programming

LIST OF EXPERIMENTS

1. Create Perl scripts using arrays and functions.
2. Implement simple Data Structures (Linked List, Stack and Queue) using Perl scripts.
3. Establish database connectivity with Perl and MySQL for any enterprises.
4. Create dynamic web pages with Perl and CGI.
5. Implement functions, strings and arrays in PHP.
6. Perform basic file handling operations in PHP.
7. Implement OOP concepts in PHP.
8. Create forms in PHP to get form data and to retrieve data from get requests.
9. Create a database with PHP and MySQL to perform create, insert, delete and update operations.
10. Implement collections (Strings, Tuples, Lists, Sets and Dictionaries) in Python.
11. Implement the following in Python
    i. User-defined and Built-in Functions
    ii. Object and classes
12. Perform file handling operations with exception handling in Python.
13. Implement database connectivity with Python and MySQL for any application.
14. **Implement conditional and looping structures in Ruby.**
15. **Perform file handling operations in Ruby.**

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES

At the end of course students should be able to

CO1: Create dynamic web pages and implement database connectivity with Perl and CGI.

CO2: Develop OOP concepts, file handling functions and database connections with PHP.

CO3: Implement functions, collections and database integrations in Python.

CO4: Implement basic operations in Ruby.

CO5: Implement file handling operations in Ruby.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
Co1	Create dynamic web pages and implement database connectivity with Perl and CGI.		3	3	3	3								3	3	3
Co2	Develop OOP concepts, file handling functions and database connections with PHP.		3	2	3	2									2	
Co3	Implement functions, collections and database integrations in Python.		3	2	2	3								3	1	
Co4	Implement basic operations in Ruby.		2	3	2	3										
Co5	Implement file handling operations in Ruby		2	1	3	1										

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618ITP08 **COMPILER ENGINEERING LABORATORY**

L	T	P	C
0	0	2	1

OBJECTIVE(S):

- Be exposed to compiler writing tools.
- Designing the different phases of a compiler.
- To learn code generation process
- To learn optimization techniques

LIST OF EXPERIMENTS:

1. **Construction of NFA from a given regular expression.**
2. **Construction of minimized DFA from a given regular expression**
3. Symbol table creation from a list of declarations
4. Lexical analyzer to recognize patterns in C (ex. Identifiers, constants, comments, operators etc.)
5. **Count the number of lines, words, blank spaces and characters in a file**
6. **Program to recognize a valid variable which starts with a letter followed by any number of letter or digits.**
7. **Implementation of shift-reduced parsing algorithm.**
8. **Construction of LR-parsing table**
9. **Implementation of calculator using Lex and Yacc.**
10. Evaluation of arithmetic expression with LEX and YACC.
11. Syntax tree creation from —if statement.
12. Three address code generation for assignment statement with array references
13. **Three address code generation for Conditional Expression.**
14. **Construction of DAG.**
15. Code Optimization techniques (Constant Propagation, Constant Folding).

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

At the end of the course the students are able to

CO1: Construction of NFA and DFA from a given regular expression

CO2: Construct a token recognizer using LEX and YACC.

CO3: Demonstrate parsing and construct a syntax tree for control statements.

CO4: Generate intermediate code for the intermediate language

CO5: Translate the source to target code and optimize it.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
Co1	Construction of NFA and DFA from a given regular expression		2	2	3	2								3		
Co2	Construct a token recognizer using LEX and YACC.		3	2	3	1								2		
Co3	Demonstrate parsing and construct a syntax tree for control statements.		3	3	3	2									3	
Co4	Generate intermediate code for the intermediate language		2	2	2	3										
Co5	Translate the source to target code and optimize it.		3	3	2	1								2		

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618ITP09	OBJECT ORIENTED MODELING AND DESIGN LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVES:

- Learn the basics of OO analysis and design skills
- Be exposed to the UML design diagrams
- Learn to map designing to coding modules
- Be familiar with the various testing techniques

LIST OF EXPERIMENTS

To develop a mini-project by following the 5 exercises listed below

1. To develop a problem statement.
2. Identify Use Cases and develop the Use Case model.
3. Identify the conceptual classes and develop a domain model with UML Class diagram.
4. Using the identified scenarios, find the interaction between objects and represent them using UML Sequence diagrams.
5. Draw relevant state charts and activity diagrams.
6. Identify the User Interface, Domain objects, and Technical services. Draw the partial layered, logical architecture diagram with UML package diagram notation.
7. Develop and test the Technical services layer.
8. Develop and test the Domain objects layer.
9. Develop and test the User interface layer.

Suggested List of Applications

1. Fundamental of UML diagrams and notations
2. A business perspective-of-sales system
3. E-bookshop
4. Online auction system
5. Student information system
6. Software personnel management system
7. Conference Management System

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES

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

CO1: Use the UML analysis and design diagrams
CO2: Apply appropriate design patterns
CO3: Design and implement applications using OO concepts
CO4: Validating the code and design
CO5: Develop and Test User Interface Layer.

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Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
Co1	Use the UML analysis and design diagrams		3	3	2	3				3		3		3		3
Co2	Apply appropriate design patterns		2	3	3	2						3			2	
Co3	Design and implement applications using OO concepts		3	3	3	2						3			3	3
Co4	Validating the code and design		1	2	3	2						3		2		
Co5	Develop and Test User Interface Layer		3	3	2	3				3		3				

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

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.

Prerequisite: Computer Networks

UNIT-I SYMMETRIC KEY ENCRYPTION **10**

Overview - Classical Encryption Techniques - Block Ciphers and the Data Encryption Standard - Block Cipher Operation - Advanced Encryption Standard: AES Structure, AES Transformation Function - **RC6**.

UNIT-II NUMBER THEORY AND PUBLIC KEY ENCRYPTION **10**

Basic Concepts in Number Theory: Prime Numbers, Modular Arithmetic, The Euclidean Algorithm, , Fermat's and Euler's Theorem **-** Testing for Primality - The Chinese Remainder Theorem **-** 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 - Nonmalicious Program Errors - Viruses and other Malicious Code - Targeted Malicious Code - Control against Program Threats.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

At the end of the course the students are able to

CO1: Convert Plain text to Cipher tect using classical and symmetric encryption techniques.

CO2: Apply 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: Understand the importance of firewalls and intrusion Detection System.

CO5: Discover and identify abnormalities within the network caused byworms, 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 Forouzan, "Cryptography and Network Security", Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2010.
2. AtulKahate,"Cryptography and Network Security",ThirdEdition,McGraw Hill Education Pvt. Ltd., New Delhi, 2013.

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Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
Co1	Convert Plain text to Cipher tect using classical and symmetric encryption techniques.	3	3											2		
Co2	Apply number theory concepts and algorithms of public key cryptosystems to perform encryption and decryption.	3			2											
Co3	Apply key management and authentication techniques to provide secure Communication.			2	3									3		
Co4	Understand the importance of firewalls and intrusion Detection System.	1					3								2	
Co5	Discover and identify abnormalities within the network caused byworms, viruses and program threats.		2				3	2							3	

718ITT02 **FUNDAMENTALS OF MACHINE LEARNING** **L T P C**
3 0 0 3

OBJECTIVES:

- Understand basic underlying concepts, characteristics of machine learning algorithms.
- To learn and apply various supervised learning algorithms
- To learn and apply various unsupervised learning algorithms
- To understand graphical models of machine learning algorithms

PREREQUISITES: Probability and Statistics

UNIT I INTRODUCTION **9**

Introduction-Well Posed Learning Problems, Basic concepts, Designing a learning system and Issues In Machine Learning. Types of Machine Learning -Concept Learning-version spaces and candidate elimination algorithm-Real World Applications.

UNIT II SUPERVISED LEARNING **11**

Classification and Regression: Linear Regression - K-Nearest Neighbor - Support Vector Machines - Decision Tree-issues in decision tree learning-Naïve Bayes-Random Forest

UNIT III UNSUPERVISED LEARNING **9**

Clustering –Mixture Densities- K-Means Clustering- Hierarchical Clustering –Distributional clustering-Association rules- The Curse of Dimensionality – Dimensionality Reduction – Principal Component Analysis

UNIT IV PROBABILISTIC GRAPHICAL MODELS **9**

Graphical Models- Undirected Graphical Models-Markov Random Fields-Directed Graphical Models-Bayesian Networks-Conditional Independence properties-Markov Random Fields-Hidden Markov Models-Conditional Random Fields.

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UNIT V ADVANCED LEARNING **7**

Reinforcement Learning – Active Learning- Strategies in Active Learning- Online Learning Recommendation Systems, Ensemble Learning – Bootstrap Aggregation – Boosting-Gradient Boosting Machines.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

On completion of the course, the student should be able to,

CO1: Gain Knowledge on basic concepts and types of machine learning

CO2: Implement supervised learning algorithms for an application of their choice.

CO3: Implement typical clustering algorithms and apply Dimensionality reduction techniques

CO4: Formulate and solve problems with uncertain information using Bayesian and HMM approaches

CO5: Explain the basic concepts of reinforcement learning algorithms and Ensembles Methods

TEXTBOOKS:

1. Tom Mitchell, "Machine Learning", McGraw-Hill, 2017.
2. Ethem Alpaydin,"Introduction to Machine Learning", Third Edition, MIT Press, 2014.

REFERENCES:

1. Kevin P. Murphy,"Machine Learning: A Probabilistic Perspective", MIT Press, 2012.
2. Stephen Marsland,"Machine Learning – An Algorithmic Perspective", Second Edition, CRC Press, 2014.
3. Christopher Bishop,"Pattern Recognition and Machine Learning",Springer,2007.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Gain Knowledge on basic concepts and types of machine learning	3					2									
CO2	Implement supervised learning algorithms for an application of their choice.			3		3								3		
CO3	Implement typical clustering algorithms and apply Dimensionality reduction techniques				2		3									
CO4	Formulate and solve problems with uncertain information using Bayesian and HMM approaches		3		3									2		
CO5	Explain the basic concepts of reinforcement learning algorithms and Ensembles Methods						2			3					3	

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718ITT03 **MOBILE APPLICATION DEVELOPMENT**

L	T	P	C
3	0	0	3

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.

Prerequisites: Java Programming

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, ASync 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 HOURS:45 PERIODS

COURSE OUTCOMES:

At the end of the course students should be able to

CO1: Familiarize with Mobile apps development aspects.

CO2: Design and implement the user interfaces for mobile applications

CO3: Develop useful mobile applications using Google Android and Eclipse simulator.

CO4: Develop mobile applications using graphics and animation

CO5: Perform testing, signing, packaging and distribution of mobile apps

TEXT BOOK:

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

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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).

Course Outcome		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Co1	Familiarize with Mobile apps development aspects.		2	3										1		
Co2	Design and implement the user interfaces for mobile applications			3			2							3		
Co3	Develop useful mobile applications using Google Android and Eclipse simulator.			2		3	2	2							3	
Co4	Develop mobile applications using graphics and animation			3	2		3								3	
Co5	Perform testing, signing, packaging and distribution of mobile apps					3		2	2					3		2

718ITT04 **WEB PROGRAMMING** **L T P C**
3 0 0 3

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.

PREREQUISITES: Object Oriented Programming, Java Programming,

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.9

UI DESIGN: Markup Language (HTML): Introduction to HTML and HTML5 - Formatting and Fonts – Commenting Code – Anchors – Backgrounds – Images – Hyperlinks – Lists – Tables – Frames - HTML Forms. Cascading Style Sheet (CSS): The need for CSS, Introduction to CSS – Basic syntax and structure -Inline Styles – Embedding Style Sheets - Linking External Style Sheets – Backgrounds – Manipulating text - Margins and Padding - Positioning using CSS.

UNIT II JAVASCRIPT, JQUERY **9**

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

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UNIT III DOM,XML **9**

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

UNIT-IV SERVER SIDE PROGRAMMING **9**

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

UNIT V INTRODUCTION TO AJAX AND WEB SERVICES **9**

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

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES

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

CO1: Design Web page with HTML elements and CSS .
CO2: Write Client side script using java script.
CO3: Structure the data using XML.
CO4: Develop and deploy web application using JSP and Servlets.
CO5: Create, describe and access simple Web Services.

Mapping of CO's with PO and PSO

TEXT BOOKS

1. Harvey M. Deitel and Paul J.Deitel, Internet & World Wide Web How to Program, Pearson Education, 2018.
2. John Dean, "Web Programming with HTML5, CSS, and JavaScript", Jones & Bartlett Learning, US, 2018

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.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Design Web page with HTML elements and CSS .			3									2	3		2
CO2	Write Client side script using java script.			2		3					2				3	
CO3	Structure the data using XML.		3		3									2		
CO4	Develop and deploy web application using JSP and Servlets.		3	2	2										3	
CO5	Create, describe and access simple Web Services.					3	2					2			3	1

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718ITP07 **MOBILE APPLICATION DEVELOPMENT LABORATORY**

L	T	P	C
0	0	2	1

OBJECTIVE(S):

The student should be made to:

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

LIST OF EXPERIMENTS:

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

TOTAL HOURS:45 PERIODS

OUTCOMES:

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

CO1: Design and Implement various mobile applications using emulators.

