K. RAMAKRISHNAN COLLEGE OF ENGINEERING

TIRUCHIRAPPALLI

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

REGULATION 2020

Curriculum & Syllabus

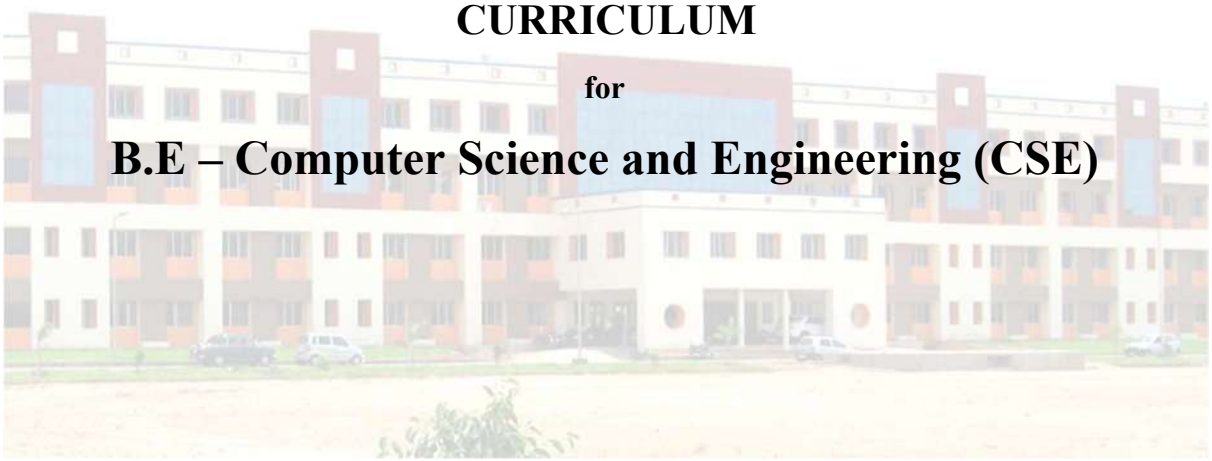
K.RAMAKRISHNAN
COLLEGE OF ENGINEERING
Permanently Affiliated to Anna University Chennai and Approved by AICTE, New Delhi
ISO 9001:2015 Certified Institution, Accredited with 'A' grade by NAAC
Samayapuram,Trichy,Tamilnadu

(An Autonomous Institution)

CURRICULUM

for

B.E – Computer Science and Engineering (CSE)



Prepared by

Department of Computer Science and Engineering,

K.Ramakrishnan College of Engineering

CONTENTS

K. RAMAKRISHNAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

SAMAYAPURAM, TRICHY

B.E. COMPUTER SCIENCE AND ENGINEERING

REGULATION – 2020 (FULL TIME)

CURRICULUM (I to VIII SEMESTER)

(CHOICE-BASED CREDIT SYSTEM)

INSTITUTION VISION & MISSION

Vision	Mission
• To achieve a prominent position among the top technical institutions	• To bestow standard technical education par excellence through state of the art infrastructure, competent faculty and high ethical standards. • To nurture research and entrepreneurial skills among the students in cutting edge technologies. • To provide education for developing high-quality Professionals to transform the society.

DEPARTMENT VISION & MISSION

Vision	Mission
To create eminent professionals of Computer Science and Engineering by imparting quality education.	M1: To provide technical exposure in the field of Computer Science and Engineering through state of the art infrastructure and ethical standards. M2: To engage the students in research and development activities in the field of Computer Science and Engineering. M3: To empower the learners to involve in industrial and multi-disciplinary projects for addressing the societal needs.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs):

1.PEO1: Analyse, design and create innovative products for addressing social needs.

2.PEO2: Equip themselves for employability, higher studies and research.

3.PEO3: Nurture the leadership qualities and entrepreneurial skills for their successful career.

PROGRAM OUTCOMES POs

Engineering Graduates will be able to:

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

2. 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.

3. 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.

4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

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

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

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

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

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

10. 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.

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

12. 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 COURSE OUTCOMES (PSOs)

Students will be able to

1.PSO1: Apply the basic and advanced knowledge in developing software, hardware and firmware solutions addressing real life problems.

2.PSO2: Design, develop, test and implement product-based solutions for their career enhancement.

Mapping of POs/PSOs to PEOs Contribution

1. Reasonable 2. Significant 3. Strong

MAPPING OF POs TO PEOs

	PEO 1 **Analyse, design and create innovative products** for addressing social needs.	**PEO 2** Equip themselves for **employability, higher studies and research.**	**PEO 3** **Nurture the leadership qualities and entrepreneurial skills** for their successful career
PO1 Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.	3	3	3
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.	3	3	3
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.	3	3	3
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.	3	3	2
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.	3	3	2

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.	3	3	1
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.	3	3	1
PO8 Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.	3	3	3
PO9 Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	2	2	3
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.	3	3	3
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.00	2	2	3
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.	3	3	3

2. `

MAPPING OF PSOs TO PEOs

PSOs	PEO1	PEO2	PEO3
1. Apply the basic and advanced knowledge in developing software, hardware and firmware solutions addressing real life problems.	**3**	**2**	**3**
2. Design, develop, test and implement product-based solutions for their career enhancement.	**3**	**3**	**3**
3. Nurture the leadership qualities and entrepreneurial skills for their successful career.	**2**	**3**	**3**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

The following table illustrates the mapping between the course outcomes and the programme outcomes.

SEMESTER	COURSE TITLE	PROGRAMME COURSE OUTCOMES (PO)											
		1	2	3	4	5	6	7	8	9	10	11	12
SEMESTER I	Technical English – I								✓	✓	✓		✓
	Mathematics-I	✓	✓	✓						✓			✓
	Engineering Physics-I	✓	✓	✓				✓					✓
	Engineering Chemistry	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓
	Python Programming and Problem Solving	✓	✓	✓	✓	✓						✓	✓
	Basic Civil and Mechanical Engineering (Theory + Lab)	✓	✓	✓		✓	✓	✓			✓	✓	✓
	Physics and Chemistry Laboratory	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Python Programming and Problem Solving Laboratory	✓	✓	✓	✓	✓			✓	✓	✓		✓
SEMESTER II	Technical English – II								✓	✓	✓		✓
	Mathematics-II	✓	✓	✓	✓					✓			
	Engineering Physics - II	✓	✓	✓		✓		✓					✓
	Environmental Science and Engineering	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
	C Programming	✓	✓	✓	✓				✓	✓	✓		✓
	Engineering Graphics	✓	✓	✓	✓				✓		✓		✓
	Basic Electrical and Electronics Engineering (Theory + Lab)	✓	✓	✓	✓				✓		✓		✓
	C programming Laboratory	✓	✓	✓					✓	✓	✓		✓
	Professional skills - I	✓	✓	✓	✓							✓	✓
SEMESTER III	Discrete Mathematics & Graph Theory	✓	✓	✓	✓					✓			
	Analog Electronic Circuits	✓	✓	✓	✓	✓				✓	✓		

	Data Structures and Algorithm Analysis	✓	✓	✓	✓	✓							
	Computer Organization & Architecture	✓	✓	✓		✓							
	Object Oriented Programming with java	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓
	Data Structures and Algorithms Laboratory	✓	✓	✓					✓	✓	✓	✓	✓
	Object Oriented Programming Laboratory	✓	✓	✓		✓			✓	✓	✓		✓
	Analog Electronic Circuits Laboratory	✓	✓	✓	✓	✓				✓	✓		
	Interpersonal Skills Laboratory								✓	✓	✓		✓
	Professional Skills – II	✓	✓	✓	✓							✓	✓
SEMESTER IV	**Applied Probability Statistics and Numerical Analysis**	✓	✓	✓						✓			✓
	Database Management Systems	✓	✓	✓	✓	✓				✓	✓	✓	✓
	Operating Systems	✓	✓	✓	✓	✓							✓
	Software Engineering	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
	Total Quality Management	✓	✓		✓		✓		✓	✓	✓	✓	✓
	Operating Systems Laboratory	✓	✓	✓		✓				✓	✓		✓
	Database Management Systems Laboratory	✓	✓	✓					✓	✓	✓		✓
	Mini Project	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Professional Skills-III	✓	✓	✓	✓							✓	✓
SEMESTER V	**Theory of Automata**	✓	✓	✓	✓								
	Computer Networks	✓	✓	✓	✓	✓						✓	✓
	Artificial Intelligence	✓	✓	✓		✓		✓					✓
	Mobile Computing	✓	✓	✓									✓
	Internet of Things	✓	✓	✓	✓	✓	✓						✓
	Professional Elective-I	✓	✓	✓								✓	
	Mobile Computing	✓	✓	✓		✓	✓		✓	✓	✓		✓

	Laboratory												
	Computer Networks Laboratory	✓	✓	✓	✓	✓	✓			✓			✓
	Professional Communication Laboratory								✓	✓	✓		✓
	Professional Skills-IV	✓	✓	✓	✓							✓	✓
SEMESTER VI	**Data Warehousing and Data Mining**	✓	✓	✓	✓	✓				✓			✓
	Compiler Design	✓	✓	✓		✓			✓	✓	✓		✓
	Object Oriented Analysis and Design	✓	✓	✓	✓	✓	✓		✓	✓			✓
	Machine Learning												
	Professional Electives-II	✓	✓	✓		✓						✓	
	Open Elective-I	✓	✓	✓								✓	
	Data Mining Laboratory	✓	✓	✓	✓	✓			✓	✓	✓		✓
	Compiler Design Laboratory	✓	✓		✓	✓					✓	✓	
	Object Oriented Analysis and Design Laboratory	✓	✓	✓		✓	✓		✓	✓	✓		✓
SEMESTER VII	**Cloud Computing**	✓	✓		✓						✓	✓	
	Computer Graphics	✓	✓	✓	✓						✓	✓	
	Data Visualization	✓	✓		✓						✓	✓	
	Human Computer Interaction	✓	✓	✓								✓	
	Professional Elective-III	✓	✓	✓								✓	
	Professional Elective-IV	✓	✓	✓								✓	
	Cloud Computing Laboratory	✓	✓	✓	✓						✓	✓	
	Computer Graphics Laboratory	✓	✓	✓	✓						✓	✓	
SEMESTER VIII	**Professional Elective-V**	✓	✓	✓								✓	
	Professional Elective-VI	✓	✓	✓								✓	
	Open Elective-II	✓	✓	✓								✓	
	Project Work	✓	✓	✓	✓					✓		✓	✓

PROFESSIONAL ELECTIVE COURSE													
	Neural Networks	✓	✓	✓									
	Agile Methodologies	✓	✓	✓									
	R Language	✓	✓	✓									
	Microprocessors and Microcontrollers	✓	✓	✓		✓						✓	
	Data Analytics						✓	✓				✓	✓
	Fault Tolerant Computing	✓	✓	✓									
	Green Computing	✓	✓	✓		✓						✓	
	Information Security	✓	✓	✓		✓		✓					
	Adhoc and Sensor Networks		✓		✓								
	Digital Currency Programming	✓	✓								✓		
	Parallel Computing	✓	✓	✓		✓	✓						
	Software Testing	✓	✓	✓									
	Distributed Systems	✓		✓	✓		✓	✓		✓			
	Cyber Forensic and Malware	✓	✓	✓	✓								
	Ethical Hacking	✓	✓	✓									
	Fuzzy Logic	✓	✓	✓									
	Human Rights	✓	✓	✓									
	Quantum Computing	✓	✓	✓	✓				✓			✓	
	Real Time Systems	✓	✓	✓									
	Service Oriented Architecture	✓	✓	✓	✓			✓					
	Digital Image Processing	✓	✓		✓				✓				
	Soft Computing		✓		✓								
	Software Project Management	✓	✓	✓	✓								
	Intellectual Property Rights		✓		✓								

Consolidated Autonomous Curriculum Proposal (R2020)

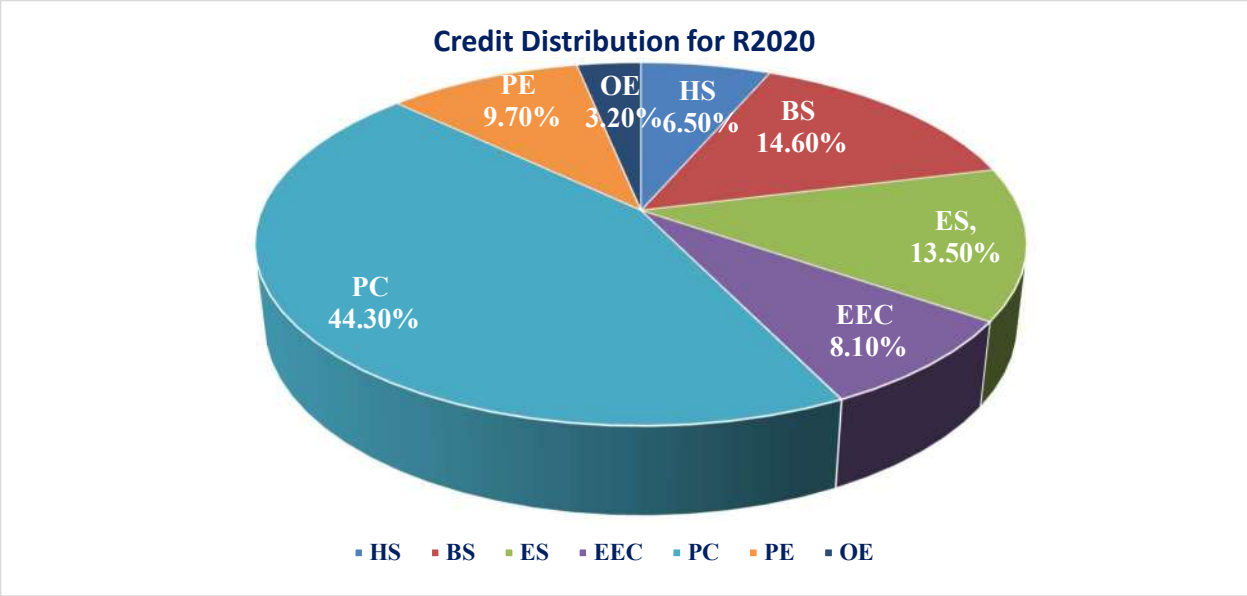
Categories	HS	BS	ES	PC	PE	OE	EEC		CREDITS
SEM	SUBJECTS								
	Sub 1	Sub 2	Sub 3	Sub 4	Sub 5	Sub 6	Sub 7	Sub 8	Sub 9	Sub 10	
I	Technical English- I	Mathematics – I	Engineering Physics -I	Engineering Chemistry	Python Programming and Problem Solving	Basic Civil and Mechanical Engineering (Theory + Lab)	Physics and Chemistry Laboratory	Python Programming and Problem Solving Laboratory	------	-----	
	3	4	3	3	3	4	2	2			24
II	Technical English II	Mathematics –II	Engineering Physics - II	Environmental Science and Engineering	C Programming	Engineering Graphics	Basic Electrical and Electronics Engineering (Theory&Lab)	C Programming Laboratory	Professional skills - I	___	
	3	4	3	3	3	3	3	2	1		25
III	Discrete Mathematics & Graph Theory	Analog Electronic Circuits	Data Structures and Algorithm Analysis	Computer Organization & Architecture	Object Oriented Programming with Java	Data Structures and Algorithms Laboratory	Object Oriented Programming Laboratory	Analog Electronic Circuits Laboratory	Interpersonal Skills Laboratory	Professional Skills – II	
	4	3	3	3	3	2	2	2	1	1	24
IV	Applied Probability Statistics and Numerical Analysis	Database Management Systems	Operating systems	Software Engineering	Total Quality Management	Operating Systems Laboratory	Database Management Systems Laboratory	Mini Project	Professional Skills- III	____	
	4	3	3	3	3	2	2	2	1		23

V	Theory of Automata	Computer Networks	Artificial Intelligence	Mobile Computing	Internet of Things	Professional Elective – I	Mobile Computing Laboratory	Computer Networks Laboratory	Professional Communication Laboratory	Professional Skills-IV	
	3	3	3	3	3	3	2	2	2	1	25
VI	Data Warehousing and Data Mining	Compiler Design	Object Oriented Analysis and Design	Machine Learning	Professional Elective – II	Open Elective – I	Data Mining Laboratory	Compiler Design Laboratory	Object Oriented Analysis and Design Laboratory	———	
	4	4	3	4	3	3	2	2	2		27
VII	Cloud Computing	Computer Graphics	Data Visualization	Human Computer Interaction	Professional Elective – III	Professional Elective – IV	Cloud Computing Laboratory	Computer Graphics Laboratory	———	———	
	3	3	3	3	3	3	2	2			22
VIII	Professional Elective – V	Professional Elective – VI	Open Elective – II	———	———	———	Project Work	———	———	———	
	3	3	3				6				15
TOTAL CREDITS										185	

Credits distribution of Proposed Curriculum under various categories for each semester

SEM	HS	BS	ES	EEC	PC	PE	OE	Credits
1	3	12	9		-	-	-	24
2	6	7	11	1	-	-	-	25
3	-	4	5	2	13	-	-	24
4	3	4	-	3	13	-	-	23
5	-	-	-	3	19	3	-	25
6	-	-	-		21	3	3	27
7	-	-	-		16	6	-	22
8	-	-	-	6	-	6	3	15
TOTAL	12	27	25	15	82	18	6	185
Credit %	6.5%	14.6%	13.5%	8.1%	44.3%	9.7%	3.2%	100%

Comparison of Credits distribution under various categories for



REGULATIONS - 2020
CHOICE BASED CREDIT SYSTEM
B.E. COMPUTER SCIENCE AND ENGINEERING
I TO VIII SEMESTERS CURRICULUM AND SYLLABUS

SEMESTER I

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	TOTAL CONTACT PERIODS	PERIODS PER WEEK			CREDITS
					L	T	P	
THEORY								
1	UHS1151	Technical English - I	HS	3	3	0	0	3
2	UMA1151	Mathematics - I	BS	4	3	1	0	4
3	UPH1151	Engineering Physics - I	BS	3	3	0	0	3
4	UCY1151	Engineering Chemistry	BS	3	3	0	0	3
5	UGE1151	Python Programming and Problem Solving	ES	3	3	0	0	3
THEORY CUM PRACTICAL								
6	UBE1161	Basic Civil and Mechanical Engineering (Theory + Lab)	ES	5	3	0	2	4
PRACTICALS								
7	UBS1161	Physics and Chemistry Laboratory	BS	4	0	0	4	2
8	UGE1161	Python Programming and Problem Solving Laboratory	ES	4	0	0	4	2
			TOTAL	**29**	**18**	**1**	**10**	**24**