CO2: Deploy applications to hand-held devices

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

CO4: Construct an application using multi-threading and RSS feed

CO5: Make use of location identification using GPS in an application.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Design and Implement various mobile applications using emulators.		2	3										1		
CO2	Deploy applications to hand-held devices			3			2							3		
CO3	Develop an application using basic graphical primitives and databases.			2		3	2	2							3	
CO4	Construct an application using multi threading and RSS feed			3	2		3								3	
CO5	Make use of location identification using GPS in an application.					3		2	2					3		

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718ITP08 **WEB PROGRAMMING LABORATORY**

L	T	P	C
0	0	2	1

OBJECTIVES

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

LIST OF EXPERIMENTS

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

   b)Create your class timetable using table tag.
2. Design a web page of your home town with an attractive background color, textcolor, 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 customers transactions (credits and debits).Write a JSP to calculate the current balance, cumulative total of credits and debits of the individual customer.
7. Create an Extensible mark up language to represent the students mark information of a class. Create a webpage to display all the students consolidated mark statement with pass (green color)or fail (red color)using XSLT
8. Develop a web service for an airline management and implement the following scenario using database

(a) Check ticket availability.

(b) Check air services through travel agent.

(c) Search a passenger whether he / she travelled in a particular date or not.

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

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES

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

CO1: Design Web pages using HTML/DHTML and style sheets
CO2: Built dynamic web pages using Java script.
CO3: Design and Implement database applications.
CO4: Develop simple GUI interfaces to interact with users in real time applications.
CO5: Design and Develop webpage using Ajax.

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Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Design Web pages using HTML/DHTML and style sheets					3	3	3						3		
CO2	Built dynamic web pages using Java script.						3	3							3	
CO3	Design and Implement database applications.		2	2		3	2								2	
CO4	Develop simple GUI interfaces to interact with users in real time applications.		3			2								3		
CO5	Design and Develop webpage using Ajax						3	3						1	2	

718ITP09 **MINI PROJECT** **L T P C**
0 0 4 2

AIM:

To obtain the basic knowledge of doing projects by using their programming skills learned.

OBJECTIVE:

The main objective of the Mini Project is to enhance the Student's ability in solving real time problems and situations related to industry and academics needs by the application of varying tools and techniques.

PREREQUISITE: Object Oriented and Modelling & Design Lab

IMPORTANCE OF MINI PROJECT:

1. To have a systematic approach for solving problems**.**
2. Provides an opportunity for the students to develop and orient their solutions to the real time problems.
3. Forms the base for working in a team and to have upper hand in application of skills and knowledge gained in the previous semesters.

GUIDELINES FOR MINI PROJECT:

1. The students in groups of not more than 4 members have to take one Mini Project.
2. The team can select the problem domain based on their area of interest.
3. Periodic Monitoring of the project will be scheduled during the project hours and phase based deliverables are expected (SRS, Design Diagrams, Coding, Test reports, Project report).
4. Projects have to be developed during the project hours and it has to be in-house project.

EVALUATION OF MINI PROJECT:

1. Each project will be guided by a guide based on their area of interest.
2. Continuous assessment of the Mini Project will be done by the conduction of 3 reviews.
3. Each Individual student will be evaluated based on the progress and performance during the reviews.

TOTAL HOURS:45 PERIODS

COURSE OUTCOME:

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

CO1: Demonstrate a sound technical knowledge of their selected project topic.
CO2: Design engineering solutions to complex problems utilizing a system approach.
CO3: Analyze engineering problem specification and recommend an optimum set of technical solutions.
CO4**:** Implement innovative ideas in solving contemporary issues.
CO5: Acquire industry relevant skills by working in team and efficiently communicating the deliverables.

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

OBJECTIVE(S):

- 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.

Prerequisites: Data Warehousing and Data Mining and Fundamentals of Machine Learning

UNIT-I INTRODUCTION TO BIG DATA **8**

Concepts and Terminologies – Big Data Characteristics – Types of Data – Big Data Analytics Lifecycle –**Big Data Analytics: Classification of Analytics – Top Challenges Facing Big Data – Importance of Big Data Analytics – Data Analytics Tools**- Big Data Processing Concepts: Parallel Data – Distributed Data –Batch Mode – Real Time Mode.

UNIT-II BIG DATA ANALYTICS TECHNIQUES **9**

Quantitative Analysis – Qualitative Analysis – Statistical Analysis: A/B Testing – Correlation – **Regression – Linear Regression – Polynomial Regression – Multivariate Regression** - Machine Learning: Classification – Clustering – Outlier Detection – Filtering – Semantic Analysis – Visual Analysis – Heat Maps – Time Series Plots – Network Graph – Spatial Data Mapping **– Reinforcement Learning.**

UNIT-III STREAM MEMORY **9**

Introduction to Stream Concepts – Stream Data Model and Architecture – Stream Computing – Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Ones in a Window – Decaying Window **– Case Studies: – Real Time 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-

MongoDB: Introduction to MongoDB – Terms used in RDBMS and MongoDB – Data Types in MongoDB – MongoDB Query Language.Case Studies:BigData for E-Commerce-BigData for Blogs

UNIT-V BIG DATA FRAMEWORK **10**

Hadoop: Introduction to Hadoop – RDBMS Vs Hadoop – Hadoop Overview – Hadoop Distributors – HDFS – Processing Data with Hadoop – Managing Resources and Application with Hadoop YARN – Hadoop Ecosystem.

Hive: Introduction to Hive – Hive Architecture – Hive Data Types –Hive File Format – Hive Query Language – RC File Implementation – Ser De – User Defined Function (UDF).

Pig: Introduction to Pig - The Anatomy of Pig - Pig on Hadoop - Pig Philosophy - Use Case for Pig: ETL Processing Data Types in Pig - Running Pig - Execution Modes of Pig - HDFS Commands - Relational Operators - Eval Function - Complex Data Types - User-Defined Functions (UDF)

TOTAL HOURS:45 PERIODS

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COURSE OUTCOMES:

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

CO1: Discuss the challenges of big data, its analytics 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 NoSQL DB.

CO5: Excel on big data applications using big data frameworks.

TEXT BOOKS:

1. Thomas Erl, WajidKhattak, Paul Buhler, "Big Data Fundamentals: Concepts, Drivers & Techniques" ,Prentice Hall, 2015
2. Seema Acharya, Subhashini Chellappan, "Big Data Analytics", Wiley India Private Limited, First Edition, 2018.

REFERENCE BOOKS:

1. David Loshin, Morgan Kaufman, "Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph", Elsevier Publishers, 2013.
2. Bart Baesens, "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications", Wiley Publishers, 2015.
3. Tom White, "Hadoop The Definitive Guide", O'Reilly Publishers, 4th Edition, 2015.
4. Edward Capriolo, Dean Wampler, Jason Rutherglen, "Programming Hive", O'Reilly Publishers, 2012.
5. Tim Hawkins, EelcoPlugge, Peter Membrey, David Hows, "The Definitive Guide to MongoDB: A complete guide to dealing with Big Data using MongoDB", Third Edition,Apress Publishers, 3rdEdition, 2015.
6. Anand Rajaraman, Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
Co1	Discuss the challenges of big data, its analytics and processing concepts.		2													
Co2	Apply analytics for various big data based problems.													2		
Co3	Identify the appropriate solution to data streams related problems	2	2													
Co4	Develop applications using NoSQL DB.			3		3									3	
Co5	Excel on big data applications using big data frameworks.					2		3								3

818ITP01 **PROJECT WORK & VIVA VOCE**

L	T	P	C
0	0	12	6

AIM: To obtain the basic knowledge of doing projects by using their programming skills learned.

PREREQUISITE: Mini Project, All Professional Cores and Electives

OBJECTIVE:

The main objective of the Project is to enhance the Student's ability in solving real time problems and situations related to industry and academics needs by the application of varying tools and techniques.

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IMPORTANCE OF PROJECT:

1. To have a systematic approach for solving problems**.**
2. Provides opportunity for the students to develop and orient their solutions to the real time problems.
3. Forms the base for working in a team and to have upper hand in application of skills and knowledge gained in the previous semesters.

GUIDELINES FOR PROJECT:

1. The students in groups of not more than 4 members have to take one Project.
2. The team can select the problem domain based on their Area of Specialization.
3. Periodic Monitoring of the project will be scheduled during the project hours and phase based deliverables are expected (SRS, Design Diagrams, Coding, Test reports, Project report).
4. Projects have to be developed during the project hours and it has to be in-house project.

EVALUATION OF MINI PROJECT:

1. Each project will be guided by a guide based on their Area of Specialization.
2. Continuous assessment of the Project will be done by the conduction of 3 reviews.
3. Each Individual student will be evaluated based on the progress and performance during the reviews.

COURSE OUTCOME:

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

CO1: Demonstrate a sound technical knowledge of their selected project topic.
CO2: Design engineering solutions to complex problems utilizing a system approach.
CO3: Analyze engineering problem specification and recommend an optimum set of technical solutions.
CO4: Implement innovative ideas in solving contemporary issues.
CO5: Acquire industry relevant skill s by working in team and efficiently communicating the deliverable

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Demonstrate a sound technical knowledge of their selected project topic.		2													
CO2	Design engineering solutions to complex problems utilizing a system approach.													2		
CO3	Analyze engineering problem specification and recommend an optimum set of technical solutions.	2	2													
CO4	Implement innovative ideas in solving contemporary issues.			3		3									3	
CO5	Acquire industry relevant skills by working in team and efficiently communicating the deliverables.					2		3								3

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518CIE01	C# & .NET PROGRAMMING	L	T	P	C
		3	1	0	4

OBJECTIVE(S):

- To understand the fundamentals of .NET Programming
- To develop real time applications using C#

PREREQUISITE: Object Oriented Programming.

UNIT-I C# LANGUAGE FUNDAMENTALS **9**

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

UNIT-II OBJECT ORIENTED PROGRAMMING WITH C# **9**

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

UNIT-III INTERFACES, COLLECTIONS, DELEGATES, EVENTS AND 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-IVDEVELOPING 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.NETAND ASP.NET **9**

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

TOTAL HOURS:60 PERIODS

COURSE OUTCOMES:

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

CO1: Understand anatomy of C# Programming.

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

CO3: Develop Applications using Interfaces and Events.

CO4: Develop Window form application with Database connectivity.

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

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TEXT BOOKS:

1. Andrew Troelsen, "Pro C# 5.0 and the .NET 4.5 Framework" Apress, 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

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Understand anatomy of C# Programming.				3	1								3		
CO2	Develop Console application using object oriented concepts, advanced features in C#.			3	3	3	2	3						3	3	
CO3	Develop Applications using Interfaces and Events.			3	3	3		3						3	3	
CO4	Develop Window form application with Database connectivity.		2	3	2	3	3	3						3	3	3
CO5	Build Applications using ADO.NETAND ASP.NET.			2	3	3	3	3						3	3	3

518ITE02 **THEORY OF COMPUTATION** **L T P C**
3 1 0 4

OBJECTIVE(S):

- Understand the Properties of formal languages and formal grammars.
- Introduce deterministic and non-deterministic finite automata.
- Learn Pushdown Automata and Context free language.
- Understand Turing machines and computing with Turing machines.
- Acquaint with 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.

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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 language –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- 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 - A simple Undecidable problem: Rice Theorm - Post's Correspondence Problem (PCP) -Definition, Undecidability of PCP.

TOTAL HOURS:60 PERIODS

COURSE OUTCOMES:

At the end of the course student should be able to

CO1: Construct automata, regular expression for any pattern.

CO2: Design grammars and Automata (recognizers) for different language classes.

CO3: Write Context free grammar for any construct.

CO4: Design Turing machines for any language and propose computation solutions using Turing machines.

CO5: Derive whether a problem is decidable or not.

TEXT BOOKS:

1. John E. Hopcroft and Rajeev Motwani and Jeffrey D. Ullman, “Introduction to 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.Janaki Meena, “ 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.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Construct automata, regular expression for any pattern.	2	3											3		
CO2	Design grammars and Automata (recognizers) for different language classes.			3	3										3	2
CO3	Write Context free grammar for any construct		3	2	2	3										
CO4	Design Turing machines for any language and propose computation solutions using Turing machines			3	2	2								3		3
CO5	Derive whether a problem is decidable or not	1			3	2									2	

518CIE03 **ADVANCED JAVA PROGRAMMING**

L	T	P	C
3	1	0	4

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 infobus - Glasgow developments - Application Builder tool- JAR files-Introspection-Bound Properties-Persistence-customizers - java beans API.

UNIT III Enterprise Java Beans **9**

EJB: EJB architecture- EJB requirements – design and implementation – EJB session beans- EJB entity beans-EJB Clients – deployment tips, tricks and traps for building distributed and other systems – implementation and future directions of EJB-Variable in perl- perl control structures and operators – functions and scope

UNIT IV RMI and Object Request Broker **9**

RMI – Overview – Developing applications with RMI: Declaring & Implementing remote interfaces-stubs & skeletons, Registering remote objects, writing RMI clients –Pushing data from RMI Servlet – RMI over Inter-ORB Protocol.

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UNIT V Java Server Pages and Javamail API **9**

JSP –Introduction JSP-Examining MVC and JSP -JSP scripting elements & Directives-Working with variables scopes-Error Pages - using Java Beans in JSP Working with Java Mail-Understanding Protocols in Javamail-Components-Javamail API-Integrating into J2EE-Understanding Java Messaging Services-Transactions

TOTAL HOURS:60 PERIODS

COURSE OUTCOMES:

At the end of the course the should 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.

CO3: Design and Implement EJB in Java.

CO4: Develop and Implement the RMI and ORB protocol.

CO5: Understand and deploy the application using JSP and Java mail API.

TEXT BOOKS:

1. H. Schildt, 2014, Java 2 Complete Reference, 9th Edition, Tata McGraw Hill, New Delhi.
2. J. McGovern,R. Adatia,Y. Fain, 2003, J2EE 1.4 Bible, Wiley-dreamtech India Pvt. Ltd, 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.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Understand the advanced concepts of Java programming such as Servlets, Session management and JDBC in servlets.	3		2	3		3	2						2		3
CO2	Design and develop Java Beans Application		3	3	3	2									3	
CO3	Design and Implement EJB in Java		2	3	3			3								
CO4	Develop and Implement the RMI and ORB protocol		3			2	3							2		3
CO5	Understand and deploy the application using JSP and Java mail API.	2				3	2	3							3	

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518ITE04	REAL TIME SYSTEMS	L	T	P	C
		3	1	0	4

OBJECTIVE(S):

- Basics of Real time systems.
- Real time programming and Tools.
- Fault tolerance, Reliability and synchronization.

Prerequisite: Operating Systems.

UNIT-I BASIC REAL TIME CONCEPTS 9

Introduction-Issues in Real Time Computing, Structure of a Real Time System, Task Classes, Performance Measures for Real Time Systems, Estimating Program Run Times, Task Assignment and Scheduling, Classical Uniprocessor scheduling algorithms, Uniprocessor scheduling of IRIS Tasks, Task Assignment, Mode Changes, Fault Tolerant Scheduling.

UNIT-II PROGRAMMING LANGUAGES AND TOOLS 6

Desired characteristics based on ADA, Data Typing, Control structures, Packages, Exception handling, Overloading Multitasking, Timing Specifications, Task scheduling, just in time compilation, Run time Support

UNIT-III REAL TIME DATABASES 9

Real time Databases, Basic Definition, Real time Vs General Purpose Databases, Main Memory Databases, Transaction priorities, Transaction Aborts, Concurrency Control Issues, Disk Scheduling Algorithms, Two-phase Approach to improve Predictability, Maintaining Serialization Consistency, Databases for Hard Real Time systems.

UNIT-IV REAL TIME SYSTEM DEVELOPMENT METHODOLOGIES 9

Introduction, Yourdon methodology, Requirements definition for Drying oven, Ward and Mellor methodology, Hatley and Pirbhai method, Mascot, Paisley method for real time software development.

UNIT-V EVALUATION TECHNIQUES 12

Fault types, Fault detection and Containment, Reliability Evaluation Techniques, Obtaining Parameter Values, Reliability Models for Hardware Redundancy, Software Error models. Clock Synchronization, Clock, A Non Fault-Tolerant Synchronization Algorithm, Impact of Faults, Fault Tolerant synchronization in Hardware, Fault Tolerant Synchronization in Software

TOTAL HOURS:60 PERIODS

COURSE OUTCOMES:

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

CO1: Understand the basics of Real time systems and modelling.

CO2: Use programming languages and tools to develop real time systems.

CO3: Use database in real time applications.

CO4: Deploy various methodologies to design real time applications.

CO5: Gain knowledge on Fault tolerance, Reliability and synchronization of RTS.

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TEXT BOOKS:

1. C.M. Krishna, Kang G. Shin, "Real-Time Systems", McGraw-Hill International Editions, 2010.
2. Stuart Bennett, "Real Time Computer Control-An Introduction", Second edition Perntice Hall PTR, 2010.

REFERENCES:

1. Philip.A.Laplante "Real Time System Design and Analysis" PHI , III Edition, April2004.
2. Jane S Liu "Real Time Systems" Pearson Education 2004
3. KVKK Prasad "Embedded Real Time Systems, Concepts, Design and Programming "Dream Teach 2003
3. R.J.A Buhur, D.L. Bailey, " "An Introduction to Real-Time Systems", Prentice-Hall International, 1999.
5. S.T. Allworth and R.N. Zobel, "Introduction to real time software design", Macmillan, II Edition, 1987.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Understand the basics of Real time systems and modelling.	3		2	3			2						2		3
CO2	Use programming languages and tools to develop real time systems.		3	3		2						2				
CO3	Use database in real time applications.				3			3								
CO4	Deploy various methodologies to design real time applications.		3			2	3							2		3
CO5	Gain knowledge on Fault tolerance, Reliability and synchronization of RTS	2				3	2	3				3			3	

518CIE05 COMPUTER GRAPHICS AND MULTIMEDIA SYSTEMS

L	T	P	C
3	1	0	4

OBJECTIVE(S):

- 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.

Pre-requisites: Nil.

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.

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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 HOURS:60 PERIODS

COURSE OUTCOMES:

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

CO1: Create Interactive Computer Graphics using OpenGL.

CO2: Apply Two Dimensional Transformations and Clipping Algorithms.

CO3: 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.

TEXT BOOKS:

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, Kiran Thakrar, "Multimedia Systems Design", First Edition, PHI, 2008.

REFERENCE BOOKS:

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.

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Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Create Interactive Computer Graphics using OpenGL.	2	3	2	2	3	2							2	3	3
CO2	Apply Two Dimensional Transformations and Clipping Algorithms.		3	3	3	3	3							1		
CO3	Apply Three Dimensional Graphics and Visible Surface Detection Methods.		3	3	3	2									2	
CO4	Explore different Multimedia Data Structures and Databases.		3		3	2										
CO5	Apply Compression Techniques and Multimedia Applications in Real Time Problems.			2	2	3								2	3	

615CIE01 **MULTI CORE ARCHITECTURE** **L T P C**
3 0 0 3

PREREQUISITES: Nil.

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.

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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 PERIODS

COURSE OUTCOMES

At the end of the course the students are 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**: Point out the salient features of different multicore architectures and how they exploit parallelism
- **CO4**: Critically analyze the different types of inter connection networks
- **CO5**: Discuss 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.

REFERENCE

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

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO 1	Identify the limitations of ILP and the need for multicore architectures	2	3	2				3						2		
CO 2	Discuss the issues related to multiprocessing and suggest solutions			2	3	3									1	
CO 3	Point out the salient features of different multicore architectures and how they exploit parallelism		2				1							2		
CO 4	Critically analyze the different types of inter connection networks		3	3										3		
CO 5	Discuss the architecture of GPUs, warehouse-scale computers and embedded processors					3									3	

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618ITE02	SOFT COMPUTING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To give students knowledge of soft computing theories and fundamentals.
- To design a soft computing system required to address a computational task and use heuristics based on human experience.
- To understand fuzzy sets and fuzzy logic for problem solving.
- To become familiar with neural networks that can learn from available examples and generalize to form appropriate rules for inferencing systems.
- To familiarize with genetic algorithms and other random search procedures useful while seeking global optimum in self-learning situations.

UNIT-I INTRODUCTION TO NEURO – FUZZY AND SOFT COMPUTING 9

Soft Computing Fundamentals - Soft Computing Constituents – From Conventional AI to Computational Intelligence. Basic Concepts of Fuzzy Logic – Fuzzy Sets and Crisp Sets – Fuzzy Set Theoretic Operations - Membership Functions – Fuzzy If-Then Rules, Fuzzy Reasoning.

UNIT II FUNDAMENTALS OF NEURAL NETWORKS 9

Neuron, Nerve Structure and Synapse – Artificial Neuron and its Model – Activation Functions – Neural Network Architecture: Single Layer and Multilayer Feed Forward Networks, Recurrent Networks – Various Learning Techniques: Perception and Convergence Rule, Auto-Associative and Hetero-Associative Memory.

UNIT III BACK PROPAGATION NETWORKS 9

Back Propagation Networks Architecture: Perceptron Model, Solution, Adaline, Single Layer Artificial Neural Network, Multilayer Perception Model – Back Propagation Learning Methods – Effect of Learning Rule Co-Efficient –Factors Affecting Back Propagation Training – Applications.

UNIT IV COMPETETIVE NEURAL NETWORKS 9

Competitive Learning Networks - Kohenen's Self Organizing Map – Learning Vector Quantization, Learning by LVQ – Hebbian Learning - The Principle Component Networks – The Hopfield Network.

UNIT V GENETIC ALGORITHM 9

Basic Concepts – Working Principle – Procedures of GA – Flow Chart of GA – Genetic Representation: (Encoding) Initialization and Selection – Genetic Operators: Mutation, Generational Cycle – Applications.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

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

CO1: Identify and describe soft computing techniques and their roles in building intelligent machines.

CO2: Recognize the feasibility of applying a soft computing methodology for a problem.

CO3: Compare different neural network approaches.

CO4: Design neural networks for pattern classification and regression problems.

CO5: Apply genetic algorithms to optimization problems.

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TEXT BOOKS:

1. J.S.R. Jang, C.T. Sun, E. Mizutani, "Neuro-Fuzzy and Soft Computing", Pearson Education, 2004.
2. S. Rajasekaran, G.A. Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis and Applications", Prentice Hall of India, 2010.

REFERENCE BOOKS:

1. S.N. Sivanandam, S.N. Deepa, "Principles of Soft Computing", Second Edition, Wiley-India, 2007.
2. Timothy Ross, "Fuzzy Logic with Engineering Applications", Wiley Publications, 2016.
3. David E. Goldberg, "Genetic Algorithms in Search, Optimization and Machine Learning", Pearson Education, 2008.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Identify and describe soft computing techniques and their roles in building intelligent machines.	1	3											2		1
CO2	Recognize the feasibility of applying a soft computing methodology for a problem.			3		2									2	
CO3	Compare different neural network approaches.	1		2											3	
CO4	Design neural networks for pattern classification and regression problems.		3		2	2								3		
CO5	Apply genetic algorithms to optimization problems.	1				3	2							2		

		L	T	P	C
618ITE03	**SOCIAL NETWORK ANALYSIS**	**3**	**0**	**0**	**3**

OBJECTIVE(S):

- Understand the concept of semantic web and related applications.
- Learn knowledge representation using ontology.
- Understand human behavior in social web and related communities.
- Learn visualization of social networks.

Prerequisite: Computer Networks.

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.

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UNIT II SOCIAL NETWORK ANALYSIS **9**

Introduction to Social Networks Profiles – Types of Commercial Social Network Profiles (CSNP) – Quantitative and Qualitative Analysis of CSNP – Analysis of Social Networks Extracted from Log Files – Data Mining Methods Related to SNA and Log Mining –Clustering Techniques – Case Study.

UNIT III SEMANTIC TECHNOLOGY FOR SOCIAL NETWORK ANALYSIS **9**

Introduction to Ontology based Knowledge Representation – Ontology Languages for the Semantic Web – RDF and OWL – Modeling Social Network Data – Network Data Representation, Ontological Representation of Social Individuals and Relationships – Aggregating and Reasoning with Social Network Data – Advanced Representations.

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 Network Analysis.**

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 PERIODS

COURSE OUTCOMES:

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

CO1: Develop semantic web related applications.
CO2: Model and represent knowledge for social semantic Web.
CO3: Represent knowledge using ontology.
CO4: Understood the mining communities in web social networks.
CO5: Develop Visualization for social networks.

TEXT BOOKS:

1. Peter Mika, “Social Networks and the Semantic Web”, Springer, 2007.
2. Borko Furht, “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.

REFERENCE BOOKS:

1. GuandongXu, Yanchun Zhang, Lin Li, “Web Mining and Social Networking Techniques and Applications”, Springer, 2011.
2. Max Chevalier, Christine Julien, Chantal Soulé-Dupuy, “Collaborative and Social Information Retrieval 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.

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Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Develop semantic web related applications.	1		3	2		1	3						2	1	
CO2	Model and represent knowledge for social semantic Web.		2	2	3									3		
CO3	Represent knowledge using ontology.	1		3	2			2	2					1		
CO4	Understood the mining communities in web social networks.	1		2										2		
CO5	Develop Visualization for social networks.		2	3					3					2	1	1

618ITE04 **MOBILE COMMUNICATION**

L	T	P	C
3	0	0	3

OBJECTIVE(S):

- To impart the fundamental concepts of mobile communications systems
- To understand working knowledge on various telecommunication systems and MAC protocols.
- To study the working principles of TCP/IP and its standards.
- To learn about MANET & VANET design, routing and security issues.
- To build skills in working with Wireless application Protocols to develop mobile content.

UNIT I INTRODUCTION **9**

Basics of Communication technologies - Mobile Computing Introduction – Mobile Computing Vs Wireless Networking – Mobile Computing Applications – Characteristics of Mobile computing – Structure of Mobile Computing Application-Cellular Mobile Communication.

UNIT II TELECOMMUNICATION SYSTEM & MAC PROTOCOLS **9**

Global System for Mobile Communication (GSM) – General Packet Radio Service (GPRS) – Universal Mobile Telecommunication System (UMTS). MAC Protocols – Wireless MAC Issues – Fixed Assignment Schemes – Random Assignment Schemes – Reservation Based Schemes-802.11 MAC Standard-MAC Protocols for Ad Hoc Networks.