SEMESTER II

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	TOTAL CONTACT PERIODS	PERIODS PER WEEK			CREDITS
					L	T	P	
THEORY								
1	UHS1251	Technical English - II	HS	3	3	0	0	3
2	UMA1251	Mathematics - II	BS	4	3	1	0	4
3	UPH1251	Engineering Physics - II	BS	3	3	0	0	3
4	UGE1251	Environmental Science and Engineering	HS	3	3	0	0	3
5	UGE1252	C Programming	ES	3	3	0	0	3
6	UGE1253	Engineering Graphics	ES	5	1	0	4	3
THEORY CUM PRACTICAL								
7	UBE1261	Basic Electrical and Electronics Engineering (Theory + Lab)	ES	4	2	0	2	3
PRACTICALS								
8	UGE1261	C Programming Laboratory	ES	4	0	0	4	2
9	UHS1252	Professional skills - I	EEC	2	0	0	2	1
		TOTAL		**31**	**18**	**1**	**12**	**25**

SEMESTER III								
S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	TOTAL CONTACT PERIODS	PERIODS PER WEEK			CREDITS
					L	T	P	
THEORY								
1.	UMA1351	Discrete Mathematics and Graph Theory	BS	4	3	1	0	**4**
2.	UEC1351	Analog Electronic Circuits	ES	3	3	0	0	**3**
3.	UCS1301	Data Structures and Algorithm Analysis	PC	3	3	0	0	**3**
4.	UCS1302	Computer Organization and Architecture	PC	3	3	0	0	**3**
5.	UCS1303	Object Oriented Programming with Java	PC	3	3	0	0	**3**
PRACTICALS								
6.	UCS1311	Data Structures and Algorithms Laboratory	PC	4	0	0	4	**2**
7.	UCS1312	Object Oriented Programming Laboratory	PC	4	0	0	4	**2**
8.	UEC1361	Analog Electronic Circuits Laboratory	ES	4	0	0	4	**2**
9.	UHS1361	Interpersonal Skills Laboratory	EEC	2	0	0	2	**1**
10.	UHS1351	Professional Skills – II	EEC	2	0	0	2	**1**
			TOTAL	**32**	**15**	**1**	**16**	**24**

SEMESTER IV								
S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	TOTAL CONTACT PERIODS	PERIODS PER WEEK			CREDITS
					L	T	P	
THEORY								
1.	UMA1454	Applied Probability Statistics and Numerical Analysis	BS	4	3	1	0	**4**
2.	UCS1401	Database Management Systems	PC	3	3	0	0	**3**
3.	UCS1402	Operating Systems	PC	3	3	0	0	**3**
4.	UCS1403	Software Engineering	PC	3	3	0	0	**3**
5.	UMG1052	Total Quality Management	HS	3	3	0	0	**3**
PRACTICALS								
6.	UCS1411	Operating Systems Laboratory	PC	4	0	0	4	**2**
7.	UCS1412	Database Management Systems Laboratory	PC	4	0	0	4	**2**
8.	UCS1413	Mini Project	EEC	4	0	0	4	**2**
9.	UHS1451	Professional Skills-III	EEC	2	0	0	2	**1**
			TOTAL	**30**	**15**	**1**	**14**	**23**

SEMESTER V								
S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	TOTAL CONTACT PERIODS	PERIODS PER WEEK			CREDITS
					L	T	P	
THEORY								
1.	UCS1501	Theory of Automata	PC	3	3	0	0	**3**
2.	UCS1502	Computer Networks	PC	3	3	0	0	**3**
3.	UCS1503	Artificial Intelligence	PC	3	3	0	0	**3**
4.	UCS1504	Mobile Computing	PC	3	3	0	0	**3**
5.	UCS1505	Internet of Things	PC	3	3	0	0	**3**
6.		Professional Elective-I	PE	3	3	0	0	**3**
PRACTICALS								
7.	UCS1511	Mobile Computing Laboratory	PC	4	0	0	4	**2**
8.	UCS1512	Computer Networks Laboratory	PC	4	0	0	4	**2**
9.	UHS1561	Professional Communication Laboratory	EEC	4	0	0	4	**2**
10.	UHS1551	Professional Skills-IV	EEC	2	0	0	2	**1**
			TOTAL	**32**	**18**	**0**	**14**	**25**

SEMESTER VI								
S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	TOTAL CONTACT PERIODS	PERIODS PER WEEK			CREDITS
					L	T	P	
THEORY								
1.	UCS1601	Data Warehousing and Data Mining	PC	4	3	1	0	**4**
2.	UCS1602	Compiler Design	PC	4	3	1	0	**4**
3.	UCS1603	Object Oriented Analysis and Design	PC	3	3	0	0	**3**
4.	UCS1604	Machine Learning	PC	4	3	1	0	**4**
5.		Professional Elective-II	PE	3	3	0	0	**3**
6.		Open Elective-I	OE	3	3	0	0	**3**
PRACTICALS								
7.	UCS1611	Data Mining Laboratory	PC	4	0	0	4	**2**
8.	UCS1612	Compiler Design Laboratory	PC	4	0	0	4	**2**
9.	UCS1613	Object Oriented Analysis and Design Laboratory	PC	4	0	0	4	**2**
			TOTAL	**33**	**18**	**3**	**12**	**27**

SEMESTER VII								
S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	TOTAL CONTACT PERIODS	PERIODS PER WEEK			CREDITS
					L	T	P	
THEORY								
1.	UCS1701	Cloud Computing	PC	3	3	0	0	**3**
2.	UCS1702	Computer Graphics	PC	3	3	0	0	**3**
3.	UCS1703	Data Visualization	PC	3	3	0	0	**3**
4.	UCS1704	Human Computer Interaction	PC	3	3	0	0	**3**
5.		Professional Elective-III	PE	3	3	0	0	**3**
6.		Professional Elective-IV	PE	3	3	0	0	**3**
PRACTICALS								
7.	UCS1711	Cloud Computing Laboratory	PC	4	0	0	4	**2**
8.	UCS1712	Computer Graphics Laboratory	PC	4	0	0	4	**2**
			TOTAL	**26**	**18**	**0**	**8**	**22**

SEMESTER VIII								
S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	TOTAL CONTACT PERIODS	PERIODS PER WEEK			CREDITS
					L	T	P	
THEORY								
1.		Professional Elective-V	PE	3	3	0	0	**3**
2.		Professional Elective-VI	PE	3	3	0	0	**3**
3.		Open Elective-II	OE	3	3	0	0	**3**
PRACTICALS								
4.	UCS1811	Project Work	EEC	12	0	0	12	**6**
			TOTAL	**21**	**9**	**0**	**12**	**15**

TOTAL NO OF CREDITS: 185

PROFESSIONAL ELECTIVE – I (SEMESTER V)								
S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	TOTAL CONTACT PERIODS	PERIODS PER WEEK			CREDITS
					L	T	P	
1	UCS1001	Neural Networks	PE	3	3	0	0	**3**
2	UCS1002	Agile Methodologies	PE	3	3	0	0	**3**
3	UCS1003	R Language	PE	3	3	0	0	**3**
4	UEC1402	Microprocessors and Microcontrollers	PE	3	3	0	0	**3**

PROFESSIONAL ELECTIVE – II (SEMESTER VI)								
S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	TOTAL CONTACT PERIODS	PERIODS PER WEEK			CREDITS
					L	T	P	
5	UAD1304	Data Analytics	PE	3	3	0	0	**3**
6	UCS1004	Fault Tolerant Computing	PE	3	3	0	0	**3**
7	UCS1005	Green Computing	PE	3	3	0	0	**3**
8	UCS1006	Information Security	PE	3	3	0	0	**3**

PROFESSIONAL ELECTIVE – III (SEMESTER VII)								
S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	TOTAL CONTACT PERIODS	PERIODS PER WEEK			CREDITS
					L	T	P	
9	UCS1007	Adhoc and Sensor Networks	PE	3	3	0	0	**3**
10	UCS1008	Digital Currency Programming	PE	3	3	0	0	**3**
11	UCS1009	Parallel Computing	PE	3	3	0	0	**3**
12	UCS1010	Software Testing	PE	3	3	0	0	**3**

PROFESSIONAL ELECTIVE – IV (SEMESTER VII)								
S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	TOTAL CONTACT PERIODS	PERIODS PER WEEK			CREDITS
					L	T	P	
13	UCS1011	Distributed Systems	PE	3	3	0	0	**3**
14	UCS1012	Cyber Forensic and Malware	PE	3	3	0	0	**3**
15	UCS1013	Ethical Hacking	PE	3	3	0	0	**3**
16	UCS1014	Fuzzy Logic	PE	3	3	0	0	**3**

PROFESSIONAL ELECTIVE – V (SEMESTER VIII)								
S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	TOTAL CONTACT PERIODS	PERIODS PER WEEK			CREDITS
					L	T	P	
17	UGE1051	Human Rights	PE	3	3	0	0	**3**
18	UCS1015	Quantum Computing	PE	3	3	0	0	**3**
19	UCS1016	Real Time Systems	PE	3	3	0	0	**3**
20	UCS1017	Service Oriented Architecture	PE	3	3	0	0	**3**

PROFESSIONAL ELECTIVE – VI (SEMESTER VIII)								
S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	TOTAL CONTACT PERIODS	PERIODS PER WEEK			CREDITS
					L	T	P	
21	UCS1018	Digital Image Processing	PE	3	3	0	0	**3**
22	UCS1019	Soft Computing	PE	3	3	0	0	**3**
23	UCS1020	Software Project Management	PE	3	3	0	0	**3**
24	UMG1051	Intellectual Property Rights	PE	3	3	0	0	**3**

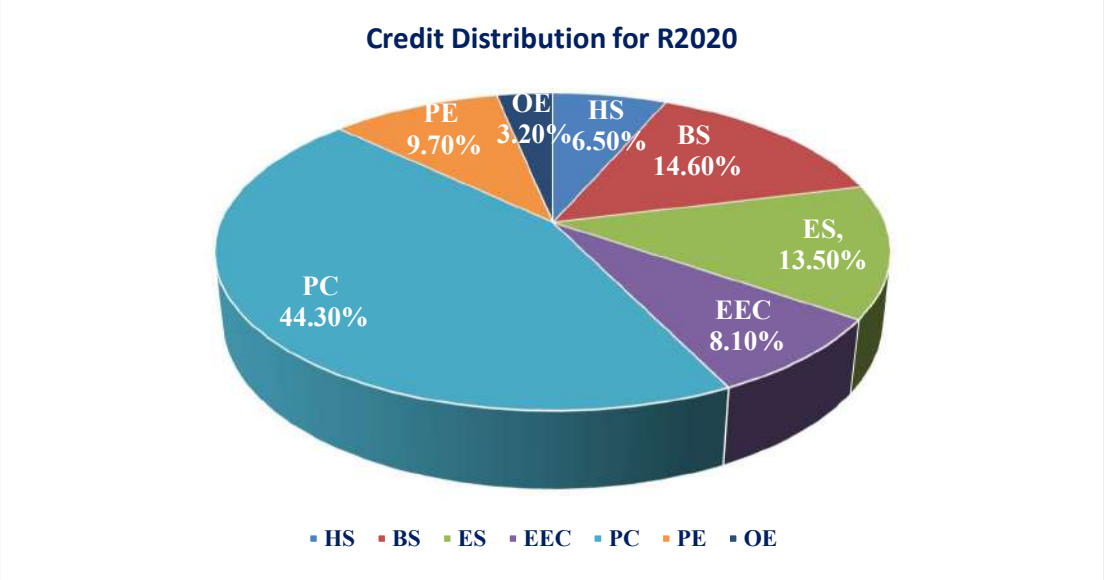
OPEN ELECTIVE – I (SEMESTER VI)								
S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	TOTAL CONTACT PERIODS	PERIODS PER WEEK			CREDITS
					L	T	P	
1	OEC1652	Satellite Communication	OE	3	3	0	0	**3**
2	OEE1651	Linear Integrated Circuits	OE	3	3	0	0	**3**
3	OME1652	Industrial Safety Engineering	OE	3	3	0	0	**3**
4	OME1654	Production Technology - I	OE	3	3	0	0	**3**
5	OMG1653	Human Capital Management	OE	3	3	0	0	**3**
6	OMG1654	Principles of Management	OE	3	3	0	0	**3**
7	OAD1651	Web Technology	OE	3	3	0	0	**3**

OPEN ELECTIVE – II (SEMESTER VIII)								
S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	TOTAL CONTACT PERIODS	PERIODS PER WEEK			CREDITS
					L	T	P	
1	OEC1852	Bio-Medical Electronics	OE	3	3	0	0	**3**
2	OEE1852	Electrical and Hybrid Vehicles	OE	3	3	0	0	**3**
3	OEE1853	Digital Logic Circuits	OE	3	3	0	0	**3**
4	OME1851	Industrial Automation	OE	3	3	0	0	**3**
5	OMG1855	Professional Ethics in Engineering	OE	3	3	0	0	**3**
6	OAD1851	Data Exploration and Visualization	OE	3	3	0	0	**3**
7	OIT1852	Cryptography and Network Security	OE	3	3	0	0	**3**

SUBJECT CREDIT DISTRIBUTION

SEMESTER	(HS)	(BS)	(ES)	(EEC)	(PC)	(PE)	(OE)	Total Credits
I	3	12	9					24
II	6	7	11	1				25
III		4	5	2	13			24
IV	3	4		3	13			23
V				3	19	3		25
VI					21	3	3	27
VII					16	6		22
VIII				6		6	3	15
Total Credits	**12**	**27**	**25**	**15**	**82**	**18**	**6**	**185**
Credit %	**6.5%**	**14.6%**	**13.5%**	**8.1%**	**44.3%**	**9.7%**	**3.2%**	**100%**

TOTAL NO OF CREDITS: 185



REGULATIONS - 2020
CHOICE BASED CREDIT SYSTEM
B.E. COMPUTER SCIENCE AND ENGINEERING
I TO VIII SEMESTERS CURRICULUM AND SYLLABUS

SEMESTER I

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	TOTAL CONTACT PERIODS	PERIODS PER WEEK			CREDITS
					L	T	P	
THEORY								
1	UHS1151	Technical English - I	HS	3	3	0	0	3
2	UMA1151	Mathematics - I	BS	4	3	1	0	4
3	UPH1151	Engineering Physics - I	BS	3	3	0	0	3
4	UCY1151	Engineering Chemistry	BS	3	3	0	0	3
5	UGE1151	Python Programming and Problem Solving	ES	3	3	0	0	3
THEORY CUM PRACTICAL								
6	UBE1161	Basic Civil and Mechanical Engineering (Theory + Lab)	ES	5	3	0	2	4
PRACTICALS								
7	UBS1161	Physics and Chemistry Laboratory	BS	4	0	0	4	2
8	UGE1161	Python Programming and Problem Solving Laboratory	ES	4	0	0	4	2
			TOTAL	**29**	**18**	**1**	**10**	**24**

SEMESTER II

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	TOTAL CONTACT PERIODS	PERIODS PER WEEK			CREDITS
					L	T	P	
THEORY								
1	UHS1251	Technical English - II	HS	3	3	0	0	3
2	UMA1251	Mathematics - II	BS	4	3	1	0	4
3	UPH1251	Engineering Physics - II	BS	3	3	0	0	3
4	UGE1251	Environmental Science and Engineering	HS	3	3	0	0	3
5	UGE1252	C Programming	ES	3	3	0	0	3
6	UGE1253	Engineering Graphics	ES	5	1	0	4	3
THEORY CUM PRACTICAL								
7	UBE1261	Basic Electrical and Electronics Engineering (Theory + Lab)	ES	4	2	0	2	3
PRACTICALS								
8	UGE1261	C Programming Laboratory	ES	4	0	0	4	2
9	UHS1252	Professional skills - I	EEC	2	0	0	2	1
		TOTAL		**31**	**18**	**1**	**12**	**25**

SEMESTER III								
S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	TOTAL CONTACT PERIODS	PERIODS PER WEEK			CREDITS
					L	T	P	
THEORY								
1.	UMA1351	Discrete Mathematics and Graph Theory	BS	4	3	1	0	**4**
2.	UEC1351	Analog Electronic Circuits	ES	3	3	0	0	**3**
3.	UCS1301	Data Structures and Algorithm Analysis	PC	3	3	0	0	**3**
4.	UCS1302	Computer Organization and Architecture	PC	3	3	0	0	**3**
5.	UCS1303	Object Oriented Programming with Java	PC	3	3	0	0	**3**
PRACTICALS								
6.	UCS1311	Data Structures and Algorithms Laboratory	PC	4	0	0	4	**2**
7.	UCS1312	Object Oriented Programming Laboratory	PC	4	0	0	4	**2**
8.	UEC1361	Analog Electronic Circuits Laboratory	ES	4	0	0	4	**2**
9.	UHS1361	Interpersonal Skills Laboratory	EEC	2	0	0	2	**1**
10.	UHS1351	Professional Skills – II	EEC	2	0	0	2	**1**
			TOTAL	**32**	**15**	**1**	**16**	**24**

SEMESTER IV								
S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	TOTAL CONTACT PERIODS	PERIODS PER WEEK			CREDITS
					L	T	P	
THEORY								
1.	UMA1454	Applied Probability Statistics and Numerical Analysis	BS	4	3	1	0	**4**
2.	UCS1401	Database Management Systems	PC	3	3	0	0	**3**
3.	UCS1402	Operating Systems	PC	3	3	0	0	**3**
4.	UCS1403	Software Engineering	PC	3	3	0	0	**3**
5.	UMG1052	Total Quality Management	HS	3	3	0	0	**3**
PRACTICALS								
6.	UCS1411	Operating Systems Laboratory	PC	4	0	0	4	**2**
7.	UCS1412	Database Management Systems Laboratory	PC	4	0	0	4	**2**
8.	UCS1413	Mini Project	EEC	4	0	0	4	**2**
9.	UHS1451	Professional Skills-III	EEC	2	0	0	2	**1**
			TOTAL	**30**	**15**	**1**	**14**	**23**

SEMESTER V								
S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	TOTAL CONTACT PERIODS	PERIODS PER WEEK			CREDITS
					L	T	P	
THEORY								
1.	UCS1501	Theory of Automata	PC	3	3	0	0	**3**
2.	UCS1502	Computer Networks	PC	3	3	0	0	**3**
3.	UCS1503	Artificial Intelligence	PC	3	3	0	0	**3**
4.	UCS1504	Mobile Computing	PC	3	3	0	0	**3**
5.	UCS1505	Internet of Things	PC	3	3	0	0	**3**
6.		Professional Elective-I	PE	3	3	0	0	**3**
PRACTICALS								
7.	UCS1511	Mobile Computing Laboratory	PC	4	0	0	4	**2**
8.	UCS1512	Computer Networks Laboratory	PC	4	0	0	4	**2**
9.	UHS1561	Professional Communication Laboratory	EEC	4	0	0	4	**2**
10.	UHS1551	Professional Skills-IV	EEC	2	0	0	2	**1**
			TOTAL	**32**	**18**	**0**	**14**	**25**