UNIT III MOBILE INTERNET PROTOCOL AND TRANSPORT LAYER **9**

Overview of Mobile IP – Features of Mobile IP – Key Mechanism in Mobile IP – route Optimization-Dynamic Host Configuration Protocol. Overview of TCP/IP – Architecture of TCP/IP- Adaptation of TCP Window – Improvement in TCP Performance.

UNIT IV AD-HOC NETWORKS **9**

Ad-Hoc Basic Concepts – Characteristics – Applications – Design Issues – Routing – Essential of Traditional Routing Protocols –Routing in MANETs - MANET Routing Protocols: DSDV,DSR , **ZRP** – Vehicular Ad Hoc networks (VANET) –– Security Attacks and Counter Measures in MANETs, **Introduction to FANETs, MANET Vs VANET Vs FANETs**.

UNIT V APPLICATION LAYERS 9

WAP-Architecture, WDP, WTLS, WTP, WSP, WAE, WML, WML Script, WTA, Push Architecture, Push/Pull Services.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

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

CO1: Gain knowledge on the mobile telecommunication systems.

CO2 : Apply MAC protocols for mobile and wireless environments.

CO3: Deploy various protocols that support mobility at network layer and transport layer.

CO4: Use proactive, reactive and hybrid protocols to design Ad hoc networks

CO5: Develop wireless applications using script and mark-up languages.

TEXT BOOKS:

1. Prasant Kumar Pattnaik, Rajib Mall, "Fundamentals of Mobile Computing", PHI Learning Pvt. Ltd, New Delhi – 2018.
2. Jochen Schiller, "Mobile Communications", PHI/Pearson Education, Second Edition, 2011.
3. http://tarjomefa.com/wp-content/uploads/2017/08/7432-English-TarjomeFa.pdf (FANETs)

REFERENCES:

1. C.Siva Ram Murthy and B.S.Manoj, "AdHoc Wireless Networks", Second Edition, Pearson Education, 2007.
2. Dharma Prakash Agarval, Qing and An Zeng, "Introduction to Wireless and Mobile systems", Thomson Asia Pvt Ltd, 2005.
3. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, "Principles of Mobile Computing", Springer, 2003.
4. William.C.Y.Lee,"Mobile Cellular Telecommunications-Analog and Digital Systems", Second Edition,Tata Mc Graw Hill Edition ,2006.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Gain knowledge on the mobile telecommunication systems.	3	2	1	3		2							1	2	
CO2	Apply MAC protocols for mobile and wireless environments.		3	2	2		2								1	
CO3	Deploy various protocols that support mobility at network layer and transport layer.	1	3	3	2		2							2		
CO4	Use proactive, reactive and hybrid protocols to design Ad hoc networks	1			3		2							3		
CO5	Develop wireless applications using script and mark-up languages.			1	3		3							3		

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618ITE05	EMBEDDED SYSTEMS	L	T	P	C
		3	0	0	3

OBJECTIVE(S):

- To understand the basics of embedded systems and ARM processor.
- To prescribe memory and input / output management.
- To create a knowledge about process and operating systems
- To explain about embedded software
- To analyze embedded system various examples.

Prerequisite: Nil

UNIT I INTRODUCTION TO EMBEDDED SYSTEMS **9**

Challenges of Embedded Systems – Embedded System Design Process, Classification, Major Application Areas, Purpose of Embedded Systems, Embedded processors – ARM processor – Architecture, Instruction Sets.

UNIT II MEMORY AND INPUT / OUTPUT MANAGEMENT **9**

Programming Input and Output – Memory System Mechanisms – Memory and I/O Devices and Interfacing – Interrupts Handling.

UNIT III PROCESSES AND OPERATING SYSTEMS **9**

Multiple Tasks and Processes – Context Switching – Scheduling Policies –Inter Process Communication Mechanisms – Performance issues

UNIT IV EMBEDDED SOFTWARE **9**

Programming Embedded Systems in Assembly and C – Meeting Real Time Constraints –Multi-State systems and Function Sequences. Embedded Software Development Tools –Emulators and Debuggers-Cross Compilers.

UNIT V EMBEDDED SYSTEM DEVELOPMENT **9**

Design Issues and techniques – Case studies – Complete Design of Example Embedded Systems – Telephone EPBX, Ink Jet Printer, Set-Top Boxes.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES

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

CO1: Differentiate the general computing system and the embedded system also recognize the classification of embedded systems.

CO2: Summarize the concepts of memory inputs and output managements

CO3: Transform the concepts of process and operating systems.

CO4: Design real time embedded systems using the embedded software

CO5: Understand the design and techniques of embedded system development.

TEXT BOOKS

1. Wayne Wolf, "Computers as Components: Principles of Embedded Computer System Design", Elsevier, 2006.
2. Michael J. Pont, "Embedded C", Pearson Education, 2007.

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REFERENCE BOOKS

1. Steve Heath, "Embedded System Design", Elsevier, 2005.
2. Muhammed Ali Mazidi, Janice GillispieMazidi and Rolin D. McKinlay, "The 8051Microcontroller and Embedded Systems", Pearson Education, Second edition, 2007
3. Raj Kamal, Embedded Systems Architecture, Programming, and Design. (2/e), Tata McGraw Hill, 2008
4. K.V. Shibu, Introduction to Embedded Systems, Tata McGraw, 2009.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Differentiate the general computing system and the embedded system also recognize the classification of embedded systems.		2		3								2	2		3
CO2	Summarize the concepts of memory inputs and output managements			2											1	
CO3	Transform the concepts of process and operating systems.			3	2	2							3		3	
CO4	Design real time embedded systems using the embedded software		2	3									3	2		3
CO5	Understand the design and techniques of embedded system development.		2	2	1								2	1	2	3

718CIE01 **INTERNET OF THINGS**

L	T	P	C
3	0	0	3

OBJECTIVE(S):

- To understand the fundamentals of Internet of Things
- To learn about the basics of IOT protocols
- To build a small low cost embedded system using Raspberry Pi.
- To apply the concept of Internet of Things in the real world scenario.

Prerequisites: Nil

UNIT-I 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 .

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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 8

Python Packages of Interest for IoT-JSON, XML, HTTPLib & URLLib, SMTPLib, Raspberry Pi, About the Board , Linux on Raspberry Pi, Raspberry Pi Interfaces, Serial, SPI , I2C Programming Raspberry Pi with Python-Controlling LED with Raspberry Pi , Interfacing an LED and Switch with Raspberry Pi, Interfacing a Light Sensor (LDR) with Raspberry Pi, Other IoT Devices-pcDuino, Beagle Bone Black, Cubie board.

UNIT-IV IoT PHYSICAL SERVERS & CLOUD OFFERINGS 9

IoT Physical Servers & Cloud Offerings,WAMP - AutoBahn for IoT,Xively Cloud for IoT, Python Web Application Framework – Django, Django Architecture , Starting Development with Django , Designing a RESTful Web API,Amazon Web Services for IoT , Amazon EC2, Amazon AutoScaling ,Amazon S3,Amazon RDS Amazon DynamoDB, Amazon Kinesis, Amazon SQS,Amazon EMR,SkyNet 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 HOURS:45 PERIODS

COURSE OUTCOMES:

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

CO1: Compare and analyze different design issues and domains of IoT.

CO2: Identify different design methodologies and end point devices of IoT.

CO3: Prepare different cloud based and embedded solution for IoT.

CO4: Formulate different case studies related to IoT framework.

CO5: Solve data analytical and real-time application problems on IoT.

TEXT BOOKS:

1. Arshdeep Bagha ,Vijay Madisetti,Internet of Things (A Hands-on-Approach), University Press, 2015.

REFERENCE BOOKS:

1. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), - Architecting the Internet of Things, Springer, 2011.
2. Honbo Zhou, - The Internet of Things in the Cloud: A Middleware Perspective, CRC Press, 2012.

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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)

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Compare and analyze different design issues and domains of IoT.		2	3		3								2		
CO2	Identify different design methodologies and end point devices of IoT.		3	3											3	
CO3	Prepare different cloud based and embedded solution for IoT.			3				3	2					3		
CO4	Formulate different case studies related to IoT framework.															3
CO5	Solve data analytical and real-time application problems on IoT.					2			3		3	3				3

718CIE02 **BUILDING ENTERPRISE APPLICATION**

L	T	P	C
3	0	0	3

OBJECTIVE(S):

- Building and design of the foundational enterprise IT architecture
- To evolving technology, continued improvements in enterprise applications and establishing baseline metrics is important to the sustenance of key infrastructure elements of software enterprise applications
- A Unified meta-model of elements can lead to effective business analysis from an idea that originated in order to bring rigid engineering concepts to building enterprise IT systems, Enterprise Architecture (EA) is evolving into a business-driven
- To formally capture and implement the dynamic and static elements of an enterprise to manage enterprise change

UNIT I INTRODUCTION **8**

Introduction to Enterprise Applications and their Types, Software Engineering Methodologies, Life Cycle of Raising an Enterprise Application, Introduction to Skills Required to Build an Enterprise Application, Key Determinants of Successful Enterprise Applications, and Measuring the Success of Enterprise Applications.

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UNIT II INCEPTING ENTERPRISE APPLICATIONS 9

Inception of Enterprise Applications, Enterprise Analysis, Business Modeling, Requirements Elicitation, Use Case Modeling, Prototyping, Non Functional Requirements, Requirements Validation, Planning and Estimation.

UNIT III ARCHITECTING AND DESIGNING ENTERPRISE APPLICATIONS 10

Concept of Architecture, Views and Viewpoints, Enterprise Architecture, Logical Architecture, Technical Architecture - Design, Different Technical Layers, Best Practices, Data Architecture and Design – Relational, XML, and Other Structured Data Representations, Infrastructure Architecture and Design Elements - Networking, Internetworking, and Communication Protocols, IT Hardware and Software, Middleware, Policies for Infrastructure Management, Deployment Strategy, Documentation of Application Architecture and Design.

UNIT IV CONSTRUCTING ENTERPRISE APPLICATIONS 9

Construction Readiness of Enterprise Applications - Defining a Construction Plan, Defining a Package Structure, Setting up a Configuration Management Plan, Setting up a Development Environment, Introduction to the Concept of Software Construction Maps, Construction of Technical Solutions Layers, Methodologies of Code Review, Static Code Analysis, Build and Testing, Dynamic Code Analysis – Code Profiling and Code Coverage**.**

UNIT V TESTING AND ROLLING OUT ENTERPRISE APPLICATIONS 9

Types and Methods of Testing an Enterprise Application, Testing Levels and Approaches, Testing Environments, Integration Testing, Performance Testing, Penetration Testing, Usability Testing, Globalization Testing and Interface Testing, User Acceptance Testing, Rolling out an Enterprise Application.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

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

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

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3. Martin Fowler, "Patterns of Enterprise Application Architecture", 1st Edition, Pearson/ Goels Computer Hut Publisher,

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Understand the fundamental of Enterprise applications and key determinants to measure the success.		2	3			3							1		
CO2	Demonstrate an understanding of different modelling techniques used to design Enterprise applications.		2			3					3				3	
CO3	Develop knowledge in designing Enterprise Applications.			3				2		3				2	3	
CO4	Construct Enterprise applications by understanding the design.		2	3		2									2	
CO5	Test and roll out the enterprise applications in real environment.			3	3			3				3				3

718CIE03 **BUSINESS INTELLIGENCE AND ITS APPLICATIONS**

L	T	P	C
3	0	0	3

OBJECTIVE(S):

- To Understand the BI concept and frame work
- To Understand Transaction Processing and Analytical applications and describe the need for Business Intelligence
- To identify the metrics, indicators and make recommendations to achieve the business goal

UNIT I INTRODUCTION TO BUSINESS INTELLIGENCE **9**

Introduction to digital data and its types – structured, semi-structured and unstructured, Introduction to OLTP and OLAP (MOLAP, ROLAP, HOLAP), BI Definitions & Concepts, BI Framework, Data Warehousing concepts and its role in BI, BI Infrastructure Components – BI Process, BI Technology, BI Roles & Responsibilities, Business Applications of BI, BI best practices

UNIT II BASICS OF DATA INTEGRATION (EXTRACTION TRANSFORMATION LOADING) **9**

Concepts of data integration, needs and advantages of using data integration, introduction to common data integration approaches, Meta data - types and sources, Introduction to data quality, data profiling concepts and applications, introduction to ETL using Pentaho data Integration (formerly Kettle).

UNIT III INTRODUCTION TO MULTI-DIMENSIONAL DATA MODELING **9**

Introduction to data and dimension modeling, multidimensional data model, ER Modeling vs. multi dimensional modeling, concepts of dimensions, facts, cubes, attribute, hierarchies, star and snowflake schema, introduction to business metrics and KPIs, creating cubes using Microsoft Excel

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UNIT IV BASICS OF ENTERPRISE REPORTING **9**

A typical enterprise, Malcolm Baldrige - quality performance framework, balanced scorecard, enterprise dashboard, balanced scorecard vs. enterprise dashboard, enterprise reporting using MS Access / MS Excel, best practices in the design of enterprise dashboards.

UNIT IV BI AND MOBILITY **9**

Understanding BI and Mobiltiy,BI and Cloud Computing, Business Intelligence for ERP systems, Social CRM and BI,Case Study-Good Food Restaurants, TenTo Ten Retails stores.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES

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

CO1: Understand concept of data warehousing and data mining along with associated techniques and their benefits to organizations of all sizes

CO2: Determining the relevance of data to business

CO3: Apply common methods used in business intelligence.

CO4: Practice the design enterprise dashboards

CO5: Implement and apply BI techniques using various tools for various situations.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Business intelligence roadmap by Larissa Terpeluk Moss, Shaku Atre
2. An introduction to Building the Data Warehouse – IBM
3. Business Intelligence For Dummies – Swain Scheps
4. Successful Business Intelligence: Secrets to making Killer BI Applications by Cindi Howson
5. Information dashboard design by Stephen Few

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Understand concept of data warehousing and data mining along with associated techniques and their benefits to organizations of all sizes		2	3										1		
CO2	Determining the relevance of data to business								2							
CO3	Apply common methods used in business intelligence.			3				2		3				2	3	
CO4	Practice the design enterprise dashboards		2	3		2									2	
CO5	Implement and apply BI techniques using various tools for various situations.			3	3			3				3				3

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

OBJECTIVE(S):

- Understand logical and physical components of a storage infrastructure
- To study different types of storage area networks
- To gain knowledge in different backup and recovery topologies and their role in providing disaster recovery and business continuity capabilities
- To gain knowledge in information security and identify different storage virtualization technologies

Pre requisites: Computer Networks, Database Systems

UNIT I INTRODUCTION TO STORAGE TECHNOLOGY **9**

Review data creation and the amount of data being created and understand the value of data to a business, challenges in data storage and data management, Solutions available for data storage, Core elements of a data center infrastructure, role of each element in supporting business activities.

UNIT II STORAGE SYSTEMS ARCHITECTURE **9**

Hardware and software components of the host environment, Key protocols and concepts used by each component, Physical and logical components of a connectivity environment , Major physical components of a disk drive and their function, logical constructs of a physical disk, access characteristics, and performance Implications, RAID , RAID levels, Compare and contrast integrated and modular storage systems, High-level architecture and working of an intelligent storage system

UNIT III INTRODUCTION TO NETWORKED STORAGE **9**

Evolution of networked storage, Architecture, components, and topologies of FC -SAN, NAS, and IP-SAN, FCoE , iSCSI Benefits of the different networked storage options, understand the need for long-term archiving solutions and describe how CAS full fill the need, understand the appropriateness of the different networked storage options for different application environments.

UNIT IV INFORMATION AVAILABILITY, MONITORING & MANAGING DATACENTER **9**

Business Continuity**-** Information Availability, RTO and RPO, Identify single points of failure in a storage infrastructure and list solutions to mitigate these failures, Architecture of backup/recovery and the different backup/ recovery topologies, Data Deduplication, Local and Remote replication technologies. Monitoring the storage infrastructure, Information Life cycle Management.

UNIT V SECURING STORAGE AND STORAGE VIRTUALIZATION **9**

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

TOTAL HOURS:45 PERIODS

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COURSE OUTCOMES:

At the end of the course student should be able to

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

CO2: Analyze the different storage systems architecture.

CO3: Analyze different storage networking technologies.

CO4: Ability to identify key challenges in managing information and also describe the different role in providing disaster recovery and business continuity capabilities.

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

REFERENCE BOOKS:

1. EMC Corporation, Information Storage and Management, Wiley, India, 2nd Edition, 2012.
2. Robert Spalding, "Storage Networks: The Complete Reference", Tata McGraw Hill, Osborne, 2003.
3. Marc Farley, "Building Storage Networks", Tata McGraw Hill ,Osborne, 2001.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Ability to identify the key requirements of data center.		2	3				3	3					2		
CO2	Analyze the different storage systems architecture.		3		3		2								3	
CO3	Analyze different storage networking technologies.		3		3			2								3
CO4	Ability to identify key challenges in managing information and also describe the different role in providing disaster recovery and business continuity capabilities.	2		3		3		3						3		
CO5	Ability to identify and analyzes the common threats in different domains.							3		3						3

718CIE05 **AGILE SOFTWARE DEVELOPMENT**

L	T	P	C
3	0	0	3

OBJECTIVES:

- To provide students with a theoretical as well as practical understanding of agile software development practices and how small teams can apply them to create high-quality software.
- To provide a good understanding of software design and a set of software technologies and APIs.
- To do a detailed examination and demonstration of Agile development and testing techniques.
- To understand the benefits and pitfalls of working in an Agile team.
- To understand Agile development and testing.

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UNIT I AGILE METHODOLOGY **9**

Theories for Agile Management – Agile Software Development – Traditional Model vs. Agile Model – Classification of Agile Methods – Agile Manifesto and Principles – Agile Project Management – Agile Team Interactions – Ethics in Agile Teams – Agility in Design, Testing – Agile Documentations – Agile Drivers, Capabilities and Values.

UNIT II AGILE PROCESSES **9**

Lean Production – SCRUM, Crystal, Feature Driven Development- Adaptive Software Development – Extreme Programming: Method Overview – Lifecycle – Work Products, Roles and Practices.

UNIT III AGILITY AND KNOWLEDGE MANAGEMENT **9**

Agile Information Systems – Agile Decision Making – Earl_S Schools of KM – Institutional Knowledge Evolution Cycle – Development, Acquisition, Refinement, Distribution, Deployment, Leveraging – KM in Software Engineering – Managing Software Knowledge – Challenges of Migrating to Agile Methodologies – Agile Knowledge Sharing – Role of Story-Cards – Story-Card Maturity Model (SMM).

UNIT IV AGILITY AND REQUIREMENT ENGINEERING **9**

Impact of Agile Processes in RE–Current Agile Practices – Variance – Overview of RE Using Agile – Managing Unstable Requirements – Requirements Elicitation – Agile Requirements Abstraction Model – Requirements Management in Agile Environment, Agile Requirements Prioritization – Agile Requirements Modeling and Generation – Concurrency in Agile Requirements Generation.

UNIT V AGILITY AND QUALITY ASSURANCE **9**

Agile Product Development – Agile Metrics – Feature Driven Development (FDD) – Financial and Production Metrics in FDD – Agile Approach to Quality Assurance – Test Driven Development – Agile Approach in Global Software Development.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

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

CO1: Realize the importance of interacting with business stakeholders in determining the requirements for a software system

CO2: Perform iterative software development processes: how to plan them, how to execute them.

CO3: Point out the impact of social aspects on software development success.

CO4: Develop techniques and tools for improving team collaboration and software quality.

CO5: Perform Software process improvement as an ongoing task for development teams and Show how agile approaches can be scaled up to the enterprise level.

TEXT BOOKS:

1. David J. Anderson and Eli Schragenheim, —Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results, Prentice Hall, 2003.
2. Hazza and Dubinsky, —Agile Software Engineering, Series: Undergraduate Topics in Computer Science, Springer, 2009.

REFERENCES:

1. Craig Larman, —Agile and Iterative Development: A Managers Guide, Addison-Wesley, 2004.
2. Kevin C. Desouza, —Agile Information Systems: Conceptualization, Construction, and Management, Butterworth-Heinemann, 2007.

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Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Realize the importance of interacting with business stakeholders in determining the requirements for a software system										2				2	
CO2	CPerform iterative software development processes: how to plan them, how to execute them.		2											2		
CO3	Point out the impact of social aspects on software development success.		3													
CO4	Develop techniques and tools for improving team collaboration and software quality.					3										
CO5	Perform Software process improvement as an ongoing task for development teams and Show how agile approaches can be scaled up to the enterprise level.											3				3

718CIE06 **CYBER SECURITY AND LAW**

L	T	P	C
3	0	0	3

OBJECTIVES:

Upon Completion of this course, the students will be familiar with

- Cybercrime and Cyber offence.
- Cybercrime using mobile devices.
- Tools and methods used in cybercrime.
- Fundamental of Computer Forencics.

UNIT I INTRODUCTION TO CYBERCRIME AND CYBER OFFENCE **9**

Cybercrime and Information Security, Classifications of Cybercrimes, Cybercrime: The Legal Perspectives, Cybercrimes: Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes, Cybercrime Era: Survival Mantra for the Netizens. Cyber offenses: How Criminals Plan Them: How Criminals Plan the Attacks, Social Cyber stalking Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector, Cloud Computing.

UNIT II CYBERCRIME: MOBILE AND WIRELESS DEVICES **9**

Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Fraudsin Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

UNIT III TOOLS AND METHODS USED IN CYBERCRIME **9**

Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks. **Phishing and Identity Theft:** Introduction, Phishing, Identity Theft (ID Theft).

UNIT IV UNDERSTANDING COMPUTER FORENSICS **9**

Introduction, Historical Background of Cyber forensics, Digital Forensics Science, The Need for Computer Cyber forensics and Digital Evidence, Forensics Analysis of E-Mail, Digital Forensics Life Cycle, Chain of Custody Concept, Network Forensics, Approaching a Computer Forensics Investigation, Setting up a Computer Forensics Laboratory: Understanding the Requirements, Computer Forensics and Steganography, Relevance of the OSI 7 Layer Model to Computer Forensics, Forensics and Social Networking Sites: The Security/Privacy Threats, Computer Forensics from Compliance Perspective, Challenges in Computer Forensics, Special Tools and Techniques, Forensics Auditing, Anti forensics.

UNIT V THE 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 andPunishment.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

On completion of the course, the student will be able to,

CO1: Discriminate and analyze problems involved in cybercrime

CO2: Synthesis cybercrime issues on wireless and mobile devices

CO3: Use and apply modern cyber forensics tools

CO4: Analyze the computer forensic problems for a feasible solution

CO5: Apply cyber law for a given type of cyber issues**.**

TEXT BOOKS:

1. SunitBelapure and Nina Godbole, “Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives”, Wiley India Pvt Ltd, ISBN: 978-81-265- 21791, Publish Date 2013
2. Dr. Surya Prakash Tripathi, RitendraGoyal, Praveen Kumar Shukla, KLSI. “Introduction to information security and cyber laws”. Dreamtech Pre ss. ISBN: 9789351194736, 2015

REFERENCE BOOKS:

1. Thomas J. Mowbray, “Cybersecurity: Managing Systems, Conducting Testing, and Investigating Intrusions”, Copyright © 2014 by John Wiley & Sons, Inc, ISBN: 91-118 -84965 -1
2. James Graham, Ryan Olson, Rick Howard, “Cyber Security Essentials”, CRC Press, 15-Dec-2010.

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Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Discriminate and analyze problems involved in cybercrime		2													
CO2	Synthesis cybercrime issues on wireless and mobile devices				3											
CO3	Use and apply modern cyber forensics tools					3			2					2		
CO4	Analyze the computer forensic problems for a feasible solution		2												3	
CO5	Apply cyber law for a given type of cyber issues**.**	2													2	

718ITE07 **AD HOC AND SENSOR NETWORKS**

L	T	P	C
3	0	0	3

OBJECTIVE(S):

- Learn the architecture and design issues in Ad Hoc and Sensor Network.
- Familiarize different types of MAC protocols in Ad Hoc Networks.
- Know the fundamental of routing protocols in Ad Hoc Networks.
- Understand the basic concepts of WSN.
- Imparts knowledge of routing in WSN.

PREREQUISITES: Computer Networks

UNIT I INTRODUCTION **9**

Fundamentals of Wireless Communication Technology – Ad Hoc and Sensor Network Concepts and Architecture – Characteristics of Ad Hoc and Sensor Network – Design Issues and Challenges in Ad Hoc and Sensor Network – Applications of Ad Hoc and Sensor Network –**Design Challenges in Adhoc and Sensor Networks**.

UNIT II MAC PROTOCOLS FOR AD HOC NETWORKS **9**

Classifications – Contention based Protocols: MACAW – MACA by Invitation. Contention based Protocols with Reservation Mechanism: Distributed Packet Reservation Multiple Access Protocol – Collision Avoidance Multiple Access Protocol – Hop Reservation Multiple Access Protocol – Soft Reservation with Multiple Access Priority Assignment – Five Phase Reservation Protocol – Real Time Medium Access Protocol. Contention based MAC Protocols with Scheduling Mechanism: Distributed Priority Scheduling and Medium access in Ad Hoc Networks.

UNIT III ROUTING PROTOCOLS IN AD HOC NETWORKS 9

Classifications - Table Driven Routing Protocols: DSDV – WRP – CHGS . On Demand Routing Protocols: DSR – AODV – TORA – LAR . Hybrid Routing Protocols: - Core Extraction Distributed Ad Hoc Routing Protocol – ZRP. Power Aware Routing Protocols: Power aware Routing Metrics – Minimal Energy Consumption Per Packet–Maximize Network Connectivity – Minimum Cost per Packet.

UNIT IV WIRELESS SENSOR NETWORKS 9

Single node Architecture:Hardware and software components of sensor node-WSN architecture – MAC Protocols for Sensor Networks: Self Organizing – Hybrid TDMA/FDMA - CSMA based MAC protocol. Location Discovery: Indoor and Sensor Network Localization –QoS in Sensor Network.

UNIT V ROUTING IN WIRELESS SENSOR NETWORKS 9

Directed Diffusion – Sequential Assignment Routing – Minimum Cost forwarding – Coherent and Non-Coherent Processing – Energy Aware Routing – Hierarchical Routing – Cluster based Routing Protocol – LEACH – TEEN –PEGASIS – MECN.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

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

- **CO1:** Explain the concepts, architecture and applications of Ad Hoc and WSN.
- CO2: Describe the MAC protocol issues of Ad Hoc networks.
- **CO3:** Design Ad Hoc routing protocols with respect to some protocol design issues.
- **CO4:** Identify different MAC protocols and evaluate the QOS related performance measurement of Sensor Networks.
- **CO5:** Recognize various routing protocols and its issues in WSN.