SEMESTER VI								
S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	TOTAL CONTACT PERIODS	PERIODS PER WEEK			CREDITS
					L	T	P	
THEORY								
1.	UCS1601	Data Warehousing and Data Mining	PC	4	3	1	0	**4**
2.	UCS1602	Compiler Design	PC	4	3	1	0	**4**
3.	UCS1603	Object Oriented Analysis and Design	PC	3	3	0	0	**3**
4.	UCS1604	Machine Learning	PC	4	3	1	0	**4**
5.		Professional Elective-II	PE	3	3	0	0	**3**
6.		Open Elective-I	OE	3	3	0	0	**3**
PRACTICALS								
7.	UCS1611	Data Mining Laboratory	PC	4	0	0	4	**2**
8.	UCS1612	Compiler Design Laboratory	PC	4	0	0	4	**2**
9.	UCS1613	Object Oriented Analysis and Design Laboratory	PC	4	0	0	4	**2**
			TOTAL	**33**	**18**	**3**	**12**	**27**

SEMESTER VII								
S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	TOTAL CONTACT PERIODS	PERIODS PER WEEK			CREDITS
					L	T	P	
THEORY								
1.	UCS1701	Cloud Computing	PC	3	3	0	0	**3**
2.	UCS1702	Computer Graphics	PC	3	3	0	0	**3**
3.	UCS1703	Data Visualization	PC	3	3	0	0	**3**
4.	UCS1704	Human Computer Interaction	PC	3	3	0	0	**3**
5.		Professional Elective-III	PE	3	3	0	0	**3**
6.		Professional Elective-IV	PE	3	3	0	0	**3**
PRACTICALS								
7.	UCS1711	Cloud Computing Laboratory	PC	4	0	0	4	**2**
8.	UCS1712	Computer Graphics Laboratory	PC	4	0	0	4	**2**
			TOTAL	**26**	**18**	**0**	**8**	**22**

SEMESTER VIII								
S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	TOTAL CONTACT PERIODS	PERIODS PER WEEK			CREDITS
					L	T	P	
THEORY								
1.		Professional Elective-V	PE	3	3	0	0	**3**
2.		Professional Elective-VI	PE	3	3	0	0	**3**
3.		Open Elective-II	OE	3	3	0	0	**3**
PRACTICALS								
4.	UCS1811	Project Work	EEC	12	0	0	12	**6**
			TOTAL	**21**	**9**	**0**	**12**	**15**

TOTAL NO OF CREDITS: 185

PROFESSIONAL ELECTIVE – I (SEMESTER V)								
S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	TOTAL CONTACT PERIODS	PERIODS PER WEEK			CREDITS
					L	T	P	
1	UCS1001	Neural Networks	PE	3	3	0	0	**3**
2	UCS1002	Agile Methodologies	PE	3	3	0	0	**3**
3	UCS1003	R Language	PE	3	3	0	0	**3**
4	UEC1402	Microprocessors and Microcontrollers	PE	3	3	0	0	**3**

PROFESSIONAL ELECTIVE – II (SEMESTER VI)								
S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	TOTAL CONTACT PERIODS	PERIODS PER WEEK			CREDITS
					L	T	P	
5	UAD1304	Data Analytics	PE	3	3	0	0	**3**
6	UCS1004	Fault Tolerant Computing	PE	3	3	0	0	**3**
7	UCS1005	Green Computing	PE	3	3	0	0	**3**
8	UCS1006	Information Security	PE	3	3	0	0	**3**

PROFESSIONAL ELECTIVE – III (SEMESTER VII)								
S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	TOTAL CONTACT PERIODS	PERIODS PER WEEK			CREDITS
					L	T	P	
9	UCS1007	Adhoc and Sensor Networks	PE	3	3	0	0	**3**
10	UCS1008	Digital Currency Programming	PE	3	3	0	0	**3**
11	UCS1009	Parallel Computing	PE	3	3	0	0	**3**
12	UCS1010	Software Testing	PE	3	3	0	0	**3**

PROFESSIONAL ELECTIVE – IV (SEMESTER VII)								
S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	TOTAL CONTACT PERIODS	PERIODS PER WEEK			CREDITS
					L	T	P	
13	UCS1011	Distributed Systems	PE	3	3	0	0	**3**
14	UCS1012	Cyber Forensic and Malware	PE	3	3	0	0	**3**
15	UCS1013	Ethical Hacking	PE	3	3	0	0	**3**
16	UCS1014	Fuzzy Logic	PE	3	3	0	0	**3**

PROFESSIONAL ELECTIVE – V (SEMESTER VIII)								
S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	TOTAL CONTACT PERIODS	PERIODS PER WEEK			CREDITS
					L	T	P	
17	UGE1051	Human Rights	PE	3	3	0	0	**3**
18	UCS1015	Quantum Computing	PE	3	3	0	0	**3**
19	UCS1016	Real Time Systems	PE	3	3	0	0	**3**
20	UCS1017	Service Oriented Architecture	PE	3	3	0	0	**3**

PROFESSIONAL ELECTIVE – VI (SEMESTER VIII)								
S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	TOTAL CONTACT PERIODS	PERIODS PER WEEK			CREDITS
					L	T	P	
21	UCS1018	Digital Image Processing	PE	3	3	0	0	**3**
22	UCS1019	Soft Computing	PE	3	3	0	0	**3**
23	UCS1020	Software Project Management	PE	3	3	0	0	**3**
24	UMG1051	Intellectual Property Rights	PE	3	3	0	0	**3**

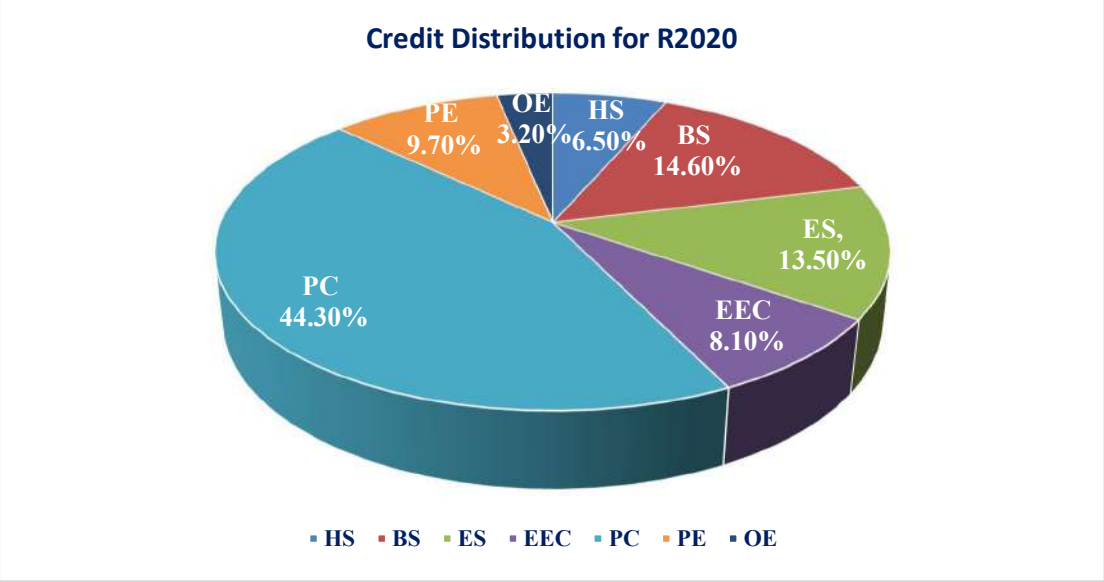
OPEN ELECTIVE – I (SEMESTER VI)								
S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	TOTAL CONTACT PERIODS	PERIODS PER WEEK			CREDITS
					L	T	P	
1	OEC1652	Satellite Communication	OE	3	3	0	0	**3**
2	OEE1651	Linear Integrated Circuits	OE	3	3	0	0	**3**
3	OME1652	Industrial Safety Engineering	OE	3	3	0	0	**3**
4	OME1654	Production Technology - I	OE	3	3	0	0	**3**
5	OMG1653	Human Capital Management	OE	3	3	0	0	**3**
6	OMG1654	Principles of Management	OE	3	3	0	0	**3**
7	OAD1651	Web Technology	OE	3	3	0	0	**3**

OPEN ELECTIVE – II (SEMESTER VIII)								
S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	TOTAL CONTACT PERIODS	PERIODS PER WEEK			CREDITS
					L	T	P	
1	OEC1852	Bio-Medical Electronics	OE	3	3	0	0	**3**
2	OEE1852	Electrical and Hybrid Vehicles	OE	3	3	0	0	**3**
3	OEE1853	Digital Logic Circuits	OE	3	3	0	0	**3**
4	OME1851	Industrial Automation	OE	3	3	0	0	**3**
5	OMG1855	Professional Ethics in Engineering	OE	3	3	0	0	**3**
6	OAD1851	Data Exploration and Visualization	OE	3	3	0	0	**3**
7	OIT1852	Cryptography and Network Security	OE	3	3	0	0	**3**

SUBJECT CREDIT DISTRIBUTION

SEMESTER	(HS)	(BS)	(ES)	(EEC)	(PC)	(PE)	(OE)	Total Credits
I	3	12	9					24
II	6	7	11	1				25
III		4	5	2	13			24
IV	3	4		3	13			23
V				3	19	3		25
VI					21	3	3	27
VII					16	6		22
VIII				6		6	3	15
Total Credits	**12**	**27**	**25**	**15**	**82**	**18**	**6**	**185**
Credit %	**6.5%**	**14.6%**	**13.5%**	**8.1%**	**44.3%**	**9.7%**	**3.2%**	**100%**

TOTAL NO OF CREDITS: 185



HOD **Member Secretary** **Academic Council Chairman**

K. RAMAKRISHNAN COLLEGE OF ENGINEERING

TIRUCHIRAPPALLI

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

REGULATION 2020

Semester I

UHS1151	**TECHNICAL ENGLISH – I**	**L**	**T**	**P**	**C**
	(Common to CSE,ECE, EEE,MECH, AIDS, IT & AIML)	**3**	**0**	**0**	**3**

OBJECTIVES:

- To develop the basic reading and writing skills of first year engineering students.
- To emphasize specially the development of speaking skills among learners of Engineering.
- To inculcate the habit of effective communication and to develop the basic grammar skills.
- To develop the habit of reading and speaking skills among learners to speak fluently in real contexts.
- To enable the learners to write effectively and to listen efficiently.

UNIT I **9**

Listening – Introduction – Importance – Types of Listening – Listening to an audio; Speaking – Greetings - Introducing oneself; Reading – Skimming for main ideas - Scanning for specific information –Note taking; Writing – Personal Letters – Business Letters –Reading comprehension; Grammar & Vocabulary – Technical Vocabulary – Synonyms, Antonyms – Parts of speech : Noun – Verb – Adverb – Adjective – Conjunction and Cohesive devices.

UNIT II **9**

Listening – Listening to video lectures and answering questions; Speaking –introducing others – Extempore – on a given topic; Reading – Reading newspapers, Magazines, Journal articles; Writing – Letter to the Editor – Email Writing – Essay Writing; Grammar & Vocabulary – Preposition – Pronoun – Types of pronouns – Word Formation – Different forms of words – Word Order - Phrasal Verbs.

UNIT III **9**

Listening – Listening to Speeches of famous personalities; Speaking – Congratulating on various occasions; Reading – Reading and interpreting visual Materials; Writing – Paragraph Writing – Autobiographical Writing; Grammar & Vocabulary – Fixes: Prefix and Suffixes – Articles – Tenses – Simple Tenses – Continuous Tenses.

UNIT IV **9**

Listening – Listening Short Audio Texts; Speaking – Describing a Person / Place / Process / Experience / Object- Short talks; Reading – Reading an Email; Writing – Biographical Writing- Dialogue Writing ; Grammar– Tenses - Perfect Tenses – Perfect Continuous Tenses– Interrogation - Yes or No Questions – WH Questions – Indirect Questions.

UNIT V **9**

Listening – Listening: News Bulletins & Dialogues- Role play; Speaking – Speaking in formal and informal situation; Reading – Reading from Various Sources; Writing – Recommendations – Instructions – Use of Imperatives; Grammar – Modal Auxiliary Verbs – Definitions – Cause and Effect Expressions – Collocations – Idioms and Phrases– Single Word Substitutions – Sentence completion.

TOTAL :45 PERIODS

TEXT BOOK:

1.Board of Editors. Using English: A Course Book for Undergraduate Engineers and Technologists. Orient Black Swan Limited, Hyderabad: 2015.
2.Richards, C. Jack. Interchange Students' Book-2 New Delhi: CUP, 2015.

REFERENCES:

1. Bailey, Stephen. Academic Writing: A practical guide for students. New York: Routledge, 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 RajeevanGeeta. 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

WEB REFERENCES:

1. https://www.google.com/search?q=english+grammar&oq=english+grammar&aqs=chrome..69i57j0i131i433i512j0i512l2j0i433i512l3j0i131i433i512j0i433i512j0i512.8249j0j7&sourceid=chrome&ie=UTF-8

2. https://www.google.com/search?q=phrasal+verbs&oq=phrasal+verbs&aqs=chrome..69i57j0i67j0i20i263i512j0i131i433i512j0i67i433j0i433i512j0i67j69i60.4289j0j9&sourceid=chrome&ie=UTF-8

3. https://www.google.com/search?q=communication+skills+in+english+and+practices&sxsrf=AOaemvIfpLlNsGeJFvUTWTJSF9BpNqQ22w%3A1638954948844&ei=xHewYe_3Ms6cseMP6e5kAw&ved=0ahUKEwjv6Zz87tP0AhVOTmwGHftTDsIQ4dUDCA4&uact=5&oq=communication+skills+in+english+and+practices&gs_lcp=Cgdnd3Mtd2l6EAMyBQghEKABMgUIIRCgATIHCAAQRxCwAzoHCAAQsAMQQzoECAAQQzoFCAAQgAQ6CggAEIAEEIcCEBQ6BggAEBYQHjoGCAAQDRAeOggIIRAWEB0QHkoFCDwSATFKBAhBGABKBAhGGABQzgpYnShg4itoAXACeACAAY8DiAH_EpIBCDAuMTAuMy4xmAEAoAEByAEKwAEB&sclient=gws-wiz

COURSE OUTCOMES:

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

1. read, write and speak clearly, cohesively, confidently, avoiding grammatical errors and using a wide range of vocabulary.
2. participate effectively in informal conversations; introduce themselves and their friends and express opinions in English.
3. able to read articles of a general kind in newspapers and magazines.
4. comprehend conversation and personal letters and email in English.
5. write short essays of a general kind and deliver short speeches in English.

UMA1151 **MATHEMATICS - I**

L	T	P	C
3	1	0	4

OBJECTIVES:

- To provide the basic tools of calculus mainly for the purpose of modeling the engineering problems mathematically and obtaining solutions.
- Vector calculus can be widely used for modeling the various laws in engineering fields.
- This is a foundation course, which mainly deals with topics such as single integrals.
- To impart to the students the skills of employing the basic tools of differential, integral calculus for solving basic and difficult engineering problems.
- To provide the requisite and relevant background necessary to understand other important engineering mathematics courses offered for Engineers and Scientists.

UNIT I DIFFERENTIAL CALCULUS 12

Radius of Curvature ,In Cartesian, Parametric and Polar Forms (Without Proof),Centre and Circle of Curvature (Formulae Only) ,Applications of Evolutes and Involutes, Taylor's and Maclaurin's Series Expansions (Without Proof) For Functions of Single Variable, Partial Differentiation: Definition, Total Derivatives Differentiation of Composite Functions, Jacobian-Problems, Applications, Maxima and Minima of Functions of Two Variables ,Lagrange's Method of Undetermined Multipliers with One Subsidiary Conditions.

UNIT II VECTOR CALCULUS 12

Vector Differentiation, Scalar and Vector Point Functions, Gradient of a Scalar Field-Directional Derivative, Divergence and Curl of a Vector Field, Vectors Identities, Vector Integration-Green's Theorem in the Plane, Stoke's and Gauss Divergence Theorem (Without Proof). Applications , Work Done By Force and Flux.

UNIT III INTEGRAL CALCULUS 12

Definite and Indefinite integrals ,Substitution rule ,Techniques of Integration , Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions, Improper integrals, Reduction formulae ,$\int \sin^n x\,dx$, $\int \cos^n x\,dx$, $\int \sin^m x \cos^n x\,dx$ (m and n are positive integers),evaluation of these integrals with standard limits (0, π/2) and problems.

UNIT IV MULTIPLE INTEGRALS 12

Double integrals, Evaluation by change of order of integration and by changing to polar co-ordinates, Applications, Area and Volume, Triple integrals, simple applications involving cubes, sphere and rectangular parallelepiped, Beta and Gamma function: Definition, relation between them , simple problems.

UNIT V LINEAR ALGEBRA 12

Rank of a matrix, Determination of rank by elementary transformation (Echelon and normal forms), Consistency of a system of linear homogeneous equations, Gauss elimination and Gauss-Jordan methods, Eigen values and Eigen vectors (no properties), Diagonalization of matrices.

TOTAL : 60 PERIODS

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics (44th Edition), Khanna Publishers, New Delhi.
2. B.V. Ramana, Higher Engineering Mathematics, Tata McGraw Hill publications, New Delhi, 11th Reprint, 2010.
3. T.Veerarajan& co Higher Engineering Mathematics ,Tata McGraw Hill Publications, New Delhi.
4. M.K. Venkataraman., "Engineering mathematics: first year. Volume II, Calculus and analytical geometry", The National Publishing Co., 1965.

REFERENCES:

1. Erwin Kreyszig, Advanced Engineering Mathematics (Latest Edition), Wiley Publishers, New Delhi.
2. H.C. Taneja, Advanced Engineering Mathematics, Volume I&II, I.K. International Publishing House Pvt. Ltd., New Delhi.
3. N.P.Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
4. V.Krishnamurthy, V.P. Mainra and J.L.Arora, An introduction to Linear Algebra, Affiliated East-West press, Reprint 2005.
5. D.Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
6. Spiegel. M.R., Schiller. J., and Srinivasan. R.A., "Schaum's Outlines of advanced mathematics for engineers ", Tata McGraw Hill Edition, 2004.

WEB REFERENCE:

1.http://www.sfu.ca/~vjungic/Zbornik2020/Zbornik2020.pdf
2.https://ocw.mit.edu/ans7870/resources/Strang/Edited/Calculus/Calculus.pdf
3. https://www.sjsu.edu/me/docs/hsu-Chapter%203%20Vectors%20and%20Vector%20Calculus%20pdf.pdf
4. https://www2.math.upenn.edu/~kazdan/504/la.pdf

ONLINE REFERENCE:

1.https://www.digimat.in/nptel/courses/video/111105122/L01.html
2.https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-ma07/
3.https://nptel.ac.in/courses/111/101/111101115/
4. https://nptel.ac.in/courses/111/107/111107111/

COURSE OUTCOMES:

After completion of this course, students will be able to demonstrate competency in the following skills:

1. Use both the limit definition and rules of differentiation to differentiate functions. Apply differentiation to solve maxima and minima problems. Assess the practical importance of polar curves, Jacobians and radius of curvature.
2. Evaluation of line, surface and volume integrals using Gauss, Stokes and Green's theorems.
3. Evaluate integrals both by using Riemann sums and by using the Fundamental Theorem of Calculus. Determine convergence/divergence of improper integrals and evaluate

convergent improper integrals.