TEXT BOOKS:

1. C. Siva Ram Murthy and B.S. manoj, “Ad Hoc Wireless Networks – Architectures and Protocols”, Pearson Education, 2012.
2. Carlos de Morais Cordeiro, Dharma Prakash Agrwal, Ad Hoc and Sensor Network: Theory and Applications, 2nd Edition, World Scientific Publishing Co, 2011.

REFERENCES:

1. Feng Zhao and Leonidas Guibas, “Wireless Sensor Networks”, Morgan Kaufman Publishers, 2004.
2. C.K.Toh, “Ad Hoc Mobile Wireless Networks”, Pearson Education, 2007.
3. Kazem Sohraby, Daniel Minoli, Taieb Znati, “Wireless Sensor Networks: Technology, Protocols and Applications”, Wiley Interscience A John Wiley & sons, INC., Publication, 2007.
4. Amiya Nayak, Ivan Stojmenovic, “Wireless Sensor and Actuator Networks – Architecture and
5. Protocols”, Pearson Education, 2010.
6. Thomas Krag and Sebastin Buettrich, “Wireless Mesh Networking”, O’Reilly Publishers, 2007.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Explain the concepts, architecture and applications of Ad Hoc and WSN.	2														1
CO2	Describe the MAC protocol issues of Ad Hoc networks.															
CO3	Design Ad Hoc routing protocols with respect to some protocol design issues.			3										2		
CO4	Identify different MAC protocols and evaluate the QOS related performance measurement of Sensor Networks.		2			3								2		
CO5	Recognize various routing protocols and its issues in WSN.				3										3	

718ITE08 **CLOUD COMPUTING** **L T P C**
3 0 0 3

OBJECTIVES:

- To understand the concept of cloud and utility computing.
- To understand the various issues in cloud computing.
- To familiarize themselves with the lead players in cloud.
- To appreciate the emergence of cloud as the next generation computing paradigm.
- To use cloud platforms

UNIT-I INTRODUCTION **8**

Introduction - Historical Development - Cloud Computing Architecture – The Cloud Reference Model-**NIST Cloud Computing Reference Architecture** – Cloud Characteristics – Cloud Deployment Models: Public, Private, Community, Hybrid Clouds - Cloud Delivery Models: IaaS, PaaS, SaaS – Open Source Private Cloud Software: Eucalyptus, Open Nebula, Open Stack.

UNIT-II VIRTUALIZATION **9**

Data Center Technology - Virtualization - Characteristics of Virtualized Environments - Taxonomy of Virtualization Techniques – Virtualization and Cloud Computing – Pros and Cons of Virtualization - Implementation Levels of Virtualization - Tools and Mechanisms: Xen, VMWare, Microsoft Hyper-V.

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UNIT-III CLOUD COMPUTING MECHANISM **10**

Cloud Infrastructure Mechanism: Cloud Storage-**Storage-as-a-Service – Advantages of Cloud Storage – Cloud Storage Providers – S3-**Cloud Usage Monitor, Resource Replication – Specialized Cloud Mechanism: Load Balancer, SLA Monitor, Pay-per-use Monitor, Audit Monitor, Failover System, Hypervisor, Resource Cluster, Multi Device Broker, State Management Database – Cloud Management Mechanism: Remote Administration System, Resource Management System, SLA Management System, Billing Management System.

UNIT-IV HADOOP AND MAP REDUCE **9**

Apache Hadoop – Hadoop Map Reduce – Hadoop Distributed File System- Hadoop I/O- Developing a Map Reduce Application - Map Reduce Types and Formats - Map Reduce Features– Hadoop Cluster Setup – Administering Hadoop.

UNIT-V SECURITY IN THE CLOUD **9**

Basic Terms and Concepts – Threat Agents – Cloud Security Threats – Cloud Security Mechanism: Encryption, Hashing, Digital Signature, Public Key Infrastructure, Identity and Access Management, Single Sign-on, Cloud Based Security Groups, Hardened Virtual Server Images.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

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

CO1: Analyze the architecture of Cloud computing stack

CO2: Differentiate between full and para virtualization

CO3: Identify the architecture, storage, infrastructure and delivery models of cloud computing

CO4: Design and apply Map Reduce Programming model.

CO5: Understand the necessity and approaches for cloud security.

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.
6. John Rittinghouse and James Ransome, Cloud Computing, Implementation, Management and Strategy, CRC Press, 2010.
7. Barrie Sosinsky, "Cloud Computing Bible", Wiley, 2010.

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Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Analyze the architecture of Cloud computing stack		3	3	3	3										2
CO2	Differentiate between full and para virtualization	3		2	2	3										
CO3	Identify the architecture, storage, infrastructure and delivery models of cloud computing		3	2	3	3								1	2	
CO4	Design and apply Map Reduce Programming model.		3	3	3	3								3	3	3
CO5	Understand the necessity and approaches for cloud security.	2		2	2	3	3	3						2	2	3

718ITE09 **ADVANCED JAVA SCRIPTINGLANGUAGE** **L T P C**
3 0 0 3

OBJECTIVE(S):

- 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.

PREREQUISITE: Java Programming

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 andStream – 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 PERIODS

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COURSE OUTCOMES

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

CO1: Understand about JavaScript objects.

CO2: Design Database access with AJAX & JSON.

CO3: Build real world applications using Angular JS.

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

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

TEXT BOOKS

1. Harvey M. Deitel and Paul J.Deitel, Internet & World Wide Web How to Program, Pearson Education, 2018.
2. John Dean, "Web Programming with HTML5, CSS, and JavaScript", Jones & Bartlett Learning, US, 2018

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.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO 1	Understand about JavaScript objects.	3		2												
CO 2	Design Database access with AJAX & JSON.			3										1		
CO 3	Build real world applications using Angular JS.		2				6								2	
CO 4	Develop a dynamic website using advanced features of Node JS.					3				3						3
CO 5	Develop a dynamic website using advanced features of React JS.					3				3						3

718ITE10 **SOFTWARE TESTING**

L	T	P	C
3	0	0	3

OBJECTIVES:

The student should be made to:

- To learn the criteria for test cases.
- To learn the design of test cases.
- To understand test management and test automation techniques.
- To apply test metrics and measurements.

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prerequisites: Nil

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 easurements - project, progress and productivity metrics. Case Study: Selenium, Appium.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES

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

CO1: Design test cases suitable for a software development for different domains.

CO2: Identify suitable tests to be carried out.

CO3: Prepare test planning based on the document.

CO4: Document test plans and test cases designed.

CO5: Use automatic testing tools and develop and validate a test plan.

TEXT BOOKS:

1. Srinivasan Desikan and Gopalaswamy Ramesh, “Software Testing - Principles and Practices”, Pearson Education, 2006.

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2. Ron Patton, “Software Testing”, Second Edition, Sams Publishing, Pearson Education, 2007.

REFERENCES:

1. Ilene Burnstein, - Practical Software Testing, Springer International Edition, 2003.
2. Edward Kit Software Testing in the Real World - Improving the Process, Pearson Education, 1995.
3. Boris Beizer, Software Testing Techniques – 2nd Edition, Van Nostrand Reinhold, New York, 1990.
4. Aditya P. Mathur, - Foundations of Software Testing - Fundamental Algorithms and Techniques, Dorling Kindersley (India) Pvt. Ltd., Pearson Education, 2008.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Design test cases suitable for a software development for different domains.	2	2		3	2						2		3		3
CO2	Identify suitable tests to be carried out.		3		3	3								2	3	3
CO3	Prepare test planning based on the document.		3	2	2	3								2		3
CO4	Document test plans and test cases designed.			2	2	3						3			3	3
CO5	Use automatic testing tools and Develop and validate a test plan.		2	3	3	3								2		

818CIE01 **SOFTWARE DEFINED NETWORKS**

L	T	P	C
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OBJECTIVE(S):

- Fundamentals of Software Defined Networks.
- Separation of the data Plane and Control Plane.
- Principles of Software Defined Network Programming.
- Various Applications of Software Defined Networks.

Prerequisites: Nil

UNIT-I INTRODUCTION **9**

History Of Software Defined Networking (SDN) – Modern Data Centre – Traditional Switch Architecture – Need For SDN: Evolution Of Switches And Control Planes –Working of SDN – Fundamental Characteristics Of SDN, SDN Operation, SDN Devices, SDN Controller.

UNIT-II OPEN FLOW AND SDN CONTROLLERS **10**

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

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UNIT-III DATA CENTRES 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 PROGRAMMING AND APPLICATIONS 9

Network Function Virtualization –SDN Vs NFV– Types of Applications - SDN Controllers - Controller Considerations – Network Device Considerations – Creating Network Virtualization Tunnels – Offloading Flows in Data Centre – Access Control For Campus – Traffic Engineering For Service Providers.

UNIT-V SDN OPEN SOURCE 8

Openflow – Switch Implementation – Controller Implementation – Orchestration and Network Virtualization – Simulation, Testing and Tools – Open Source Cloud Software: Open Stack, Cloud Stack – Juniper SDN Framework – IETF SDN Framework – Open Daylight Controller.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

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

CO1: Compare and contrast between traditional switch architecture and software defined network.

CO2: Describe the functionality of Open flow protocol and SDN controllers

CO3: Illustrate use of software defined network in data centre.

CO4: Design and develop various applications of SDN.

CO5: Demonstrate the SDN open source framework and software.

TEXT BOOKS:

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. Siamak 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 and Design", CRC Press, 2014.

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Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Compare and contrast between traditional switch architecture and software defined network.		3													
CO2	Describe the functionality of Open flow protocol and SDN controllers			3												
CO3	Illustrate use of software defined network in data centre.		2		3									2		
CO4	Design and develop various applications of SDN.		3			2									3	
CO5	Demonstrate the SDN open source framework and software.			3												3

818ITE02 **INFORMATION SECURITY** **L T P C**
3 0 0 3

OBJECTIVE(S):

- To understand framing of various security models.
- To know the various forms of attacks
- To understand the risk management
- To become aware of various standards in this area
- To learn, to protect using physical secure design and cryptographic techniques

Prerequisites: Nil

UNIT-I INTRODUCTION **9**

History, Introduction to Information Security, Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, the SDLC, the Security SDLC.

UNIT-II SECURITY INVESTIGATION & ETHICS **9**

Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues.

UNIT-III SECURITY ANALYSIS **9**

Risk Management: An Overview of risk management, Risk identification & Assessment, Risk control Strategies, **Selecting risk control strategies,** Quantitative versus Qualitative risk control practices

UNIT-IV LOGICAL DESIGN **9**

Blueprint for Security, Information Security Policy, Standards and Practices, ISO 17799/BS 7799, NIST Models, VISA International Security Model, Design of Security Architecture, Planning for Continuity.

UNIT-V PHYSICAL DESIGN **9**

Security Technology, IDS, Scanning and Analysis Tools, Access Control Devices, Physical Security, Security and Personnel, Digital forensics.

TOTAL HOURS:45 PERIODS

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COURSE OUTCOMES:

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

CO1: Demonstrate various security models in Information Security.

CO2: Formulate information security governance, and related legal and regulatory issues

CO3: Analyse risks in a given activity and write the impact of risk.

CO4: Become aware of various standards in the Information Security System

CO5: Construct network security designs using available secure solutions

TEXT BOOKS:

1. Michael E. Whitman and Herbert J Mattord, "Principles of Information Security", 6th Edition, Vikas Publishing House, 2018.
2. Micki Krause, Harold F. Tipton, "Handbook of Information Security Management Vol 1-3 CRC Press LLC, 2008.

REFERENCE BOOKS:

1. Stuart Mc Clure, Joel Scrambray, George Kurtz, "Hacking Exposed", Tata McGraw-Hill, 2003
2. Matt Bishop, "Computer Security Art and Science", Pearson/PHI, 2002.
3. Charles P.Pfleeger, Shari Lawrence Pfleeger, "Security in computing", 4th Edition, Pearson Publication, 2012.
4. Marjie T.Britz, "Computer Forensics and Cyber Crime": An Introduction", 3 rd Edition, Prentice Hall, 2013.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Demonstrate various security models in Information Security.		2													
CO2	Formulate information security governance, and related legal and regulatory issues							2	3					2		
CO3	Analyse risks in a given activity and write the impact of risk.		3	3	3			3						3	3	
CO4	Become aware of various standards in the Information Security System						2		3							3
CO5	Construct network security designs using available secure solutions.		1	3	1		3									3

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818ITE03	SWARM INTELLIGENCE	L	T	P	C
		3	0	0	3

OBJECTIVE(S):

- To evaluate the power and limitation of Swarm Intelligence when it comes to solving problems.
- To advance the state of the art in Swarm Intelligence.
- To introduce students to academic research.

Prerequisites: Computational Intelligence

UNIT-I INTRODUCTION **9**

Fundamentals of problems: Optimization - Modelling - Simulation, Search problems, NP Problems, Sources of Inspiration: Swarm Intelligence algorithms - Non Swarm Intelligence algorithms, Biological foundations of Swarm Intelligence**.**

UNIT-II OPTIMIZATION ALGORITHMS **9**

Particle Swarm Optimization: Swarms - Operating Principles - Algorithm - Neighbourhood Topologies, Variations, Ant Colony Optimization: Ant Foraging Behaviour - Theoretical Considerations - Algorithm -Variations, Introduction to Artificial Bee Colony Optimization, Applications: N-Queens problem - Knapsack problem

UNIT-III COMPUTING ALGORITHMS **9**

Bat Algorithm: Basics - Variants, Artificial Fish Swarm: Fish Swarm Optimization - variants, Firefly algorithm: Introduction - Variants, Introduction to Flower Pollination algorithm, Applications: Scheduling, Shortest path

UNIT - IV LOCAL SEARCH AND HYBRID ALGORITHMS **9**

Simulated annealing, Tabu search, Cuckoo Search: Cuckoo Search Algorithm - Cuckoo search variants, Hybrid algorithms, Application: Minimum spanning tree problem – Travelling Salesman Problem.

UNIT -V MULTIOBJECTIVE OPTIMIZATION **9**

Principles of multi objective optimization, Dominance and Pareto Optimality, Methods: Non- Elitist multi objective Algorithms, Elitist multi objective algorithms.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

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

CO1: Gain knowledge of modelling swarms/social/Biological agents in complex landscapes.
CO2: Apply swarm intelligence algorithms to solve real optimization problems
CO3: Solve some applications using advanced computing algorithms like Bat, Fish
CO4: Understand and apply local and hybrid algorithms to solve complex problems
C05: Illustrate various multi objective optimization.

TEXT BOOKS:

1. Aboul Ella Hassanien and Eid Emary, "Swarm Intelligence: Principles, Advances, and Applications", CRS Press, Boca Raton, 2018.
2. Eiben A.E and Smith J.E, "Introduction to Evolutionary Computing", 2nd Edition, Springer, New York, 2015.

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REFERENCES

1. Neumann, Frank, and Carsten Witt, "Bioinspired Computation in Combinatorial Optimization: algorithms and their Computational Complexity", Springer, New York, 2010.
2. Satchidananda Dehuri, Alok Kumar Jagadev and Mrutyunjaya Panda, "Multi-objective Swarm Intelligence: Theoretical Advances and Applications", Springer, New York, 2015.
3. Kalyanmoy Deb, "Multi-objective optimization using evolutionary algorithms", John Wiley & Sons, USA,2010.
4. Andries P.Engelbrecht, "Computational Intelligence: An Introduction", John Wiley & Sons, USA, 2007.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Gain knowledge of modelling swarms/social/Biological agents in complex landscapes.	2														
CO2	Apply swarm intelligence algorithms to solve real optimization problems				3									2		
CO3	Solve some applications using advanced computing algorithms like Bat, Fish				3										3	
CO4	Understand and apply local and hybrid algorithms to solve complex problems	2			2											
CO5	Illustrate various multi objective optimization.					3									2	

818CIE04 **GREEN COMPUTING**

L	T	P	C
3	0	0	3

OBJECTIVE(S):

To learn the fundamentals of Green Computing.

- To analyze the Green Computing Grid Framework.
- To understand the issues related with Green compliance.
- To study and develop various case studies.

Prerequisites: Nil

UNIT-I F**UNDAMENTALS** **9**

Green IT Fundamentals: Business, IT, and the Environment – Green computing: carbon foot print, scoop on power – Green IT Strategies: Drivers, Dimensions, and Goals – Environmentally Responsible Business: Policies, Practices, and Metrics.

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UNIT-II GREEN ASSETS AND MODELING 9

Green Assets: Buildings, Data Centers, Networks, and Devices – Green Business Process Management: Modeling, Optimization, and Collaboration – Green Enterprise Architecture – Environmental Intelligence – Green Supply Chains – Green Information Systems: Design and Development Models.

UNIT-III GRID FRAMEWORK 9

Virtualization of IT systems – Role of electric utilities, Telecommuting, teleconferencing and teleporting – Materials recycling – Best ways for Green PC – Green Data center – Green Grid framework.

UNIT-IV GREEN COMPLIANCE 9

Socio-cultural aspects of Green IT – Green Enterprise Transformation Roadmap – Green Compliance: Protocols, Standards, and Audits – Emergent Carbon Issues: Technologies and Future.

UNIT-V CASE STUDIES 9

The Environmentally Responsible Business Strategies (ERBS) – Case Study Scenarios for Trial Runs – Case Studies – Applying Green IT Strategies and Applications to a **Home**, Hospital, Packaging Industry and Telecom Sector.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

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

CO1: Acquire knowledge to adopt green computing practices to minimize negative impacts on the environment

CO2: Enhance the skill in energy saving practices in their use of hardware

CO3: Acquire knowledge on grid framework

CO4: Evaluate technology tools that can reduce paper waste and carbon footprint by the Stakeholders

CO5: Develop and analyze few case studies.

TEXT BOOKS:

1. Bhuvan Unhelkar, —Green IT Strategies and Applications-Using Environmental Intelligence‖, CRC Press, June 2014.
2. Woody Leonhard, Katherine Murray, —Green Home computing for dummies‖, August 2012.

REFERENCES:

1. Alin Gales, Michael Schaefer, Mike Ebbers, —Green Data Centre: steps for the Journey‖, Shroff/IBM rebook, 2011.
2. John Lamb, —The Greening of IT‖, Pearson Education, 2009.
3. Jason Harris, —Green Computing and Green IT- Best Practices on regulations & industry‖, Lulu.com, 2008
4. Carl speshocky, —Empowering Green Initiatives with IT‖, John Wiley & Sons, 2010.
5. Wu Chun Feng (editor), —Green computing: Large Scale energy efficiency‖, CRC Press.

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Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Acquire knowledge to adopt green computing practices to minimize negative impacts on the environment						2	3						2		
CO2	Enhance the skill in energy saving practices in their use of hardware						2									
CO3	Enhance the skill in energy saving practices in their use of hardware				2											
CO4	Evaluate technology tools that can reduce paper waste and carbon footprint by the Stakeholders						3	3							3	
CO5	Develop and analyse few case studies				3								2			2

818ITE05 **COMPUTER FORENSICS** **L T P C**
3 0 0 3

OBJECTIVES:

- It helps to recover, analyze, and preserve computer and related materials in such a manner that it helps the investigation agency to present them as evidence in a court of law.
- It helps to postulate the motive behind the crime and identity of the main culprit.
- Designing procedures at a suspected crime scene which helps you to ensure that the digital evidence obtained is not corrupted.
- Data acquisition and duplication: Recovering deleted files and deleted partitions from digital media to extract the evidence and validate them.
- Helps you to identify the evidence quickly, and also allows you to estimate the potential impact of the malicious activity on the victim

UNIT-I INTRODUCTION TO COMPUTER FORENSICS **9**

Introduction to Traditional Computer Crime, Traditional problems associated with Computer Crime. Introduction to Identity Theft & Identity Fraud. Types of CF techniques - Incident and incident response methodology - Forensic duplication and investigation. Preparation for IR: Creating response tool kit and IR team. - Forensics Technology and Systems - Understanding Computer Investigation – Data Acquisition.

UNIT-II EVIDENCE COLLECTION AND FORENSICS TOOLS **9**

Processing Crime and Incident Scenes – Working with Windows and DOS Systems. Current Computer Forensics Tools: Software/ Hardware Tools.

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UNIT-III ANALYSIS AND VALIDATION **9**

Validating Forensics Data – Data Hiding Techniques – Performing Remote Acquisition – Network Forensics – Email Investigations – Cell Phone and Mobile Devices Forensics

UNIT-IV ETHICAL HACKING **9**

Introduction to Ethical Hacking - Foot printing and Reconnaissance - Scanning Networks - Enumeration - System Hacking - Malware Threats - Sniffing

UNIT-V ETHICAL HACKING IN WEB **9**

Social Engineering - Denial of Service - Session Hijacking - Hacking Web servers - Hacking Web Applications – SQL Injection - Hacking Wireless Networks - Hacking Mobile Platforms.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

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

CO1: Understand the basics of computer forensics

CO2: Apply a number of different computer forensic tools to a given scenario

CO3: Analyse and validate forensics data

CO4: Identify the vulnerabilities in a given network infrastructure

C05: Implement real-world hacking techniques to test system security.

TEXT BOOKS:

1.Bill Nelson, Amelia Phillips, Frank Enfinger, Christopher Steuart, - Guide to Computer Forensics and Investigations‖, Cengage Learning, India Edition, 2018.

2. CEH official Certfied Ethical Hacking Review Guide, Wiley India Edition, 2015.

REFERENCES:

1.John R.Vacca, —Computer Forensics‖, Cengage Learning, 2009

2.MarjieT.Britz, —Computer Forensics and Cyber Crime‖: An Introduction‖, 3rd Edition, Prentice Hall, 2013.

3.AnkitFadia — Ethical Hacking‖ Second Edition, Macmillan India Ltd, 2006

4.Kenneth C.Brancik —Insider Computer Fraud‖ Auerbach Publications Taylor & Francis Group–2008.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Understand the basics of computer forensics	2														
CO2	Apply a number of different computer forensic tools to a given scenario					3								2		
CO3	Analyse and validate forensics data		2													
CO4	Identify the vulnerabilities in a given network infrastructure		2		3										3	
CO5	Implement real-world hacking techniques to test system security							3	2							3

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818ITE06	SOFTWARE PROJECT MANAGEMENT	L	T	P	C
		3	0	0	3

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

Prerequisite: Software Engineering

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 PERIODS

COURSE OUTCOMES:

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

CO1: Understand Project Management principles and the roles of the Project Manager while developing software

CO2: Evaluate a project and provide accurate cost estimates and to plan various activities

CO3: Identify and Evaluate risks involved in various Project

CO4: Apply best practices to develop skills in Monitoring and Controlling of Software Projects

CO5: Learn staff selecting process and issues related to people management

TEXT BOOKS:

1. Bob Hughes, Mike Cotterell," Software Project Management", Fifth Edition, Tata McGraw Hill, 2012.
2. 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.
6. Walker Royce," Software Project Management A Unified Framework", Pearson Education, 2004.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
Co1	Understand Project Management principles and the roles of the Project Manager while developing software	2										2		1		
Co2	Evaluate a project and provide accurate cost estimates and to plan various activities			3												
Co3	Identify and Evaluate risks involved in various Project		3													
Co4	Apply best practices to develop skills in Monitoring and Controlling of Software Projects						2								3	3
Co5	Learn staff selecting process and issues related to people management							2		3						

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

OBJECTIVE(S):

- To learn fundamentals of SOA
- 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

Prerequisites: Nil

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UNIT- I FUNDAMENTALS OF SOA AND WEB SERVICES 9

Fundamentals of service oriented architecture – Common characteristics of SOA– Benefits of SOA – Evolution of SOA– SOA timeline – Web services– Message exchange patterns– Service activity– Coordination– Atomic transactions– Business activities– Orchestration– Choreography.

UNIT-II SOA BASICS 9

Service Oriented Architecture (SOA) – Comparing SOA with Client-Server and Distributed architectures - Characteristics of SOA – Benefits of SOA -- Principles of Service orientation – Service layers - Business Process management

UNIT-III SERVICE ORIENTED ANALYSIS 9

SOA delivery strategies – SOA delivery lifecycle phases – Top-down strategy – Bottom-up strategy – Agile strategy – Introduction to service oriented analysis – Benefits of a business centric SOA – Deriving business services – Service modelling – Step by step process – Classifying service model logic.

UNIT-IV SERVICE ORIENTED DESIGN 9

Introduction – WSDL– Related schema language basics – WSDL language basics – SOAP language basics – Service interface design tools – Steps to composing SOA – Service design overview – Entity centric business service design – Application service design – Task centric business service design.

UNIT-V WEB SERVICES EXTENSIONS 9

WS-BPEL language basics – WS-Coordination overview – Service oriented business process design – Comparison of service orientation and object orientation –Tale of two design paradigms – Comparison of goals – Comparison of fundamental concepts and design principles.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

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

CO1: Explain the basic concepts of service oriented architecture and web services.
CO2: Explain service orientation principles and service layers of SOA.
CO3: Explore various service delivery strategies and service modelling.
CO4: Use the basic tools and languages for service oriented design.
CO5: Compare service and object orientation methodologies.

TEXT BOOKS:

1. Thomas Erl, “Service–Oriented Architecture: Concepts, Technology, and Design”, Prentice Hall, 1st edition, 2016.

REFERENCE BOOKS:

1. Thomas Erl, “SOA Principles of Service Design”, The Prentice Hall Service–Oriented Computing Series from Thomas Erl, 1st edition, 2008.
2. Newcomer, Lomow, “Understanding SOA with Web Services”, Pearson Education, 1st edition, 2005.
3. Frank P.Coyle, “XML, Web services and the data revolution”, Pearson education, 1st edition, 2002..

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Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Explain the basic concepts of service oriented architecture and web services.	2										2		1		
CO2	Explain service orientation principles and service layers of SOA.			3												
CO3	Explore various service delivery strategies and service modelling.		3													
CO4	Use the basic tools and languages for service oriented design.						2								3	3
CO5	Compare service and object orientation methodologies.							2		3						

818ITE08 **VIRTUAL AND AUGMENTED REALITY**

L	T	P	C
3	0	0	3

OBJECTIVE(S):

- Basic components, input devices and output devices of Virtual Reality systems.
- Computing architecture, Modeling and programming toolkits of VR systems.
- Various applications of VR systems.
- Basics and functional components of AR systems.
- Content, Interaction and applications of AR systems.