4. Apply integration to compute multiple integrals, area, volume, integrals in polar coordinates, in addition to change of order and change of variables.
5. Use matrices techniques for solving systems of linear equations in the different areas of linear algebra. Apply the concepts in problem solving and relate the solutions to the various engineering streams.

UPH1151	ENGINEERING PHYSICS - I	L	T	P	C
	(Common to CSE,ECE,EEE,MECH,IT,AIDS & AIML)	3	0	0	3

OBJECTIVES:

- To impart the fundamental knowledge of crystal physics and crystal growth.
- To understand the concept of properties of matter and thermal physics.
- To acquire the knowledge on quantum physics and its applications.
- To provide the concept of acoustics and ultrasonics.
- To explain the concept of laser and fibre optics.

UNIT I CRYSTAL PHYSICS 9

Classification of solids - Lattice points and space lattice - Unit cell and lattice parameters - crystal systems and Bravais lattices - Crystallographic planes - Lattice planes – Miller indices–d-spacing in cubic lattice – Calculation of number of atoms per unit cell – Atomic radius – Coordination number – Packing factor for SC, BCC, FCC, HCP and Diamond structures – Graphite structures (qualitative treatment) – crystal imperfections: (qualitative) – Crystal growth mechanism: (qualitative)

UNIT II PROPERTIES OF MATTER AND THERMAL PHYSICS 9

Elasticity- Hooke's law - Relationship between three modulii of elasticity (qualitative) – stress –strain diagram – Poisson's ratio –Factors affecting elasticity –Bending moment – Depression of a cantilever—Young's modulus by uniform bending- I-shaped girders - Modes of heat transfer - thermal conductivity – Forbe's and Lee's disc method – conduction through compound media (series and parallel)

UNIT III QUANTUM PHYSICS 9

Failure of classical theory - Black body radiation – Planck's theory (derivation) – Deduction of Wien's displacement law and Rayleigh – Jeans Law from Planck's theory – Compton effect and Compton Shift – wave particle duality - concept of wave function and its physical significance – Schrödinger's wave equation – Time independent and time dependent equations – Particle in a one dimensional box –Tunneling effect-Scanning Tunnelling Microscope.

UNIT IV ACOUSTICS AND ULTRASONICS 9

Classification of Sound – Decibel – Weber-Fechner law – Sabine's formula- derivation using growth and decay method – Absorption Coefficient and its determination –factors affecting acoustics of buildings.

Production of ultrasonics by piezoelectric methods — Determination of Wavelength and frequency of Ultrasonic using Acoustic Grating - Application: NDT using pulse echo system through transmission and reflection modes - A, B and C–scan displays,–SONAR.

UNIT V LASERAND FIBRE OPTICS 9

Fundamentals of laser - Spontaneous and stimulated emission - Population inversion –Einstein's A and B coefficients - derivation. Types of lasers — Nd:YAG, CO_2, Semiconductor lasers (homo-junction & hetero-junction) – Industrial and Medical Applications.

Principle and propagation of light in optical fibres– Numerical aperture and Acceptance angle — Types of optical fibres (material, refractive index, mode) - Application: Fibre Optical Communication system-Active and passive fibre sensors.

TOTAL : 45 PERIODS

TEXT BOOK:

1 Bhattacharya, D.K. & Poonam,T.- Engineering Physics. Oxford University Press, 2015.

2 Gaur, R.K. & Gupta, S.L.- Engineering Physics. Dhanpat Rai Publishers, 2012.

3 Pandey,B.K. & Chaturvedi,S. – Engineering Physics. Cengage Learning India, 2012.

4 Paul G Hewitt, "Conceptual Physics", 12th Edition Pearson Higher Education Pvt. Ltd., 2014.

REFERENCES:

1 Halliday, D., Resnick, R. & Walker,J.- Principles of Physics. Wiley, 2015.

2 Serway,R.A. & Jewett, J.W.- Physics for Scientists and Engineers. Cengage Learning, 2010.

3. Tipler,P.A. & Mosca,G.- Physics for Scientists and Engineers with Modern Physics, W.H.Freeman, 2007.

4. Gerdkeiser, "Optical fiber communications", Tata Mc Graw Hill Pvt Ltd, 4th Edition, 2008

COURSE OUTCOMES:

At the end of this course, students will

1 Illustrate crystal systems, Miller Indices, crystal imperfections and crystal growth techniques.

2 Describe the properties of matter, modes of heat transfer, methods to measure thermal conductivity of materials

3 Demonstrate the concepts of quantum physics and its applications

4 Explain the basics of acoustics, Sabine's formula and generation and applications of ultrasonics.

5 Summarize the basics of Laser and fibre optics. Illustrate the production of laser, types of fiber and applications of laser and fibre optics.

UCY1151	ENGINEERING CHEMISTRY	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To make the students conversant with boiler feed water requirements, related problems and water treatment techniques.
- To know the First law and second law of thermodynamics and second law based derivations of importance in engineering applications.
- To make the students be familiar with the principles and generation of energy in nuclear reactors, solar cells, wind mills.
- To learnt about the Types of fuels, calorific value calculations, manufacture of solid, liquid and gaseous fuels.
- To develop an understanding of the basic concepts of phase rule and its applications to single and two component systems and appreciate the purpose and significance of alloys.

UNIT I WATER TECHNOLOGY 9

Introduction-hard water and soft water- hardness of water- boiler feed water-requirements-formation of deposits in steam boilers and heat exchangers- disadvantages (wastage of fuels, decrease in efficiency, boiler explosion)-prevention of scale and sludge formation-estimation of hardness by EDTA method- problems based on hardness- softening of hard water- external treatment- zeolite and demineralisation- internal treatment-boiler compounds(carbonate, phosphate, calgon, colloidal, sodium aluminate conditioning)- desalination of brackish water-reverse osmosis-Electro dialysis.

UNIT II CHEMICAL THERMODYNAMICS 9

Terminology of thermodynamics –First and Second law: Entropy - entropy change for an ideal gas, reversible and irreversible processes; entropy of phase transitions. Free energy and work function: Helmholtz and Gibbs free energy functions (problems); GibbsHelmholtz equation (problems); Clausius-Clapeyron equation; Maxwell relations – Van't Hoff isotherm and isochore (problems).

UNIT III PHASE RULE AND ALLOYS 9

Phase rule: Introduction- definition of terms with examples- One component system- water system and Carbon dioxide system- reduced phase rule- two component systems- classification-lead silver system-zinc magnesium system.

Alloys: Introduction-definition-properties of alloys- significance of alloying- Ferrous alloys-Nichrome and stainless steel- heat treatment of steel- Non-ferrous alloys- brass and bronze.

UNIT IV FUELS AND COMBUSTION 9

Fuel: 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) – natural gas- compressed natural gas(CNG)-liquefied petroleum gases(LPG)- producer gas- water gas. Power alcohol and bio diesel. Combustion of fuels: introduction-calorific value- higher and lower calorific values-ignition temperature- explosive range – flue gas analysis (ORSAT Method).

UNIT V ENERGY SOURCES AND STORAGE DEVICES 9

Nuclear fission – controlled nuclear fission – nuclear fusion – differences between nuclear fission and fusion – nuclear chain reactions – nuclear energy – light water nuclear power plant – breeder reactor – solar energy conversion – solar cells – wind energy. Batteries, fuel cells and super capacitors: Types of batteries – primary battery (dry cell) secondary battery (lead acid battery, Nickel-Cadmium battery, lithium-ion-battery) Fuel cells – H2-O2 fuel cell

TOTAL : 45 PERIODS

TEXT BOOK:

1. Jain P.C. and Monica Jain, "Engineering Chemistry", DhanpatRai Publishing Company (P) Ltd., New Delhi, 2010.
2. Kannan P., Ravikrishnan A., "Engineering Chemistry", Sri Krishna Hi-tech Publishing Company Pvt. Ltd. Chennai, 2009.
3. Vairam S, Kalyani P and SubaRamesh.,"Engineering Chemistry"., Wiley India PvtLtd., New Delhi., 2011.
4. T. Denton, "Electric and Hybrid Vehicles", Routledge, 2016.
5. A.K.Babu, "Electric & Hybrid Vehicles", Khanna Publishers, New Delhi 2019
6. Anupam Singh, "Electric Vehicles: And the end of ICE Age", Adhyyan Books, New Delhi 2019.

REFERENCES:

1. Dara S.S, Umare S.S, "Engineering Chemistry", S. Chand & Company Ltd., New Delhi 2010.
2. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2008.
3. Gowariker V.R. ,Viswanathan N.V. and JayadevSreedhar, "Polymer Science", New Age International P (Ltd.,), Chennai, 2006.
4. RenuBapna and Renu Gupta., "Engineering Chemistry", Macmillan India Publisher Ltd.,2010.
5. Pahari A and Chauhan B., "Engineering Chemistry"., Firewall Media., New Delhi., 2010.

COURSE OUTCOMES:

At the end of this course, students will demonstrate the ability to,

1. Identify and describe the various water quality parameters and methods to purify water in contest with boilers and domestics usage.
2. Explain the fundamentals of thermodynamics and Derive the various thermodynamic parameters.
3. Identify the various component systems and Apply the concept of phase rule in metal-alloy system.
4. Recognize the manufacturing technologies used for solid, liquid and gaseous fuels.
5. Describe Illustrate and Discuss the generation of energy in batteries, nuclear reactors, solar cells and fuel cells.

HOD **PRINCIPAL**

UGE1151 PYTHON PROGRAMMING AND PROBLEM SOLVING L T P C
3 0 0 3

OBJECTIVES:

- To understand the basics of algorithmic problem solving.
- To understand control flow of functions and evaluate the control flow.
- To analyze and implement the Python data structures: List, tuples and dictionaries.
- To understand the usage methodology and benefits of files.
- To analyze and apply methods in Python.

UNIT I INTRODUCTION 9

Introduction to the way of programs – Variables, Expression and Statements: values and types – Variables – Variable name and keywords – Operators and operands – Expressions and statements – Interactive mode and script mode – Order of operations – String operations – Notation: Pseudo code, Flow chart, Programming language, Algorithmic problem solving, Iteration, Recursion. Illustrative programs: Flowchart to find the maximum of three numbers, Pseudo code to find the number of integers in a range, Flowchart to find the day of the week, Pseudo code to find the reverse of a string.

UNIT II FUNCTIONS AND CONDITIONS 9

Functions: Function calls – Type conversion – Math functions – Composition – Adding new functions – Flow of execution – Parameters and arguments – Variables and parameters are local – Stack diagram – Conditions: Precedence – Modulus operator – Boolean expressions – Expression evaluation – Logical operators – Conditional and alternative execution – Chained and nested conditions, Illustrative programs: Using logical operator find the maximum and minimum of three numbers, GCD, Multiply two matrices, Fibonacci series, Linear and binary search.

UNIT III RECURSION, FRUITFUL FUNCTIONS AND LIST 9

Recursion – Stack diagrams for recursive functions – Infinite recursion – Keyboard input – Fruitful functions: Return values, Incremental development, Composition, Boolean functions – Recursion – Leap of faith – Checking types – List: Traversal, Operations, Slices, Methods, Mapping, Filter and Reduce, Deletion, Objects and Values, Aliasing, Arguments, Illustrative programs: Find maximum and minimum in a list, Insert and delete in a sorted list, Selection sort, Insertion sort, Mergesort, Histogram.

UNIT IV ITERATION, STRINGS AND TUPLES 9

Iteration: Multiple assignment, Updating variables, While statement, Break statement, Square roots, Algorithms – String: String is a sequence, len, Traversal with for loop, String methods, String comparison, looping and counting – Tuples: Operations, Tuple assignment, Tuple as return values – Dictionaries: Looping, Reverse lookup, Memos, Global variables, Long integers – Illustrative programs: Using while loop display a range of numbers, Length of string, Number of letters in a string, Print a range of tuples.

UNIT V FILES, EXCEPTIONS AND MODULES 9

Persistence – Reading and Writing – Format operator – Filenames and paths – Catching exceptions – Databases – Pickling – Pipes – Modules – Illustrative programs: Display the contents in a word file, Copy file, Catch a 'zero' exception, Markov Analysis.

TOTAL : 45 PERIODS

TEXT BOOKS:

1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016.
2. Guido van Rossum and Fred L. Drake Jr, "An Introduction to Python", Revised and updated for Python 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", McGraw Hill Education (India) Private Ltd., 2015.
4. Kenneth A. Lambert, "Fundamentals of Python: First Programs", CENGAGE Learning, 2012.
5. Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem-Solving Focus", Wiley India Edition, 2013.
6. Python: The Complete Reference, Martin C. Brown, Tata McGraw Hill, 2018.

COURSE OUTCOMES:

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

1. Understand problem solving and complexity analysis.
2. Apply and formulate simple Python programs using function.
3. Analyze and design the recursive functions and list.
4. Create Python programs with iteration, strings and tuples.
5. Design real-time applications with file manipulations and exception handling operations.

ONLINE REFERENCES:

1. https://onlinecourses.nptel.ac.in/noc21_cs67/preview
2. https://onlinecourses.swayam2.ac.in/aic20_sp33/preview
3. https://onlinecourses.nptel.ac.in/noc21_cs78/preview
4. https://onlinecourses.nptel.ac.in/noc21_cs75/preview

UBE1161	BASIC CIVIL AND MECHANICAL ENGINEERING	L	T	P	C
	(Theory Cum Lab)	3	0	2	4

OBJECTIVES:

- To impart basic knowledge on Civil and Mechanical Engineering.
- To familiarize the various components and its working in Civil and Mechanical Engineering.
- To familiarize the materials and measurements used in Civil Engineering.
- To provide the exposure on the fundamental elements of Mechanical engineering
- To enable the students to distinguish the components and working principle of power plant units, IC engines, Pumps and R & AC system

UNIT I SCOPE OF CIVIL ENGINEERING, MATERIALS AND SURVEYING 9

Overview of Civil Engineering - Civil Engineering contributions to the welfare of Society – Specialized sub disciplines in Civil Engineering – (Structural, Construction, Geotechnical, Environmental, Transportation and Water Resources Engineering): Definition & need. Civil Engineering Materials: Bricks, stones, sand, cement, concrete, steel, timber – definition, types & applications. Surveying: Objects – classification – principles – instruments for measuring Distance & Angles – Leveling: definition & types – Contours.

UNIT II CIVIL ENGINEERING COMPONENTS AND STRUCTURES 9

Roads – Definition, types & various cross sectional view – safety precautions, various road and traffic signs. Foundations: Types of foundations - Bearing capacity and settlement. Civil Engineering Structures: Brick masonry – stonemasonry – beams – columns – lintels – roofing – flooring – plastering – floor area, carpet area and floor space index. Bridges - definition & types – applications, Dams - definition & types - sources of water - rainwater harvesting – applications.

UNIT III SCOPE OF MECHANICAL ENGINEERING, POWER PLANTS AND BOILERS 9

Overview of Mechanical Engineering - Mechanical Engineering contributions to the welfare of Society – Specialized sub disciplines in Mechanical Engineering – (Production, Automobile, Design, Energy Engineering): definition & need - Interdisciplinary concepts in Mechanical Engineering. Power Plants - Classification of power plants – Construction, working principle and applications of steam, Gas, Diesel, Hydro - electric and Nuclear Power plants. Boilers: Cochran boiler – Babcock & Wilcox boiler - Benson boiler.

UNIT IV INTERNAL COMBUSTION ENGINES 9

Internal Combustion Engines – Engine – types - classification – working cycle – Main Components in IC Engine – Construction, working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles – Comparison of four stroke and two stroke engines - cooling methods – lubrication methods – ignition methods.

UNIT V REFRIGERATION, AIR CONDITIONING SYSTEM AND PUMPS 9

Terminology of Refrigeration and Air Conditioning. Principle of vapour compression and absorption system – Layout of typical domestic refrigerator – Window and Split type room Air conditioner, Pumps: Definition, Construction and working principle of Reciprocating Pumps (single acting and double acting) and Centrifugal Pumps.

TOTAL : 45 PERIODS

PRACTICALS - LIST OF EXPERIMENTS 30 HOURS

1. Study of plumbing components of residential and industrial buildings.
2. Hands-on-exercise on preparation of plumbing line sketches for water supply and sewage works - Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.
3. Study of carpentry components of residential and industrial buildings.
4. Hands-on-exercise on Wood work, joints by sawing, planning and cutting.
5. Study about various welding components
6. Hands-on-exercise on preparation of butt joints, lap joints and T- joints by metal arc welding
7. Study about Basic Machining by Lathe and Drilling machine
8. Hands-on-exercise on Simple Turning, Step Turning, Taper turning and Drilling
9. Study about various sheet metal tools and different type of sheet metal joints.
10. Hands-on-exercise on Forming & Bending - Model making – Trays and funnels

TOTAL HOURS: 75

TEXT BOOK:

1. Shanmugam Gand Palanichamy MS,"Basic Civil and Mechanical Engineering", Tata McGraw Hill Publishing Co.,NewDelhi,1996.

REFERENCES:

1. Palanikumar, K. Basic Mechanical Engineering, ARS Publications, 2010.
2. Ramamrutham S.,"Basic Civil Engineering", Dhanpat Rai Publishing Co.(P) Ltd.1999.
3. Seetharaman S.,"Basic Civil Engineering", AnuradhaAgencies,2005.
4. ShanthaKumar SRJ.,"Basic Mechanical Engineering", Hi-tech Publications, Mayiladuthurai, 2000.

COURSE OUTCOMES:

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

1. Appreciate the Civil and Mechanical Engineering components.
2. Understand the need and procedures followed during surveying of any land
3. Explain the usage of construction material, structures and proper selection of construction materials.
4. Identify the components used in power plant cycle.
5. Demonstrate working principles of IC Engines and Power plants, boilers.
6. Elaborate the components of refrigeration and Air conditioning cycle, pumps.

UBS1161 PHYSICS AND CHEMISTRY LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVES:

1. To impart the knowledge of different experiments of thermal physics, properties of mater and liquids, optics.
2. To acquire the basic knowledge in the determination of quality of materials in engineering field.
3. To make the student to acquire practical skills in the determination of water quality parameters through volumetric and instrumental analysis.
4. To make the student acquire practical skills in the wet chemical and instrumental methods for quantitative estimation of hardness, alkalinity, metal ion content.
5. To calculate the amount of iron in the given solution by Potentiometer.