Prerequisites: NIL

UNIT-I INTRODUCTION TO VIRTUAL REALITY **9**

The three I's of VR – Basic components of a VR system – VR input devices – 3D position Trackers Navigation and manipulation interfaces – Gesture interfaces – Output devices Graphics – Sound – Haptic feedback.

UNIT-II VR ARCHITECTURE, MODELING AND PROGRAMMING **9**

VR computing architecture – Rendering pipeline – PC graphics architecture – Workstation Based architecture – Distributed architecture – Modeling – Geometric modeling – Kinematics Modeling behavior modeling – VR Programming – Toolkits and scene graphs – World toolkit Java 3D – General haptic open software toolkits – People shop.

UNIT-III VR APPLICATIONS **9**

Medical applications of VR – Education, Art and entertainment – Military applications – VR Applications in manufacturing – VR in Robotics – Information visualization

UNIT IV AUGMENTED REALITY **9**

Introduction to Augmented Reality – Working of AR – Ingredients of AR – Hardware Components of AR systems – Software components of AR systems.

UNIT V AR APPLICATIONS **9**

Creating visual, audio and sensible contents – Interaction in AR – Application areas of Augmented Reality – Applying and evaluating augmented reality – Introduction to Mobile AR –Architecture of Mobile AR systems – Advantages/Disadvantages of Mobile AR.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

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

CO1: Identify and explain the components of VR systems.

CO2: Model and program the VR systems.

CO3: Realize the importance and applications of VR systems.

CO4: Identify and explain the components of AR systems.

CO5: Realize the importance and applications of AR systems.

TEXT BOOKS:

1. Grigore C.Burdea, Philippe Coiffet, "Virtual Reality: Technology", Wiley India, 2nd edition, 2016.
2. Alan B.Craig, "Understanding Augmented Reality: Concepts and Applications", Morgan Kaufmann publications, 1st edition, 2013.

REFERENCE BOOKS:

1. Sherman, William R. and Alan B. Craig, "Understanding Virtual Reality – Interface, Application, and Design", Morgan Kaufmann, 2002.
2. Fei GAO, "Design and Development of Virtual Reality Application System", Tsinghua Press, March 2012.
3. Greg Kipper, Joseph Rampolla, "Augmented Reality: An Emerging Technologies Guide to AR", Syngress, 2013.
4. Jon Peddie, "Augmented Reality", where we will all live, sprnget, 2017.
5. Johb Bucher, "Stongtelling for virtual reality : Methods and principles for crafting immersive narratives", Focal Press Book 2018.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Identify and explain the components of VR systems.		3													
CO2	Model and program the VR systems.						3							2		
CO3	Realize the importance and applications of VR systems.					3									3	
CO4	Identify and explain the components of AR systems.			2												
CO5	Realize the importance and applications of AR systems.				3			2								3

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818ITT09	DEEP LEARNING	L	T	P	C
		3	0	0	3

OBJECTIVE(S):

- To understand the basic concepts of deep learning.
- To familiarize with the basic ideas and principles of neural networks.
- Learn deep recurrent and memory networks.
- To explore various deep learning algorithms

Prerequisite: Fundamentals of Machine Learning

UNIT-I BASICS OF NEURAL NETWORKS **9**

Basic Concept of Neurons – Perceptron Algorithm – Feed Forward and Back propagation Networks

UNIT-II INTRODUCTION TO DEEP LEARNING **9**

Deep Feed-Forward Neural Networks - Gradient based learning - Architectural design - Activation Functions - Back-propagation for Multi-Layer Perceptron- Deep Networks - Data Representation - Regularization: Parameter Regularization - Parameter Sharing and Parameter Tying – Data Augmentation - Dropout - Early Stopping -Optimization algorithms - Stochastic, Barch, Mini-Batch Methods

UNIT-III CONVOLUTIONAL NEURAL NETWORKs **9**

Architecture - Pooling - Convolution and its variants - State of art models -AlexNet, LeNet, ResNet - Case Study: Train Convolutional Neural Network for MNIST Digit Recognition

UNIT-IV RECURRENT NEURAL NETWORK **9**

Recurrent Neural Networks (RNN) - Finding Gradients in Recurrent Neural Networks -
Back propagation Through Time - Bi-directional RNN - Challenges in Training RNN – LSTM (Long Short Term Memory) - Gated RNN

UNIT-V APPLICATIONS OF DEEP LEARNING **9**

Deep Learning Applications: Large Scale Deep Learning, Image Processing, Natural Language Processing, Speech Recognition, Video Analytics.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

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

CO1: Explain the fundamental principles, approaches for learning with deep neural networks

CO2: Identify the deep learning algorithms which are more appropriate for various types of learning tasks in various domains.

CO3: Discuss Convolutional Neural Network models to Object Detection and Digit Recognition

CO4: Build and train RNN and its variants

CO5: Know the open issues in deep learning, and have a grasp of the current research directions.

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TEXT BOOK:

1. Ian Goodfellow, Yoshua Bengio and Aaron Courville, "Deep Learning", MIT Press, USA, 2017.
2. S. Lovelyn Rose, L. Ashok Kumar and D. Karthika Renuka, "Deep Learning using Python", Wiley, New Delhi, 2019

REFERENCE BOOKS

1. Adam Gibson, Deep Learning: A Practitioner's Approach, O'Reilly Media,August 2017
2. Li Deng, “Deep Learning: Methods and Applications”, Microsoft Technical Report.
3. Josh Patterson and Adam Gibson, "Deep Learning: A practitioner's approach", O'Reilly, USA, 2017.
4. Francois Chollet, "Deep Learning using Python", Manning Publications, USA, 2017.
5. Yusuke Sugomori, Bostjan Kaluza, Soares and Alan M. F. Souza, "Deep Learning: Practical Neural Networks with Java", PACKT Publishing, UK, 2017.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Explain the fundamental principles, approaches for learning with deep neural networks	2														
CO2	Identify the deep learning algorithms which are more appropriate for various types of learning tasks in various domains.		2	3										2		
CO3	Discuss Convolutional Neural Network models to Object Detection and Digit Recognition															
CO4	Build and train RNN and its variants				4									1	3	
CO5	Know the open issues in deep learning, and have a grasp of the current research directions.					3							3			3

818ITE10 **INFORMATION VISUALIZATION**

L	T	P	C
3	0	0	3

OBJECTIVE(S):

- To understand the fundamentals of data visualization.
- To know the working principles of various information visualization tools.
- To acquire knowledge about the issues in data representation.
- To visualize the complex engineering design.
- To gain skill in designing real time interactive Information visualization system.

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Prerequisites: Computer Graphics and Multimedia

UNIT – I INTRODUCTION **9**

Introduction – Visualization Stages – Computational Support – Issues – Different Types of Tasks - Data representation – Limitation: Display Space– Rendering Time – Navigation Links**.**

UNIT-II DATA REPRESENTATION **9**

Human Factors – Foundation for a Science of Data Visualization – Optics – Optimal Display– Overview about Lightness, Brightness, Contrast, Constancy, Color –Visual Attention that Pops Out – Types of Data – Data Complexity – Encoding of Values – Encoding of Relation – Relation and Connection – Alternative Canvasses.

UNIT-III DATA PRESENTATION **9**

Human Vision – Space Limitation – Time Limitations – Design – Exploration of Complex Information Space – Figure Caption in Visual Interface – Visual Objects and Data Objects – Space Perception and Data in Space – Images, Narrative and Gestures for Explanation

UNIT-IV INTERACTION **9**

Norman's Action Cycle – Interacting with Visualization – Interaction for Information Visualization – Interaction for Navigation – Interaction with Models – Interacting with Visualization – Interactive 3D Illustrations with Images and Text.

UNIT-V CURRENT TRENDS **9**

Design – Virtual Reality: Interactive Medical Application – Tactile Maps for visually challenged People – Animation Design for Simulation – Integrating Spatial and Non-Spatial Data – Innovating the Interaction.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

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

CO1: Identify the data types and its associated visualization mechanisms.

CO2: Collect data ethically and solve engineering problem in visualising the information.

CO3: Implement algorithms and techniques for interactive information visualization.

CO4: Conduct experiments by applying various modern visualization tool and solve the space layout problem.

CO5: Analyze and design systems to visualize multidisciplinary multivariate Data individually or in teams.

TEXT BOOKS:

1. Colin Ware, "Information Visualization Perception for Design", Third Edition, Morgan Kaufmann Publishers, 2012.
2. Robert Spence, "Information Visualization An Introduction", Third Edition, Pearson Education, 2014.

REFERENCES

1. Benjamin B. Bederson, Ben Shneiderman, "The Craft of Information Visualization" Morgan Kaufmann Publishers, 2003.
2. Thomas Strothotte, "Computational Visualization: Graphics, Abstraction and Interactivity", Springer, 1998.

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3. Matthew O. Ward, George Grinstein, Daniel Keim, “Interactive Data Visualization: Foundation, Techniques and Applications”, Second Edition, A. K. Peters/ CRC Press, 2015.
4. Robert Spence, “Information Visualization Design for Interaction”, Second Edition, Pearson Education, 2006.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Identify the data types and its associated visualization mechanisms.		2													
CO2	Collect data ethically and solve engineering problem in visualising the information.			3	2											
CO3	Implement algorithms and techniques for interactive information visualization.													2		
CO4	Conduct experiments by applying various modern visualization tool and solve the space layout problem.			3											3	
CO5	Analyze and design systems to visualize multidisciplinary multivariate Data individually or in teams.														3	

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Gender based Courses

GENDER, CULTURE AND DEVELOPMENT **L T P C**
3 0 0 3

COURSE OBJECTIVES

- To familiarize with the concepts of sex and gender through literary and media
- To help students ask critical questions regarding gender roles in society.
- To provide students with the material to discuss gender issues such as gender based discrimination, violence and development.
- To help students think critically about gender-based problems and solutions.
- To help students to analyse impact of gender-based society and culture.

UNIT I INTRODUCTION TO GENDER **9**

Definition of Gender - Basic Gender Concepts and Terminology -Exploring Attitudes towards Gender -Social Construction of Gender.

UNIT II GENDER ROLES AND RELATIONS **9**

Types of Gender Roles- Gender Roles and Relationships Matrix -Gender-based Division and Valuation of Labour.

UNIT III GENDER DEVELOPMENT ISSUES **9**

Identifying Gender Issues -Gender Sensitive Language- Gender, Governance and Sustainable Development - Gender and Human Rights- Gender and Mainstreaming.

UNIT IV GENDER-BASED VIOLENCE **9**

The concept of violence- Types of Gender-based violence- The relationship between gender, development and violence-Gender-based violence from a human rights perspective

UNIT V GENDER AND CULTURE **9**

Gender and Film - Gender, Media and Advertisement

TOTAL HOURS: 45 PERIODS

COURSE OUTCOMES

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

CO1: Critically read literary and media texts and understand the underlying gender perspectives in them.
CO2: Analyse current social events in the light of gender perspectives.
CO3: Discuss, analyse and argue about issues related to gender.
CO4: Analyse and differentiate between gender-based violence.
CO5: Discuss the gender based impact on society, culture and development.

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TEXT BOOKS

1. Sukhu and Dukhu (Amar Chitra Katha). [Unit 1]
2. The Cat who Became a Queen (Folk tale, J. Hinton Knowles, Folk-Tales of Kashmir.London: Kegan Paul, Trench, Trübner, and Company, 1893, pp. 8-10.). [Unit 1]
3. Muniyakka (Short Story, Lakshmi Kannan, Nandanvan and Other Stories, Hyderabad: Orient Blackswan, 2011). [Unit 2]
4. The Many Faces of Gender Inequality (Essay, Amartya Sen, Frontline, Volume 18 - Issue 22, Oct. 27 - Nov. 09, 2001) [Unit 3]
5. Tell Us Marx (Poem, Mallika Sengupta, Translated by Sanjukta Dasgupta) [Unit 3]

REFERENCES VIDEOS:

1. Video Witness: Freeing Women from Cleaning Human Waste (2014, HRW, Manual Scavenging, India) [Unit 2]
2. Lights Out (Play, Manjula Padmanabhan) [Unit 4]
3. Lights Out (Video of play enacted) [Unit 4]
4. Mahanagar (Movie: Satyajit Ray) [Unit 5]

Course Outcome		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
CO1	Critically read literary and media texts and understand the underlying gender perspectives in them.	**3**	**2**		**1**	**2**						**3**	**1**		**1**
CO2	Analyse current social events in the light of gender perspectives.	**3**	**2**		**1**	**2**						**2**	**1**		**1**
CO3	Discuss, analyse and argue about issues related to gender.	**3**	**2**		**1**	**2**						**3**	**1**		**1**
CO4	Analyse and differentiate between gender-based violence	**2**	**2**		**1**	**3**						**2**	**1**		**1**
CO5	Discuss the gender-based impact on society, culture and development										**3**		**1**	**2**	**2**

G RANGANATH

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PRINCIPAL
Adhiyamaan College of Engineering (Autonomous)
Dr. M.G.R. Nagar, HOSUR - 635130