LAB COMPONENT PHYSICS 30

1. Determination of Young's modulus by non-uniform bending method
2. (a) Determination of wavelength, and particle size using Laser
   (b) Determination of acceptance angle in an optical fiber.
3. Determination of thermal conductivity of a bad conductor – Lee's Disc
4. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer
5. Determination of wavelength of mercury spectrum – spectrometer grating
6. Determination of band gap of a semiconductor
7. Determination of thickness of a thin wire – Air wedge method
8. Photo electric effect- LED method.

LAB COMPONENT CHEMSITRY 30

1. Estimation of HCl using Na_2CO_3 as primary standard and determination of alkalinity in water sample.
2. Determination of total, temporary & permanent hardness of water by EDTA method.
3. Determination of DO content of water sample by Winkler's method.
4. Determination of chloride content of water sample by Argentometric method.
5. Determination of strength of given hydrochloric acid using pH meter.
6. Determination of strength of acids in a mixture of acids using conductivity meter.
7. Estimation of iron content of the given solution using potentiometer.
8. Conductometric titration of strong acid with strong base.

TOTAL HOURS: 60 HOURS

COURSE OUTCOMES:

At the end of this course, students will

1 Illustrate different experiments to test the basic elastic and thermal properties of materials. Understand the basic knowledge of materials in engineering applications.

2 Demonstrate various experiments to determine the optical parameters, band gap of semiconductor and velocity of ultrasound. Understand the applications of these parameters in engineering applications.

3 Understand the practical skills in the determination of water quality parameters like Chloride content, alkalinity, hardness and dissolved oxygen through volumetric analysis.

4 Choose appropriate instrumentation techniques like conductometer and pH meter for determining the strength and the amount of the given solution.

5 Estimate the strength and amount of iron present in the given solution by using potentiometer.

UGE1161	PYTHON PROGRAMMING AND PROBLEM SOLVING LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

- To understand the basics of algorithmic problem solving.
- To understand control flow of functions and evaluate the control flow.
- To analyze and implement the Python data structures: List, tuples and dictionaries.
- To understand the files and command line arguments in Python.
- To learn the usage of turtle graphics and Pygame in Python.

LIST OF EXERCISES:

1. **Arithmetic and Conditional operations**

   a) Write a Python program to show the usage of various operators available in Python language.

   b) Write a Python program to find the biggest among three numbers with three run time inputs.

   c) Write a Python program to get 5 subject marks and display the grade using nested if and elif ladder

   d) Write a Python program to check the given year is leap year or not.

2. **Iteration and Recursion**

   a) Write a Python program to find the reversal of a number and check whether the given number is palindrome or not. (5225, 101)

   b) Write a Python program to find whether the given number is Armstrong number or not.

   c) Write a Python program to read a number and display the inverted star pattern of the desired size.

   d) Write a Python program to find the factorial of number with and without recursion

   e) Write a Python program print all possible permutations of a number with and without recursion

   f) Write a Python program with recursive function to implement Towers of Hanoi

3. **List operations in Python**

   a) Write a Python program to find the maximum number in a list.

      i. Using Built in function

      ii. Without using Built-in function

   b) Write a Python program to do check string palindromes using slicing technique.

   c) Write a Python program to find a number in list using linear search.

   d) Write a Python program to sort the numbers in a list using Merge sort.

   e) Write a Python program to accept two matrices and apply all arithmetic operations (add, sub, multiply) and display the result.

4. **Dictionaries :**

   a) Write a simple Python program to implement student management system using

dictionary, with student ID as key and values as a list with name, age, department, address, etc.

5. **Strings:**
   a) Write a Python program to count the number of characters (character frequency) in a string
   b) Write a Python function to generate all anagrams of a given string.
6. **Command Line Arguments and Files**
   a) Write a program that takes 2 numbers as command line arguments and prints its sum.
   b) Write a Python program using command line arguments and files for inventory management
   c) Write a program to print each line of a file in reverse order.
7. **GUI, Shapes and PyGame**
   a) Draw simple shapes using turtle graphics

   Implement a simple PyGame program using obstacle detection

TOTAL : 60 PERIODS

PLATFORM NEEDED:

Python 3 interpreter for Windows/Linux.

COURSE OUTCOMES:

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

1. Compose simple python programs with arithmetic operators and control structures.
2. Apply iteration and recursion on data values.
3. Analyze and implement the Python data structures: List, tuples and dictionaries.
4. Interpret programs using command line execution and apply persistent storage.
5. Design simple and interactive real-time games

ONLINE REFERENCES:

1. https://www.w3resource.com/python-exercises/
2. https://www.hackerearth.com/practice/

K. RAMAKRISHNAN COLLEGE OF ENGINEERING

TIRUCHIRAPPALLI

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

REGULATION 2020

Semester II

UHS1251	**TECHNICAL ENGLISH – II**	**L**	**T**	**P**	**C**
	(Common to CSE, ECE, EEE, MECH, AIDS, IT & AIML)	**3**	**0**	**0**	**3**

OBJECTIVES:

- To improve strategies and skills to enhance the ability to read and comprehend engineering and technology texts.
- To inculcate reading habit and to develop effective reading skills among the learners.
- To develop the speaking skills to make technical presentations and to participate in group discussions.
- To strengthen the listening skills will help the learners to comprehend lectures and talks in their areas of specialization.
- To foster the ability to write convincing Job applications and effective reports.

UNIT I **9**

Listening – Listening to Scientific/ Technical related videos & Audios and Completing Information; Speaking – Asking for & Giving Directions; Reading – Reading an Article in a newspaper; Writing – Transcoding: Pie chart – bar chart – Flow Chart; Grammar – Different Forms of Words – Question Tags – Negative Sentences – Compound Sentences – Fixed and Semi Fixed Expressions – Guessing Meaning.

UNIT II **9**

Listening – Listening to guest Lectures; Speaking – Product Description Reading – Analysing Magazine Article; Writing – Describing a Process– Hints Development; Grammar – Tense Conjugation – Voice – Active and Passive Voice – Impersonal Passive Voice.

UNIT III **9**

Listening – Listening to Documentaries & Making Notes; Speaking – Introduction to Technical Presentation & Making PPT; Reading –Reading Short Stories & Identifying the various transitions in a text; Writing – Creative Writing on Given Topic – Job Application Letter and Resume; Grammar – Subject Verb Agreement – Degrees of Comparison.

UNIT IV **9**

Listening – Listening to TED Talks/Ink Talks; Speaking – Mechanics of Presentation – Public Speaking; Reading – Speed Reading & Tongue Twisters; Writing – Preparing Check List – Industrial Visit Report; Grammar – Comparative Adjectives – Direct Speech and Indirect Speech - Conditional Clauses.

UNIT V **9**

Listening – Listening to Product Description; Speaking – Group Discussion; Reading – Reading a Book Review; Writing – Accident Report – Feasibility Report; Grammar – Connectives – Sequence Words – Numerical Expressions – Purpose Expressions – Misspelled Words – Relative clauses.

TOTAL :45 PERIODS

TEXT BOOK:

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.

REFERENCES:

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

COURSE OUTCOMES:

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

1. understand and Write cohesively, coherently and flawlessly avoiding grammatical errors, using a wide vocabulary range, organizing their ideas logically on a topic.
2. practice and analyze in reading different genres to texts adopting various reading strategies.
3. explain and summarize clearly and communicate with one or many listeners using appropriate communicative strategies
4. write reports, Job Applications and can be familiar with technical writing.
5. create and Practice and comprehend different spoken discourses.

HOD **PRINCIPAL**

UMA1251	MATHEMATICS - II	L	T	P	C
		3	1	0	4

OBJECTIVES:

- The purpose of the course is to help the students to understand and apply the Concepts of ODE's.
- To apply the concepts of PDE's infinite series to solve tough engineering problems.
- To understand the concept of Analytic Functions.
- To apply complex integration in engineering problems.
- To apply the knowledge of special functions and their properties.

UNIT I ORDINARY DIFFERENTIAL EQUATIONS 12

Higher order linear differential equations with constant coefficients, Method of variation of parameters, Homogeneous equation of Euler's and Legendre's type, System of simultaneous linear differential equations with constant coefficients, Method of undetermined coefficients.

UNIT II PARTIAL DIFFERENTIAL EQUATIONS 12

Formation of partial differential equations, Singular integrals, Solutions of standard types of first order partial differential equations, Lagrange's linear equation, Linear partial differential equations of second and higher order with constant coefficients of both homogeneous and non-homogeneous types.

UNIT III ANALYTIC FUNCTIONS 12

Analytic functions, Necessary and sufficient conditions for analyticity in Cartesian and polar coordinates, Properties, Harmonic conjugates, Construction of analytic function, Conformal mapping by functions w=z+c, w=cz, $w=\frac{1}{z}$, $w=z^2$, Bilinear transformation.

UNIT IV COMPLEX INTEGRATION 12

Line integral ,Cauchy's integral theorem ,Cauchy's integral formula ,Taylor's and Laurent's series, Singularities ,Residues, Residue theorem , Application of Residue theorem for evaluation of real integrals ,Use of circular contour and semi-circular contour.

UNIT V SPECIAL FUNCTIONS 12

Chebyshev's polynomials, Definitions, Derivations of Chebyshev's Polynomials $|T_n(x)|$. Orthogonality property, Some theorems on Chebyshev's polynomials, Recurrence relations- Generating functions, Problems, Legendre Polynomials: Series solution of Legendre's differential equation of first kind.

TOTAL : 60 PERIODS

TEXT BOOKS:

1. Grewal B.S.,"Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43'rd Edition, 2014.
2. Kreyszig Erwin, "Advanced Engineering Mathematics John Wiley and Sons, 10th Edition, New Delhi, 2016.
3. T .Veerarajan & co., Engineering Mathematics I, Tata McGraw Hill publications, New Delhi.
4. M.K. Venkataraman., "Engineering mathematics: first year. Volume II, Calculus and analytical geometry", The National Publishing Co., 1965.

REFERENCES:

1. Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.
2. Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics",Narosa Publications, New Delhi , 3rd Edition, 2007.
3. O'Neil, P.V. "Advanced Engineering Mathematics", Cengage Learning India Pvt., Ltd, New Delhi, 2007.
4. Sastry, S.S, "Engineering Mathematics", Vol. I & II, PHI Learning Pvt. Ltd, 4th Edition, New Delhi, 2014.
5. Wylie, R.C. and Barrett, L.C., "Advanced Engineering Mathematics "Tata McGraw Hill Education Pvt. Ltd, 6th Edition, New Delhi, 2012.
6. Spiegel. M.R., Schiller. J., and Srinivasan. R.A., "Schaum's Outlines of advanced mathematics for engineers ", Tata McGraw Hill Edition, 2004.

WEB REFERENCES:

1. https://brilliant.org/wiki/chebyshev-polynomials-definition-and-properties/
2. https://www.wileyindia.com/engineering-mathematics-ii-2ed-aku.html
3. https://www.classcentral.com/course/swayam-engineering-mathematics-ii-17592
4. https://pages.pomona.edu/~ajr04747/Spring2014/Math182/Notes/Math182Spring2014Notes.pdf

ONLINE RESOURCES:

1. https://nptel.ac.in/courses/111/105/111105035/
2. http://www.nptelvideos.in/2012/11/mathematics-ii.html
3. https://nptel.ac.in/courses/122/107/122107036/

COURSE OUTCOMES:

After successful completing of this course, the student will have a good understanding of the following topics and its applications:

1. Apply Various methods to solve the differential equations
2. Understand how to solve the given standard partial differential equations.
3. Apply and analyze Analytic functions, conformal mapping and complex integration.
4. Apply the knowledge of complex variables for constructing physical models connected to diverse engineering phenomena.
5. Apply to Solve some differential equation, which is not solvable in ordinary case but its series solution, gives an idea of developing special function, which has important role in some physical phenomena arising in engineering problems.

UPH1251	ENGINEERING PHYSICS - II	L	T	P	C
	(Common to CSE,ECE,EEE,MECH,IT,AIDS & AIML)	3	0	0	3

OBJECTIVES:

- To acquire the basic knowledge of classical and quantum theories on free electron and their applications.
- To impart the fundamental concept of semiconductors and its properties
- To provide the basic concept of optical materials and optical devices.
- To explain fundamental concept of magnetic dielectric and super conducting materials.
- To illustrate the basic principles about ceramics, composites, metallic glasses, SMA and nanomaterials

UNIT I CONDUCTING PROPERTIES OF MATERIALS 9

Classical free electron theory - Expression for electrical conductivity – Thermal conductivity, expression - Wiedemann-Franz law – Success and failures - Electrons in metals – Particle in a three dimensional box – Degenerate states – Fermi- Dirac statistics – Density of energy states – Carrier concentration of electron in metal – Band theory – Energy bands in solids – Metals, semiconductors and insulators – Concept of hole.

UNIT II SEMICONDUCTORS 9

Intrinsic Semiconductors – Energy band diagram – Direct and indirect semiconductors – Carrier concentration in intrinsic semiconductors – Extrinsic semiconductors - Carrier concentration in N type & P-type semiconductors – Carrier transport: Velocity-electric field relations – drift and diffusion transport – Einstein's relation – Hall effect and devices.

UNIT III OPTOELECTRONIC DEVICES 9

Classification of optical materials – Carrier generation and recombination processes-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 IV MAGNETIC, DIELECTRIC AND SUPER CONDUCTING MATERIALS 9

Magnetic Materials: Basics of Magnetism in materials – Magnetic field and induction – Magnetization - Magnetic permeability and susceptibility – Types of magnetic materials – Ferromagnetism – Domain theory – Types of energy involved in domain growth – Hysteresis – Hard and Soft magnetic materials.

Dielectric Materials: Introduction – Types of polarization – Langevin-Debye equation - Frequency & temperature effects on polarization – Dielectric breakdown – Ferroelectric materials - Applications. Superconducting Materials: Properties – Applications (quantitative).

UNIT V SMART MATERIALS **9**

Ceramics – types and applications – Composites: classification, role of matrix and reinforcement, processing of fiber reinforced plastics – Metallic glasses: types, glass forming ability of alloys, melt spinning process, applications – Shape memory alloys: phases, shape memory effect, pseudo elastic effect, NiTi alloy, applications – Nanomaterials – Carbon nano tubes (qualitative) – types.

TOTAL : 45 PERIODS

TEXT BOOK:

1 Kasap, S.O. "Principles of Electronic Materials and Devices", McGraw-Hill Education, 2007.

2 Umesh K Mishra & Jasprit Singh, "Semiconductor Device Physics and Design", Springer, 2008

3 Wahab, M.A. "Solid State Physics: Structure and Properties of Materials". Narosa Publishing House, 2009

4 Kittel, C. "Introduction to Solid State Physics". Wiley, 2005

5 Jasprit Singh, "Semiconductor Devices: Basic Principles", Wiley 2012.

REFERENCES:

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

2 Smith, W.F., Hashemi, J. & Prakash, R. — Materials Science and Engineering. Tata McGraw Hill Education Pvt. Ltd., 2014.

3. Raghavan, V. "Materials Science and Engineering", A First course. PHI Learning, 2015.

4. Hanson, G.W. "Fundamentals of Nanoelectronics", Pearson Education, 2009.

COURSE OUTCOMES:

At the end of this course, students will

1 Understand the classical and quantum free electron theories, band theory of solids and apply the concepts to obtain the carrier concentration in metal.

2 Acquire knowledge on basics of semiconductor physics and its applications in various devices

3 Illustrate the basic properties of magnetic, dielectric and superconducting materials and their engineering applications

4 Describe the absorption and emission of light by materials and apply the principles for optical devices.

5 Understand the basics of ceramics, composites, metallic glasses, SMA and nanomaterials.

UGE1251	ENVIRONMENTAL SCIENCE AND ENGINEERING	L	T	P	C
	(Common to CSE,ECE,EEE,MECH,IT,AIDS & AIML)	3	0	0	3

OBJECTIVES:

- To study the nature and facts about environment.
- To find and implement scientific, technological, economic and political solutions to environmental problems.
- 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.
- To study the integrated themes and biodiversity, natural resources, pollution control and waste management.

UNIT I ENVIRONMENT AND ECOSYSTEMS 7

Definition, scope and importance of environment – need for public awareness – 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 – 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)- Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II BIODIVERSITY 7

Introduction to biodiversity definition: genetic, species and ecosystem diversity – bio geographical classification of India – values of biodiversity: consumptive use, productive use, social, ethical, aesthetic and optional 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.

UNIT III ENVIRONMENTAL POLLUTION 11

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution– 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. Climate change, global warming, acid rain, ozone layer depletion. - Case studies- Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT IV NATURAL RESOURCES 11

Forest resources: deforestation, case studies- timber extraction, dams and their effects on forests and tribal people– Water resources: Use and over- utilization of surface and ground water– 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, Energy Resources – Renewable & Non-Renewable -Case studies – Land resources: Lands as source and degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources.

UNIT V HUMAN POPULATION, SOCIAL ISSUES AND THE ENVIRONMENT **9**

Population growth, variation among nations – population explosion – family welfare programme – human rights – Value education – HIV / AIDS, COVID 19 – women and child welfare – role of information technology in environment and human health – case studies.Urban problems related to energy – water conservation, rain water harvesting – resettlement and rehabilitation of people; its problems and concerns, case studies - wasteland reclamation.

TOTAL : 45 PERIODS

TEXT BOOK:

1 Benny Joseph, Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2006.

2 Gilbert McMasters, Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education, 2004.

REFERENCES:

1. Erach Bharucha, Textbook of Environmental Studies, Universities Press (I) PVT, LTD, Hydrabad, 2015.

2. Rajagopalan. R, Environmental Studies-From Crisis to Cure, Oxford University Press, 2005.

3. G. Tyler Miller and Scott E. Spoolman, ―Environmental Science, Cengage Learning India PVT, LTD, Delhi, 2014.

COURSE OUTCOMES:

At the end of this course, students will demonstrate the ability to,

1 Recognize that public participation is an important aspect which serves the environmental Protection. Understand the importance of public awareness of environment at infant stage.

2 Illustrate the significance of ecosystem, biodiversity for maintaining ecological balance.

3 Define environmental pollution or problems that cannot be solved by mere laws. Identify the facts, consequences, preventive measures of major pollutions and recognize the disaster phenomenon.

4 Describe the significance of natural resources and explain anthropogenic impacts of depletion of natural resources

5 Recognize the impact of population and the concept of various welfare programs, and apply the modern technology towards environmental protection. Understand that the development and improvement in standard of living has lead to serious environmental disasters.

UGE1252 **C PROGRAMMING**

L	T	P	C
3	0	0	3

OBJECTIVES:

- To make students conversant with the Fundamentals of Computing.
- To introduce the logical way of Problem solving, Algorithms, Pseudo code, Flow charts.
- To understand the Syntax of C language with Blocks, Selection and Iterative statements.
- To develop C programs using Arrays and Strings.
- To develop C Programs using Functions and Pointers.

UNIT I INTRODUCTION TO COMPUTERS & PROBLEM SOLVING 9

Characteristics of Computers – Evolution of Computers – Generation and Classification of Computers – Application of Computers – Components of Computer System – Number Systems: Natural Numbers – Integers – Decimal – Binary – Octal – Hexadecimal – Conversion – Computer Software – Categories of Software – Problem Solving – Logical Analysis and Thinking – Program Development Lifecycle – Algorithm – Pseudo code – Flow Chart – Programming Languages. Illustrative Programs: Even or Odd, Greatest of 3 numbers, Area of a Circle, Sum of 'N' numbers.

UNIT II BASICS OF C PROGRAMMING 9

Structure of C Program – Pre-processor Directives – Compilation and Linking processes – C Programming: Keywords – Data Types – Variables – Declaration – Initialization – Storage Classes – Constants – Operators: Precedence and Associativity – Expressions – Type Conversion – Casts – Input/Output Statements, Assignment Statements – Selection Statements – Iteration Statements – Block Statements. Illustrative Programs: Grade of Student, Factorial of a number, Fibonacci Series, Sum of Digits of a number.

UNIT III ARRAYS AND STRINGS 9

Arrays: Definition – Declaration – Initialization – One dimensional array Two dimensional arrays –Strings: Definition – Declaration – Initialization – String Manipulations (with Built-in functions): Length, Compare, Concatenate, Copy – Illustrative Programs: 1D Array : Computing Mean, Median and Mode using 1 D array – Selection Sorting, Linear and Binary Search – 2D Array : Matrix Operations : Scaling, Transpose, Addition and Multiplication of 2 Matrices – String Concatenation and Reverse without using built-in function.

UNIT IV FUNCTIONS AND POINTERS 9

Functions – Definition – Function Prototype, Definition, Call, Actual Parameters, Formal Parameters, Return Statement – Function Types – Parameter Passing Methods – Context Switching – Recursive Function – Library Vs User-defined Functions. Pointers – Definition – Pointer Operators – Address of and indirection operators – Initialization – Pointer Arithmetic – Pointer to Pointer – Void Pointer – Pointer Constants – Array and Pointers – Illustrative

Programs: Maximum of 2 values using function, Swapping 2 number using Function, Factorial using Recursion, Sum of Natural Numbers, Read array elements and print with addresses using Pointers.

UNIT V STRUCTURE, UNION AND FILES 9

Structure – Need for Structure – Structure Declaration – Array of Structures – Pointers and Structures – Union – Files: Introduction – Types – File Processing types: Sequential and Random Accesses – File I/O – fread() and fwrite() – fseek() – Command Line Arguments. Illustrative Program: Employee Record Maintenance and Updating with Structure and Files

TOTAL : `45 PERIODS

TEXT BOOKS:

1. Ashok, N.Kamthane, Computer Programming, Pearson Education, 2012.
2. Yashavant P. Kanetkar. "Let Us C", BPB Publications, 2011.

REFERENCES:

1. Byron S Gottfried, "Programming with C", Schaum's Outlines, Second Edition, Tata McGraw-Hill, 2006.
2. Dromey R.G., "How to Solve it by Computer", Pearson Education, Fourth Reprint, 2007.
3. Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.
4. Kernighan B.W and Ritchie D.M, "The C Programming language", Second Edition, Pearson Education, 2006.
5. E Balagurusamy, "Programming in ANSI C", Eighth Edition, Tata McGraw-Hill, 2019.
6. Pradip Dey, Manas Ghosh, Fundamentals of Computing and Programming in C' First Edition, Oxford University Press, 2009.

COURSE OUTCOMES:

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

1. Summarize the basic structure of Computers and Problem solving methods.
2. Develop and design simple C programs.
3. Implement C programs using Arrays and Strings.
4. Formulate application programs in C using Function and Pointer.
5. Design application programs in C using Structure, union and File.

ONLINE REFERENCES:

1. https://nptel.ac.in/courses/106/102/106102064/
2. https://nptel.ac.in/courses/106/106/106106133/

UGE1253	ENGINEEERING GRAPHICS	L	T	P	C
		1	0	4	3

COURSE OBJECTIVES:

- To develop in students, graphic skills for communication of concepts, ideas and design of engineering products.
- To expose them to existing national standards related to technical drawings.

UNIT I CONICS, SPECIAL CURVES AND FREEHAND SKETCHING 15

Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method. Construction of cycloids, epicycloids and hypocycloids – construction of involutes of square and circle – Drawing of tangents and normal to the above curves. Visualization concepts and Free Hand sketching: Visualization principles – Representation of Three Dimensional objects – Layout of views- Freehand sketching of multiple views from pictorial views of objects.

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACE 15

Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and traces. Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method alone.

UNIT III PROJECTION OF SOLIDS 15

Activity for 3D solids using black chart. Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes by rotating object method alone.

UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES 15

Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones.

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS 15

Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions - Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method alone.

TOTAL : 75 PERIODS

Publication of Bureau of Indian Standards

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.
2. IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.
3. IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.
4. IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

Special points applicable to End Semester Examinations on Engineering Graphics

1. There will be five questions, each of either or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.
4. The examination will be conducted in appropriate sessions on the same day.

TEXT BOOK:

1. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 50th Edition, 2010.
2. Natarajan K.V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2009.

REFERENCES:

1.Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2008.
2.Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.
3.Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Stores, Bangalore, 2007.
4. Luzzader, Warren.J. and Duff,John M., "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
5.N S Parthasarathy and Vela Murali, "Engineering Graphics", Oxford University, Press, New Delhi, 2015.
6.Shah M.B., and Rana B.C., "Engineering Drawing", Pearson, 2nd Edition, 2009.

COURSE OUTCOMES:

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

1. Familiarize with the fundamentals and standards of Engineering graphics
2. Perform freehand sketching of basic geometrical constructions and multiple views of objects.
3. Project orthographic projections of lines and plane surfaces.
4. Draw projections and solids and development of surfaces.
5. Visualize and to project isometric and perspective sections of simple solids.

UHS1252	PROFESSIONAL SKILLS - I	L	T	P	C
	(Common to CSE,ECE, EEE,MECH,AIDS,IT & AIML)	0	0	2	1

OBJECTIVES:

- To empower students to use technology to create a comic and write an introduction of self to present orally to the class and to make them well-versed in basic mathematical skill.
- To help the students to develop their articulating ability by giving them practice on fluency, vocabulary, grammar and pronunciation and to impart how to use prime factors to work out the HCF and LCM for real life problems.
- To develop key reading sub-skills such as skimming, scanning, identifying the main ideas of texts or paragraphs and guessing vocabulary from context and also make them to measure the different parameters of squares, rectangles and circles in different contexts through their problem solving skill.
- To make the students to clear with the rules and the concept of the syntax which determines the arrangements of words and phrases to create well-formed sentences in a language and to compare efficiencies and Time taken across different groups in Time-Speed-Distance
- To make students to share their knowledge through short talks in order to improve their confidence and to enhance their Quantitative ability.

UNIT I **6**

APTITUDE

Problems on numbers - Number System - Definitions, Operations & Divisibility - Number System Problems - Coding and Decoding

COMMUNICATION

Self-exordium - Sentence connectors – Homonyms/Homophones/Homographs

UNIT II **6**

APTITUDE

LCM & HCF - Basic Concepts - Problems on LCM - Problems on HCF - Number Series

COMMUNICATION

Short answers - Input & Output – Lexica

UNIT III **6**

APTITUDE

Geometry & Mensuration - Concepts & Formulae - Problems on Geometry and Mensuration

COMMUNICATION

Selecting words from the text - Phrasal verbs

UNIT IV **6**

APTITUDE

Time & Work - Basic Concepts - Problems on Time & Work

COMMUNICATION

Reframe the sentence – Punctuations – Plural, Uncountable, Infinitive

UNIT V **6**

APTITUDE

Pipes & Cisterns - Basic Concepts - Problems on Pipes and Cistern - Puzzles

COMMUNICATION

Knowledge sharing - Add it up (Reading) / MCQ

TOTAL : 30 PERIODS

TEXT BOOK:

1. Quantitative Aptitude for Competitive Examination-IV Edition by Dinesh Khattar
2. Quantitative Aptitude by S.Chand and Dr.R.S.Aggarwal
3. Objective English – VII Edition by Edgar Thorpe and Showick Thorpe

REFERENCES:

1. https://www.pteexampreparation.com/about/
2. https://www.hitbullseye.com/Reasoning/Input-Output-Questions.php
3. https://owl.purdue.edu/owl/general_writing/academic_writing/conciseness/eliminating_words.html
4. https://www.grammarbook.com/grammar_quiz/commas_1.asp

COURSE OUTCOMES:

1. Students will be able to present themselves with confidence and will gain some basic mathematical skills.
2. Students will expand their vocabulary so as to enhance their proficiency in reading and listening to academic texts, writing, and speaking and evaluates an issue and solve a problem in real- world context through prime factors.
3. Students will acquire necessary reading skills in order to follow and comprehend discourse and will apply their problem-solving skills through measurements.
4. Students can demonstrate their understanding of grammatical structures and skills in producing sentences, long and short notes and can make Calculations successfully, Interprets Data, Communicate Results.
5. Learners will be able to practice their articulating skills with eloquence and fluency by participating in speaking activities and will attain Quantitative ability knowledge.

UBE1261 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING **L T P C**
(Theory Cum Lab) **2 0 2 3**

COURSE OBJECTIVES:

- To develop a basic understanding of the concept of electrical systems and electric circuit analysis
- To interpret the construction and working of DC machines and measuring instruments.
- To discuss the basics of transformers and AC machines.
- To know the basics of Electronics.
- To know the basics of semiconductor devices.

UNIT I ELECTRICAL CIRCUIT ANALYSIS **6**

Introduction: Electric Potential, Current, Resistance, Power factor, Power and Energy - Ohms Law, Kirchhoff's Law- series and parallel circuit analysis with resistive, capacitive and inductive network - nodal analysis, mesh analysis of simple resistive networks- network theorems - Thevenins theorem, Norton theorem, single phase and three phase supply-Instantaneous, Reactive and apparent power- star - delta conversion.

UNIT II DC MACHINES AND MEASURING INSTRUMENTS **6**

Construction, Principle of Operation of DC Generator and Motor- EMF and Torque Equation, Types and Applications. Measuring instruments AC and DC - ammeter - voltmeter and energy meter - Domestic Wiring (Simple and staircase) –- Fundamentals of Protection- Need for earthing and types, Fuses and circuit breakers- Basics of LED lighting.

UNIT III TRANSFORMERS AND AC MACHINES **6**

Construction and Working Principle Single Phase Transformer - Construction and Working Principle of AC Generator, Three Phase Induction Motor and Single Phase Induction Motor (Split Phase and Capacitor Start Induction Motor) - Applications.

UNIT IV INTRODUCTION TO ELECTRONICS **6**

Physical Properties of Elements (Energy Band Structure Of Conduction In Insulator, Semiconductor, Metals, Practical Semiconductor Materials)-Passive Circuit Components (Resistors, Capacitors, Inductors) – Electron Ballistics (Charged Particles, Force, Field Intensity, Potential And Energy)

UNIT V SEMICONDUCTOR DEVICES **6**

Theory Of PN Junction Diode And Its Characteristics – Energy Band Structure –Drift And Diffusion Current Densities Current Equation – Space Charge And Diffusion Capacitances – Effect Of Temperature And Breakdown Mechanism – Zener Diode And Its Characteristics – Applications of PN junction Diode and Zener Diode.

TOTAL : 30 PERIODS

ENGINEERING PRACTICES LABORATORY **30 PERIODS**

A. ELECTRICAL ENGINEERING

1. Residential house wiring using switches, fuse, indicator, lamp and energy meter.
2. Fluorescent lamp wiring and staircase wiring.
3. Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.
4. Measurement of energy using single phase energy meter.
5. Measurement of resistance to earth of electrical equipment.

B. ELECTRONICS ENGINEERING

1. Study of Electronic components and equipments – Resistor, colour coding measurement of AC signal parameter (peak-peak, RMS period, frequency) using CRO.
2. Study of logic gates AND, OR, EX-OR and NOT.
3. Generation of Clock Signal.
4. Soldering practice – Components Devices and Circuits – Using general purpose PCB.
5. Measurement of ripple factor of HWR and FWR.

TOTAL HOURS: 60

TEXT BOOK:

1. Prasad P.V., Sivanagaraju S. and Prasad R., ―Basics of Electrical and Electronics Engineering, 1st Edition, Cengage Learning, 2013.
2. Muthusubramanian R. and Salivahanan S., ―Basics of Electrical and Electronics Engineering, 1st Edition ,Tata McGraw Hill, 2009.
3. S.Salivahanan, N.Suresh kumar., "Electronic Devices and circuits", Mc-Graw Hill Education, 2018.

REFERENCES:

1. Jegathesan V., Vinoth Kumar K. and Saravanakumar R., ―Basic Electrical and Electronics Engineering‖, 1st Edition, Wiley India, 2011.
2. Sukhija M.S. and Nagsarkar T.K., ―Basics of Electrical and Electronics Engineering‖, 1st Edition ,Oxford University Press, 2012.
3. Smarajit Ghosh, ―Fundamentals of Electrical and Electronics Engineering, 2nd Edition, PHI Learning, 2007.
4. Edward Hughes, Ian McKenzie Smith, Dr. John Hiley and Keith Brown, ―Electrical and Electronics Technology, 8th Edition, Pearson Education, 2012.
5. Jacob Millman, "Electronic Devices and Circuits.
6. BawaH.S.,"Workshop Practice", Tata McGraw – Hill Publishing Company Limited, 2007.
7. Jeyachandran K., Natarajan S. & Balasubramanian S., "A Primer on Engineering Practices Laboratory", Anuradha Publications, 2007.

COURSE OUTCOMES:

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

1. Understand the basic concepts of electrical systems and electric circuit analysis.
2. Interpret the construction and working of DC machines and measuring instruments.
3. Gain knowledge on basics of transformers and AC machines.
4. Know the basics of Electronics.
5. Know the basics of semiconductor devices.

UGE1261	C PROGRAMMING LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

- To write test and debug simple C programs.
- To write algorithms and flow charts for the programs.
- To implement C programs with conditional statements and looping constructs.
- To write C programs for Array and String manipulation.
- To use Functions, Pointers and structures in programming.

LIST OF EXERCISES:

Programs using I/O statements and expressions

1. Write a program to evaluate area of triangle using the formula sqrt(s(s-a)(s-b)(s-c)) where *s* = (a+b+c)/2.
2. Write a program to convert Celcius to Fahrenheit using the formula F=9/5*C+32.

Programs using decision-making statements

3. Find greatest among 3 numbers and print all the number in ascending order.
4. Desk calculator with switch statement.

Programs using iteration and recursion

5.Find sum of first N natural numbers for loop.

6. Generate the first N Fibonacci numbers using while loop.
7. Generate all prime numbers up to N numbers do-while loop.
8. Find factorial of a number using recursion.

Program for Strings

9. Write a C program to count the number of vowels in a string.
10. Write a C program to perform toggle case of each character in a String.
11. Design a menu driven framework to perform String manipulations without using library functions.
    i) String Length,
    ii) String Concatenation,
    iii) String reversal.
12. Write a C program to find whether a sting is a palindrome or not.
13. Write a C program to get 10 student names and sort in alphabetical order.

Program using Pointers

14. Print the elements of array with its addresses using pointers.
15. Write a C program to print a string using pointer.

Programs using Functions

16. Write a program to swap two numbers using call by value and call by address.
17. Write a C Program to find the sum of the series 1!/1+2!/2+3!/3+4!/4+5!/5 using a function to find factorial.[factorial(5) will return the value of 5!].

Program using Structures

18. Design a menu driven application using switch statement and structures for student exam management. Generate the progress report of every student in the class using structure.

Program for Sequential file access

19. Write a program to write few lines of text into a file and read it from the file.

Program for Random file access

20. Write a C program using files to print the first occurrence of a character in the file and print the character and its position.

TOTAL : 60 PERIODS

PLATFORM NEEDED:

Standalone desktops with C compiler 30 Nos.

(or)

Server with C compiler supporting 30 terminals or more.

COURSE OUTCOMES:

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

1. Develop C programs for simple daily applications.
2. Develop and implement C programs using selection and iterative statements.
3. Design modular applications in C using functions.
4. Formulate real-world problems using structures.
5. Develop persistent applications using files.

ONLINE REFERENCES:

1. https://www.codechef.com/problems/
1. https://www.hackerrank.com/domains/c

K. RAMAKRISHNAN COLLEGE OF ENGINEERING

TIRUCHIRAPPALLI

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

REGULATION 2020

Semester III

UMA1351	DISCRETE MATHEMATICS AND GRAPH THEORY	L	T	P	C
		3	1	0	4

(Common to CSE and IT)

OBJECTIVES

- To extend student‘s logical and mathematical maturity and ability to deal with abstraction.
- To introduce most of the basic terminologies used in computer science courses and application of ideas to solve practical problems.
- To understand the basic concepts of combinatorics and graph theory.
- To familiarize the applications of algebraic structures.
- To understand the concepts and significance of lattices and Boolean algebra which are widely used in computer science and engineering.

UNIT I LOGIC AND PROOFS 12

Propositional logic, Propositional equivalences, Predicates and quantifiers, Nested quantifiers, Rules of inference, Introduction to proofs, Proof methods and strategy.

UNIT II COMBINATORICS 12

Mathematical induction, Strong induction and well ordering, the basics of counting, the Pigeonhole principle, Permutations and combinations, Recurrence relations, Solving linear recurrence relations, Generating functions, Inclusion and exclusion principle and its applications

UNIT III GRAPH THEORY 12

Graphs and graph models, Graph terminology and special types of graphs , Matrix representation of graphs and graph isomorphism , Connectivity , Euler and Hamilton paths.

UNIT IV ALGEBRAIC STRUCTURES 12

Algebraic systems , Semi groups and Monoids , Groups , Subgroups , Homomorphism‘s , Normal subgroup and Cosets , Lagrange‘s theorem , Definitions and examples of Rings and Fields.

UNIT V LATTICES AND BOOLEAN ALGEBRA 12

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 : 60 PERIODS

TEXT BOOK:

1. Rosen, K.H., “Discrete Mathematics and its Applications”, 7th Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, Special Indian Edition, 2011.
2. Tremblay, J.P. and Manohar.R,” Discrete Mathematical Structures with Applications to Computer Science”, Tata McGraw Hill Pub. Co. Ltd, New Delhi, 30th Reprint, 2011.

REFERENCES:

1. Grimaldi, R.P. “Discrete and Combinatorial Mathematics: An Applied Introduction”, 4th Edition, Pearson Education Asia, Delhi, 2007.
2. Lipschutz, S. and Mark Lipson., “Discrete Mathematics”, Schaum‘s Outlines, Tata McGraw Hill Pub. Co. Ltd., New Delhi, 3rd Edition, 2010.
3. Koshy, T. “Discrete Mathematics with Applications” , Elsevier Publications,2006.

COURSE OUTCOMES:

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

1	Have knowledge of the concepts needed to test the logic of a program.
2	Have an understanding in identifying structures on many levels.
3	Be aware of a class of functions which transforms which transform a finite set into another finite set which relates to input and output functions in computer science.
4	Be aware of the counting principles.
5	Be exposed to concepts and properties of algebraic structures such as groups, rings and fields.

WEB RESOURCES:

1. https://www.embibe.com/exams/permutation-and-combination/.
2. https://www.geeksforgeeks.org/mathematics-graph-theory-basics-set-1/
3. https://www.geeksforgeeks.org/mathematics-graph-theory-basics-set-1/

ONLINE RESOURCES:

1. https://nptel.ac.in/courses/111/106/111106050/.
2. https://nptel.ac.in/courses/111/106/111106113/
3. https://nptel.ac.in/courses/111/106/111106083/

UEC1351	ANALOG ELECTRONIC CIRCUITS	L	T	P	C
		3	0	0	3

OBJECTIVES

- To notify the students with the construction, theory and operation of the basic electronic devices such as PN junction diode
- To design and analyze the regulated DC power supplies and filters.
- To understand the method of biasing and analyze single stage and multistage amplifier circuits
- To analyze the frequency response of small signal amplifiers of BJT and FET
- To study about feedback amplifiers and oscillators principles, tuned amplifiers and multivibrators circuits

UNIT I SEMICONDUCTOR DEVICES AND POWER SUPPLIES 9

PN junction diode, forward and reverse bias characteristics, Zener diode and its characteristics, Half wave ,Full wave and Bridge Rectifiers - Ripple factor, Rectification efficiency, Filters - L, C filters - Voltage Regulators – Zener Regulator-Switched Mode Power Supplies.

UNIT II BJT and MOSFET AMPLIFIERS 9

NPN -PNP –Transistor Construction and Operations –h parameter model of BJT amplifiers - Analysis of CE, CC and CB amplifiers using equivalent circuits - Differential amplifier,– Small signal analysis of Differential and common mode gain and CMRR - Analysis of MOSFET CS, CD and CG amplifiers

UNIT III FEEDBACK AMPLIFIERS & OSCILLATORS 9

Feedback Concepts – NEGATIVE FEEDBACK - gain with feedback – effect of negative feedback on gain stability, distortion, bandwidth and topologies of negative feedback amplifiers. Barkhausen criterion for oscillation – RC phase shift– Hartley oscillators- crystal oscillators.

UNIT IV MULTIVIBRATORS 9

Low pass and High pass RC circuits-Collector coupled Astable multivibrator – Monostable multivibrator - Bistable multivibrators, Schmitt Trigger.

UNIT V TUNED AMPLIFIERS and WAVE SHAPING CIRCUITS 9

Coil losses, Q factor, Analysis of single tuned amplifiers, Diode clippers – Clampers.

TOTAL : 45 PERIODS

TEXT BOOK:

1 Boylestad L Robert and Nashelsky Louis, Electronic Devices and circuits, Prentice Hall of India, New Delhi, 2009.
2 David A Bell,Electronic Devices and Circuits, Prentice Hall of India, New Delhi, 2008.
3 Jacob Millman, Christos C Halkias, Satyabrata Jit, Electronic Devices and Circuits, 4th Edition, McGraw Hill International, New Delhi, 2007

REFERENCES:

1 Millman J and Taub H., Pulse, Digital and Switching waveforms, McGraw Hill International, New Delhi, 2011
2 Donald L Schilling and Charles Belove, Electronic Circuits, 2002.
3 Sedra and Smith, Micro electronic Circuits,Oxford University Press, Chennai,2007.
4 Allen Mottershed, Electronic Devices and Circuits, Prentice Hall of India, New Delhi, 2009.

COURSE OUTCOMES:

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

1 Classify the biasing circuits into different types according to their properties
2 Frequency analysis of BJT and MOSFET amplifiers
3 Capable of characterizing feedback in amplifiers
4 Analyze the filter and multivibrators
5 Compute the output of Wave shaping circuits

UCS1301 DATA STRUCTURES AND ALGORITHM ANALYSIS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To Understand analysis of algorithm and its time complexity
- To Learn linear data structures – lists, stacks, and queues
- To understand sorting, searching and hashing algorithms
- To Be familiar with and implement the Linked list data structure
- Have a comprehensive knowledge of Trees and their implementations

UNIT I INTRODUCTION TO DATA STRUCTURES 9

Introduction: Basic terminology – Data structures –operations – Algorithm Analysis: Space Complexity – Time Complexity – Mathematical notations and functions – Asymptotic notations – Linear and Binary search – Bubble sort.

UNIT II LINEAR DATA STRUCTURES – ARRAYS, LIST, STACKS, QUEUES 9

Array : Operations on Arrays, Applications of Arrays – Single dimensional arrays, Multi-dimensional arrays, Abstract Data Types (ADTs) – List – List operations(Insertion, Deletion and Search) – Singly Linked List – Doubly Linked List – Circular Linked List–Stack – Operations – Applications – Balancing Symbols – Conversion of Infix to postfix expression– Recursion – Towers of Hanoi – Queue – Operations – Types of Queues – Circular Queue – Priority Queue – Double Ended Queue– Applications of queues

UNIT III NON LINEAR DATA STRUCTURES – TREES 9

Tree Terminologies – Representation of Trees –Tree traversals – Binary tree – Expression tree Binary Tree Traversals – Binary Search Tree – Insertion, Searching, Deletion – AVL Tree – Rotation, Insertion – Splay Tree – B-tree – Insertion, searching, deletion – Red Black tree – Binary Heap.

UNIT IV NON LINEAR DATA STRUCTURES – GRAPHS 9

Graph Terminologies – Representation of Graph – Types of graph – Breadth-first traversal – Depth-first traversal – Topological Sort – Minimum Spanning Tree – Prims – Kruskals - Shortest path algorithm – Dijkstra's – Applications of graphs.

UNIT V SEARCHING, SORTING AND HASHING TECHNIQUES 9

Searching: Linear Search – Binary Search – Sorting: Bubble sort – Selection sort – Insertion sort – Quick sort – Merge sort – Shell sort – Radix sort – Hashing : Hash Functions – Collision avoidance – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing.

TOTAL : 45 PERIODS

TEXT BOOKS:

1. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C, 2nd Edition, Pearson Education,1997.
2. Reema Thareja, “Data Structures Using C, Second Edition , Oxford University Press, 2011

REFERENCES:

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein, “Introduction to Algorithms", Second Edition, Mcgraw Hill, 2002.
2. Brian W. Kernighan and Dennis M. Ritchie, “The C Programming Language”, 2nd Edition, Pearson Education, 1988
3. Aho, Hopcroft and Ullman, “Data Structures and Algorithms, Pearson Education, 1983
4. Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, “Fundamentals of Data Structures in C, Second Edition, University Press, 2008
5. R.F.Gilberg, B.A.Forouzan, “Data Structures”, Second Edition, Thomson India Edition
6. Anany Levitin, “Introduction to the Design and Analysis of Algorithms”, Third Edition, Pearson Education, Asia, 2014.

COURSE OUTCOMES:

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

1. Interpret the runtime efficiencies of algorithms using various analysis methods
2. List the various linear data structures.
3. Analyze trees and binary search trees.
4. Critically analyze the various graph algorithms.
5. Compare various sorting algorithms.

ONLINE REFERENCES:

1. https://nptel.ac.in/courses/106/102/106102064/
2. https://nptel.ac.in/courses/106/106/106106133/

UCS1302 COMPUTER ORGANIZATION AND ARCHITECTURE

L	T	P	C
3	0	0	3

OBJECTIVES:

- To make students understand the basic structure and operation of digital computer.
- To learn the arithmetic and logic unit and implementation of fixed-point and floating point arithmetic unit.
- To expose the students to the concept of pipelining and different types of hazards.
- To understand parallelism and multi-core processors.
- To familiarize the students with hierarchical memory system including cache memories and virtual memory.

UNIT I BASIC STRUCTURE OF A COMPUTER SYSTEM 9

Functional Units – Basic Operational Concepts – Memory Location and Addresses– Bus Structures – Performance – Instructions: Instruction representation – Instruction Sequencing – Logical operations – decision making — Addressing Modes – Assembly Language.

UNIT II ARITHMETIC FOR COMPUTERS 9

Addition and Subtraction of Signed Numbers– Multiplication of Unsigned Numbers– Fast Multiplication –Integer Division – Floating Point Representation – Floating Point Operations – Subword Parallelism

UNIT III PROCESSOR AND CONTROL UNIT 9

Basic MIPS implementation – Building datapath – Control Implementation scheme – Pipelining – Pipelined Datapath and Control – Handling Data hazards & Control hazards – Exceptions

UNIT IV PARALLELISM 9

Instruction-level-parallelism – Parallel processing challenges – Flynn's classification – SISD, MIMD, SIMD, SPMD, and Vector Architectures – Hardware multithreading – Multi-core processors and other Shared Memory Multiprocessors.

UNIT V MEMORY & I/O SYSTEMS 9

Memory hierarchy – Memory technologies – Cache Memory – Measuring and improving cache performance – Virtual memory, TLBs – Accessing I/O Devices, Interrupts – Direct Memory Access – Bus structure – Bus operation – Arbitration – Interface circuits – USB.

TOTAL : 45 PERIODS

TEXT BOOKS:

1. William Stallings, Computer Organization and Architecture – Designing for Performance, Eighth Edition, Pearson Education, 2010.
2. John P. Hayes, Computer Architecture and Organization, Third Edition, Tata McGraw Hill, 2012.

REFERENCES:

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, “Computer Organization”, Sixth Edition,McGraw HillEducation (India) Edition, 2012.
2. John L. Hennessey and David A. Patterson, Computer Architecture – A Quantitative Approach, Morgan Kaufmann / Elsevier Publishers, Fifth Edition, 2012.
3. Govindarajalu, “Computer Architecture and Organization, Design Principles and Applications", First edition, Tata McGraw Hill, New Delhi, 2005.
4. Vincent P. Heuring, Harry F. Jordan, “Computer System Architecture”, Second Edition, Pearson Education, 2005.

COURSE OUTCOMES:

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

1. Explain the basic structure of computer, operations and addressing modes.
2. Apply arithmetic, logic and control unit operations.
3. Interpret the concepts of pipelining and identify hazards.
4. Understand the working principles of instruction level parallelism.
5. Analyze the memory and input output systems.

ONLINE REFERENCES:

1. https://nptel.ac.in/courses/106/103/106103180/
2. https://nptel.ac.in/courses/106/105/106105163/
3. https://nptel.ac.in/courses/106/106/106106166/
4. https://nptel.ac.in/courses/106/106/106106092/

UCS1303 OBJECT ORIENTED PROGRAMMING WITH JAVA

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the fundamentals of object oriented programming in Java
- To learn the concepts of inheritance and packages.
- To study the basics of generics and collections.
- To establish a firm foundation on core Java concept like Exceptions.
- To develop Graphical User Interface using Event Driven Programming

UNIT I INTRODUCTION 9

Introduction to OOP – Thinking Object Oriented – Object Oriented Design. Introduction to Java – JVM – Data types – Variables – Operators – Control statements – Classes and Methods – Instances and Initialization – Constructors and Destructors – Garbage collection – Abstract Classes and Methods – Arrays

UNIT II INHERITANCE AND PACKAGES 9

Inheritance – Access Specifiers – Interfaces – Default interface method – Polymorphism – Packages – this Pointer – Static Instances – String Handling – The Object class – Object Cloning

UNIT III GENERICS AND COLLECTIONS 9

Enumerations – Type Wrappers – Autoboxing – Annotations – Generic classes – Generic methods – Generic interfaces – Collections – Lists – Sets – Maps – I/O streams – File streams

UNIT IV EXCEPTION HANDLING AND MULTITHREADING 9

Exception handling – Exception hierarchy – Throwing and catching exceptions – Throws – Finally – Built in Exceptions – User defined Exceptions – Chained exceptions – Multithreaded programming – Interrupting threads – Thread states – Thread priorities – Thread synchronization – Inter Thread Communication

UNIT V EVENT HANDLING 9

The applet class – Basics of event handling – Delegation event model – Event classes – Event listener interfaces – Adapter classes – AWT – Swing.

TOTAL : 45 PERIODS

TEXT BOOKS:

1. Herbert Schildt, “Java the Complete Reference”, 9th edition, McGraw-Hill Osborne Media, 2014.
2. P.J.Deitel and H.M.Deitel, “JAVATM HOW TO PROGRAM”, Seventh edition, Pearson International Edition, 2009.

REFERENCES:

1. K. Arnold and J. Gosling, "The JAVA programming language", Third edition, Pearson Education, 2000.
2. Timothy Budd, "Understanding Object-oriented programming with Java", Updated Edition, Pearson Education, 2000.
3. Timothy Budd, "An Introduction to Object-Oriented Programming", Third Edition, Pearson Education, 2008.

COURSE OUTCOMES:

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

1. Explain the basic concepts of object oriented programming in Java for solving problems and develop simple Java Programs using OOP Principles.
2. Develop Java programs using the concept of inheritance, interface, packages and Strings.
3. Apply the features of generics,lists and I/O Streams to develop simple software programs.
4. Develop software components with Exceptions & Multithreading techniques
5. Build interactive event driven Java programs using AWT and swings for implementing various applications.

ONLINE REFERENCES:

1. https://nptel.ac.in/courses/106/105/106105191/
2. https://onlinecourses.nptel.ac.in/noc21_cs56/preview
3. https://www.hackerrank.com/domains/java
4. https://www.codechef.com/wiki/java

UCS1311	DATA STRUCTURES AND ALGORITHMS LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

- To write, test and debug simple programs.
- To write a C program for list implementation.
- To write a C program for stack implementation using array and linked list.
- To implement binary search tree for insertion and searching for an element.
- To implement minimum spanning tree using Prims, Kruskals and Dijkstra's algorithm.

LIST OF EXERCISES:

1. Programs using I/O statements and expressions
2. Implementation of Sorting and Searching
3. Implementation of linear list using array
4. Implementation of linear list using Singly Linked List
5. Implementation of Circular List and Doubly Linked list
6. Implementation of stack using array and Linked List
6. Implementation of Queue using array and Linked list
7. Implementation of Applications of Stack
8. Implementation of Applications of Queue
9. Implementation of Binary Search Tree : Insertion and Search
10. Implementation of Minimum Spanning Tree – Prims.
11. Implementation of Minimum Spanning Tree – Kruskals.
12. Implementation of Shortest path algorithm using Dijkstra.

TOTAL : 60 PERIODS

PLATFORM NEEDED:

Standalone desktops with C Compiler 30 Nos.

COURSE OUTCOMES:

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

1. Construct C program for list and stack implementation.
2. Develop and implement C programs for stack and queue.
3. Design binary search trees for insertion and search.
4. Experiment Prim's algorithm using C program.
5. Develop shortest path algorithms using Dijkstra's algorithm.

ONLINE REFERENCES:

1. https://nptel.ac.in/courses/106/102/106102064/
2. https://nptel.ac.in/courses/106/106/106106133/

UCS1312 OBJECT ORIENTED PROGRAMMING LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVES:

- To write test and debug simple JAVA programs with classes and instances.
- To write JAVA programs for handling strings.
- To implement JAVA programming using classes.
- To write JAVA program for handling files.
- To write JAVA program for real time application.

LIST OF EXERCISES:

1. Develop a JAVA program to implement currency converter (Dollar to INR, EURO to INR, Yen to INR and vice versa), distance converter (meter to KM, miles to KM and vice versa), time converter (hours to minutes, seconds and vice versa).
2. Write a JAVA program to create 2 two-dimensional arrays which hold numbers. Write a method which takes the arrays as arguments to perform matrix multiplication.
3. Handle strings using JAVA program.
4. Write a Java Program to define a class, describe its constructor, overload the Constructors and instantiate its object
5. Assume a class in JAVA named Car that keeps track of price of cars. It has member variables carName, price and taxRate. Write a member function that computes the total price (including tax) of the Car object with the values passed as arguments, but which also includes 12.5% as a reasonable default value for taxRate. Create 2 Car objects and display their total price.
6. Create a class called Book with instance variables: book name, ISBN number, author name and publisher. Define a constructor that initializes the four instance variables. Provide mutator method and accessor method (query method) for every instance variable. Provide a method named getBookInfo that returns the description of the book as a String (the description should include all the information about the book). Use 'this' keyword in member methods and constructor. Create a test application named BookTest to create an array of object for 30elements for class Book to demonstrate the class Book's capabilities.
7. Write a class in JAVA called Date which stores a date in three integers: month, day and year. There should be member functions to print the date in the following formats (dd/mm/yy) and (dd/month-string/yy). The class should implement the following exception classes.
    i) InvalidDay throw when an invalid day (<1 or >31) is passed to the class.
    ii) InvalidMonth throw when an invalid month(<1 or >12) is passed to the class.
8. Write a JAVA program that reads a file name from the user, displays information about whether the file exists, whether the file is readable, or writable, the type of file and the length of the file in bytes.
9. Write a program that uses a structure to store the following student information in a file. The program should have a menu that allows the user to perform the following tasks

i) Add new records to the file
ii) Display any record in the file.

10. Consider a class called UsedCar which uses an interface called secsalesItem. The UsedCar class has the following fields: vehicleNumber, model, year, kmTravelled, price and the following methods: getVehicleNumber, getModel and getRetailPrice. The interface secsalesItem has only one method called getRetailPrice which calculates price based on the year of manufacture and kilometers travelled. Create 5 usedCar objects and serialize them into a file.

TOTAL : 60 PERIODS

PLATFORM NEEDED:

Standalone desktops with JAVA 30 Nos.

COURSE OUTCOMES:

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

1. Develop and implement JAVA programs for simple applications that make use of classes.
2. Examine strings using a JAVA program.
3. Develop and implement JAVA programs with array list.
4. Design applications using file processing.
5. Solve a real time application using JAVA program.

ONLINE REFERENCES:

1. https://www.hackerrank.com/domains/java
2. https://www.codechef.com/wiki/java
3. https://onlinecourses.swayam2.ac.in/aic20_sp13/preview

UEC1361	ANALOG ELECTRONIC CIRCUITS LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

- To design and test rectifiers
- To differentiate feedback amplifiers and oscillators
- To design multivibrators and wave shaping circuits
- To gain hands on experience in designing the electronic circuits
- To perform SPICE simulation of electronic circuits

LIST OF EXPERIMENTS

1. Design and testing of rectifiers with and without filters.
2. Design and testing of Series voltage regulators.
3. Design and analysis of Frequency Response of BJT CE -amplifiers.
4. Design and analysis of Frequency Response of MOSFET CS -amplifiers.
5. Design and testing of RC phase shift oscillators.
6. Design and testing of Hartley oscillators.
7. Design of a stable multivibrators.
8. Design of Monostable multivibrators.
9. Clippers and Clampers

SIMULATION USING SPICE (Using Transistor)

10. Analysis of Frequency Response of BJT and MOSFET using Spice
11. Testing of RC phase shift oscillators using Spice
12. Testing of Monostable multivibrators using Spice

TOTAL : 60 PERIODS

LAB REQUIREMENTS FOR A BATCH OF 30 STUDENTS, 3 STUDENTS/EXPERIMENT:

S.NO	EQUIPMENTS	REQUIRED
1	CRO/DSO (Min 30MHz)	15
2	Signal Generator /Function Generators (2 MHz)	15
3	Dual Regulated Power Supplies (0 – 30V)	15
4	Digital Multimeter	15
5	Standalone Desktop PC	15
6	BC 107, BC 148,2N2646,BFW10	25 each
7	1N4007, Zener diodes	25 each
8	Resistors, Capacitors, Inductors	sufficient quantities
9	Bread Boards	sufficient quantities

COURSE OUTCOMES:

Upon completion of course students will be able to

1 Design and Test rectifiers and can analyze BJT and FET frequency responses
2 Analyze the performance of Multivibrators
3 Simulate and analyze the amplifier and oscillator circuits
4 Design and testing of oscillators
5 Compute the output of wave shaping circuits

UHS1361	**INTERPERSONAL SKILLS LABORATORY**	**L**	**T**	**P**	**C**
	(Common to CSE & ECE)	**0**	**0**	**2**	**1**

OBJECTIVES:

- To enable the learners to improve their interpersonal skills.
- To help the learners to use their language skills and perform better in their professional skills
- To impart reading interest among learners for the betterment of their language skills
- To Comprehend language and communicate effectively in formal and informal situations
- To Improve listening skills so as to understand Complex Business Communication

UNIT I **6**

Introduction – Understanding & Improving Interpersonal skills – Emotional Intelligence - Positive Relationship – Positive Attitude – Comprehending others' opinions – Art of Negotiation - Team Work – Adopting to Corporate Culture.

UNIT II **6**

The Art of Effective Listening – Types of Listening - Barriers to Listening – Listening to Pre-Recorded Video/Audio – Listening to TED & INK Talks – Listening to BBC Conversation.

UNIT III **6**

Introducing oneself - Exchanging Personal Information - JAM (Just a Minute) - Making requests and responses – Inviting and Accepting/Declining Invitations – Art of Presentation Skills – Conversation.

UNIT IV **6**

Reading Comprehension - Reading Newspapers – Employing different reading skills - Skimming – Scanning – Close reading – Speed reading- Reading technical, Non-Technical Texts and Literary Texts – Identifying the Central Idea – Inferring Lexical and Contextual Meaning.

UNIT V **6**

Writing Notices - Writing Memos – Writing Circulars - Writing Agenda – Writing Minutes – Writing Reports: Feasibility & Analytical Report - Free Writing – Email etiquettes – Sentence Completion.

TOTAL :30 PERIODS

TEXT BOOK:

1. Lewis Lansford and Peter Astley. Oxford English for careers: Engineering 1: Student's Book. USA: Oxford University Press. 2013

REFERENCES:

1. Bailey, Stephen. Academic Writing: A Handbook for Students. Routledge publication. 2018.
2. Covey Sean. Seven Habits of Highly Effective Teens. New York: Fireside Publishers. 1998
3. Business English Certificate Materials, Cambridge University Press
4. Aruna Koneru, Professional Communication. New Delhi: Tata McGraw-Hill Publishing Company
5. Kumar Sanjay, Pushpa Latha. English Language and Communication Skills for Engineers. India: Oxford University Press. 2018.
6. http://www.bbc.co.uk/learningenglish/

COURSE OUTCOMES:

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

1. Make themselves efficient for the corporate workplace.
2. Read wide range of texts effectively.
3. Understand the business communication effectively
4. Write formal and informal reports
5. Speak efficiently and present their ideas confidently.

UHS1351	PROFESSIONAL SKILLS - II	L	T	P	C
	(Common to CSE,ECE, EEE,MECH,AIDS,IT & AIML)	0	0	2	1

OBJECTIVES:

- To make students identify the various forms of written business communication and to make them recognise the difference between different types of average, i.e. mean, median, and mode, to calculate each variant accurately.
- To build presentation and verbal skills to create impact and to explore more opportunities and also to make them enhanced in logical thinking for competitive aspect.
- To enable students to understand the complex organizational features of printed text and to make them learn the application of mathematical models to different real-world contexts.
- To help the students to understand the importance of having his language skills kept ready for effective use and to impart the core skills associated with quantitative aptitude and logical reasoning.
- To use listening texts to help students improve their listening and language competence skill and to improve understanding of statistical and M&E concepts in data analysis.

UNIT I **6**

APTITUDE

Averages–Concepts – Problems on Averages – Clocks – Concepts & Facts – Problems on Clocks

COMMUNICATION

Letter writing (Business letters) – Sentence Completion

UNIT II **6**

APTITUDE

Problems on Ages– Concepts and Basics - Types of Problems on Ages – Calendars – Concepts and Tricks – Problems on Calendars

COMMUNICATION

Business Presentation – MNC Idioms – Error spotting

UNIT III **6**

APTITUDE

Ratio & Proportions – Concepts on Ratio & Proportions -Problems on Ratio & Proportions

COMMUNICATION

Can you read – Replace by correct word – Synonyms & Antonyms

UNIT IV **6**

APTITUDE

Partnership – Concepts – Problems on Partnership- **Blood Relations** – Concepts – Problems on Blood Relations

COMMUNICATION

Paragraph jumble – Verbal analogies

UNIT V **6**

APTITUDE

Data interpretation–Table DI – Graphs – Bar Graph – Pie Graph – Line Graph – Combined Graph

COMMUNICATION

Summarize spoken text – One word substitution – Sentence Improvement

TOTAL : 30 PERIODS

TEXT BOOK:

1. Quantitative Aptitude for Competitive Examination-IV Edition by Dinesh Khattar
2. Quantitative Aptitude by S.Chand and Dr.R.S.Aggarwal
3. Objective English – VII Edition by Edgar Thorpe and Showick Thorpe

REFERENCES:

1. https://www.pteexampreparation.com/about/
2. https://hindi.bankersadda.com/2020/02/sbi-clerk-prelims-english-mini-mock-4.html?m=1
3. https://sba.thehartford.com/business-management/marketing/business-letter-formats/
4. https://www.fresherslive.com/online-test/verbal-ability-test/questions-and-answers
5. https://www.smartkeeda.com/General_English/Vocabulary/Word_Usage/newest/all/passage/Word_Usage_Quiz_3/

COURSE OUTCOMES:

1. Students will be able to select the best business letter form for each writing situation and they will be able to understand the statistical implications of the different types of average, and assess their usefulness/appropriateness in different situations.
2. Learners will be able to make effective presentation by using verbal skills and also they can implement their logical thinking in real time context.
3. Students can differentiate the complex organizational features of printed text and be able to apply the mathematical models in problem solving.
4. Students will be aware about their importance of language skills in acing competitive and placement test and will be able to impart their core skills associated with quantitative aptitude.
5. Students will have the awareness about listening task and will be able to deal with nervousness and public speaking and also will understand the basic statistical concept in data analysis.

K. RAMAKRISHNAN COLLEGE OF ENGINEERING

TIRUCHIRAPPALLI

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

REGULATION 2020

Semester IV

UMA1454	APPLIED PROBABILITY STATISTICS AND NUMERICAL ANALYSIS	L	T	P	C
		3	1	0	4

COURSE OBJECTIVES:

The students should be made to:

- Understand the basic concepts of probability, random variables, and standard probability distributions.
- Apply probability concept for two dimensional random variables & Analyze Correlation and Regression.
- To acquaint the knowledge of testing of hypothesis for small and large samples plays an important role in real life problems.
- To introduce the numerical techniques of interpolation in various intervals in real life situations.
- To understand the knowledge of various techniques and methods of solving various types of partial differential equations.

UNIT I PROBABILITY AND RANDOM VARIABLES 12

Probability - Axioms of probability - Conditional probability - Baye‘s theorem - Discrete and continuous random variables – Moments - Moment generating functions - Binomial, Poisson, Geometric, Uniform, Exponential and Normal distributions.

UNIT II TWO – DIMENSIONAL RANDOM VARIABLES 12

Joint distributions - Marginal and conditional distributions – Covariance - Correlation and linear regression - Transformation of random variables - Central limit theorem (for independent and identically distributed random variables).

UNIT III TESTING OF HYPOTHESIS 12

Large sample test based on Normal distribution for single mean and difference of means - Tests based on t, χ^2 (Chi-square) and F distributions for testing means and variances - Contingency table (Test for Independency) - Goodness of fit.

UNIT IV INTERPOLATION AND APPROXIMATION 12

Interpolation with unequal intervals - Lagrange's interpolation - Newton’s divided difference interpolation - Cubic Splines - Interpolation with equal intervals - Newton’s forward and backward difference formulae.

UNIT V INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS 12

Single Step methods - Taylor’s series method - Euler’s method - Modified Euler’s method - Fourth order Runge-Kutta method for solving first order equations - Multi step methods - Milne’s and Adam’s-Bash forth predictor corrector methods for solving first order equations.

TOTAL: 60 PERIODS

TEXT BOOKS:

1. Ibe, O.C.," Fundamentals of Applied Probability and Random Processes ", 1st Indian Reprint, Elsevier, 2007.
2. Grewal. B.S., and Grewal. J.S., "Numerical Methods in Engineering and Science", 9th Edition, Khanna Publishers, New Delhi, 2007.

REFERENCES:

1. Spiegel. M.R., Schiller. J., and Srinivasan. R.A., "Schaum's Outlines on Probability and Statistics", Tata McGraw Hill Edition, 2004.
2. Walpole. R.E., Myers. R.H., Myers. S.L., and Ye. K., "Probability and Statistics for Engineers and Scientists", 8th Edition, Pearson Education, Asia, 2007.
3. Chapra. S.C., and Canale. R.P, "Numerical Methods for Engineers", 5th Edition, Tata McGraw Hill, New Delhi, 2007.
4. Gerald. C.F., and Wheatley. P.O. "Applied Numerical Analysis" Pearson Education, Asia, New Delhi, 2006.
5. Brian Bradie. "A friendly introduction to Numerical analysis", Pearson Education, Asia, New Delhi, 2007.
6. Sankara Rao. K., "Numerical methods for Scientists and Engineers", Prentice Hall of India Private, 3rd Edition, New Delhi, 2007.

WEB REFERENCES:

1. http://www2.econ.iastate.edu/classes/econ671/hallam/documents/RVProb_Distributions.pdf
2. https://www.globalspec.com/reference/76524/203279/6-5-functions-of-random-variable
3. https://latrobe.libguides.com/maths/hypothesis-testing
4. http://math.iit.edu/~fass/578_ch6.pdf
5. https://homepage.divms.uiowa.edu/~atkinson/papers/NAODE_Book.pdf

ONLINE RESOURCES:

1. https://nptel.ac.in/courses/111/104/111104032/.
2. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-041sc-probabilistic-systems-analysis-and-applied-probability-fall-2013/unit-i/.
3. https://online.stat.psu.edu/statprogram/reviews/statistical-concepts/hypothesis-testing/
4. https://nptel.ac.in/courses/111/106/111106101/

COURSE OUTCOMES :

Upon successful completion of the course, students should be able to,

1.Apply the knowledge of probability in Baye's theorem and Mathematical expectation for one dimensional random variables and standard Distribution in real life phenomena.

2.Analyze the various collections of data by methods of Correlation and regression by two dimensional random variables.

3.Analyze the concept of testing of hypothesis for small and large samples in Real life Problems.

4.Apply the knowledge of Interpolation technique for equal and unequal intervals to find new data points within the range of known data points.

5.Apply the knowledge of numerical techniques and methods for solving first and second order Ordinary Differential Equation.

HOD **PRINCIPAL**

SEMESTER IV

		L	T	P	C
UCS1401	DATABASE MANAGEMENT SYSTEMS	3	0	0	3

OBJECTIVES:

- To understand the basic principles of database management system.
- To access database using SQL queries.
- To design database using E-R model.
- To understand the internal storage structure and query processing.
- To have an introduction to advanced developments in database models and applications.

UNIT I INTRODUCTION **9**

Database management systems – view of data – database languages - database design – database and application architecture – database users and administrators – relational databases – database schema – keys – schema diagrams – relational query language – centralized and client server architecture for DBMS.

UNIT II SQL **9**

SQL – SQL data definition – SQL queries – basic operations and set operations – null values – aggregate functions – nested sub queries – join – views – transactions – integrity constraints – SQL data types and schemas – functions and procedures – triggers – accessing SQL from a programming language.

UNIT III DATABASE DESIGN **9**

Design process – entity relationship model – complex attributes – mapping cardinalities - primary key – reducing E-R diagrams to relational schemas – extended E-R features – relational database design: features – decomposition using functional dependencies – normal forms – join dependencies.

UNIT IV FILE STRUCTURE, INDEXING, HASHING AND TRANSACTIONS **9**

Operations on files –organization of records in files – RAID – types of single-level ordered indexes – multilevel indexes – B-trees and B+ trees – indexes on multilevel keys – static hashing – dynamic hashing – transaction – ACID properties – schedules – serializability – concurrency control – locking protocol – deadlock – transaction recovery.

UNIT V ADVANCED DATABASE MODELS, SYSTEMS AND APPLICATIONS **9**

Advanced database concepts and triggers – temporal database – spatial database – multimedia database – information retrieval concepts – queries in IR systems – inverted indexing – web

search and analysis – association rules – classification – clustering – building a data warehouse – functionality of a data warehouse.

TOTAL : 45 PERIODS

TEXT BOOK:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Sixth Edition, Tata McGraw Hill, 2011.
2. Ramez Elmasri and Shamkant B Navathe, "Fundamentals of Database Systems", Addison Wesley, USA, 2010.

REFERENCES:

1. C.J.Date, A.Kannan, S.Swamynathan, "An Introduction to Database Systems", Eighth Edition, Pearson Education, 2006.
2. Raghu Ramakrishnan, "Database Management Systems", Fourth Edition, McGraw-Hill College Publications, 2015.
3. G.K.Gupta,"Database Management Systems", Tata McGraw Hill, 2011.

COURSE OUTCOMES:

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

1. Analyze the basic database management systems.
2. Demonstrate SQL queries, functions and procedures.
3. Match the ER model to relational model to design database.
4. Analyze the storage structure and hashing of databases.
5. Appraise the advanced database models and the applications.

ONLINE REFERENCES:

1. https://onlinecourses.swayam2.ac.in/cec21_cs11/preview
2. https://onlinecourses.nptel.ac.in/noc21_cs52/preview
3. https://onlinecourses.swayam2.ac.in/nou21_lb02/preview

UCS1402	OPERATING SYSTEMS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the basic components of operating system.
- To explore the notion of threading and critical section problems.
- To understand and develop methods for preventing or avoiding deadlocks.
- To explore the various techniques to manage memory.
- To study the physical structure of storage devices and functions of the file systems.

UNIT I INTRODUCTION 9

Introduction to operating system – computer system architecture – computer system operation – computer system architecture – operating system structure – operating system operations – process, memory and storage management – operating system services – system call and types – system program – operating system structure – process management – operations on processes – inter-process communication

UNIT II THREADS AND SCHEDULING 9

Threads – Overview, Multithreading models, Threading issues – Scheduling: Criteria – Algorithms – Real-time CPU scheduling — Thread scheduling – Critical section problem – Semaphores – Readers – Writer problem – Dining philosopher problem – Monitor Threads – monitors.

UNIT III DEADLOCKS AND MEMORY MANAGEMENT 9

Deadlocks – deadlock characterization – methods to handle deadlock – deadlock prevention – deadlock avoidance – deadlock detection – recovery from deadlock – swapping – contiguous memory allocation – segmentation – paging – structure of page table – virtual memory – demand paging – page replacement – allocation of frames.

UNIT IV STORAGE MANAGEMENT AND FILE SYSTEM INTERFACE 9

Physical structure of secondary and tertiary storage devices – disk structure – disk scheduling – swap space management – RAID structure – file concept – access methods – directory and disk structure – file sharing – protection – file system structure – file system implementation – allocation methods – free space management – NFS

UNIT V CASE STUDY: LINUX, WINDOWS 7 9

Linux system: Linux kernel – Linux system – design principles – kernel modules – process management – scheduling – memory management – file systems – Windows 7: design principles – system components – terminal services and fast user switching – file system – networking.

TOTAL : 45 PERIODS

TEXT BOOK:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", 9th Edition, John Wiley and Sons Inc., 2015.

REFERENCES:

1. William Stallings, "Operating Systems – Internals and Design Principles", 7th Edition, Prentice Hall, 2011.
2. Andrew S. Tanenbaum, Herbert Bos "Modern Operating Systems", Fourth Edition, Pearson Education.
3. Ramaz Elmasri, A. Gil Carrick, David Levine, "Operating Systems – A Spiral Approach", Tata McGraw Hill Edition, 2010.
4. Achyut S.Godbole, Atul Kahate, "Operating Systems", McGraw Hill Education, 2016.
5. Gary Nutt, "Operating Systems", Third Edition, Pearson Education, 2004.
6. Harvey M. Deitel, "Operating Systems", Third Edition, Pearson Education, 2004.

COURSE OUTCOMES:

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

1. Define the basic components of operating system.
2. Outline the classic problems of threads and scheduling
3. Develop methods for preventing or avoiding deadlocks.
4. Evaluate memory and file management algorithms.
5. Analyze the basic principles behind Linux and Windows 7.

ONLINE REFERENCES:

1. https://onlinecourses.nptel.ac.in/noc21_cs72
2. https://onlinecourses.nptel.ac.in/noc21_cs88
3. https://onlinecourses.swayam2.ac.in/cec21_cs20

UCS1403	SOFTWARE ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the software life cycle models.
- To understand the importance of the software development process.
- To understand the significance of UML models.
- To apply designing and testing principles in software development process.
- To develop correct and robust software products.

UNIT I INTRODUCTION 9

Software and Software Engineering – Process Model: Generic Process Model – Prescriptive Process Model – Specialized Process Model – Unified Process Model – Personal and Team Process Model – Agile Development – Principles of Framework Activity**.**

UNIT II REQUIREMENTS ENGINEERING AND MODELLING 9

Requirements Engineering – Functional and Non Functional Requirements – Establishing the Groundwork – Eliciting Requirements – Developing Use case – Requirement Model - Negotiation Requirements – Validation Requirements – Requirement Analysis – Modeling: Domain Analysis and Modeling – Scenario Based Modeling – UML Model – Data Modeling – Class Based Modeling.

UNIT III SOFTWARE DESIGN 9

Design Process – Design Concepts – Design Model – Architectural Design – User Interface Design Elements – Component Level Design – Pattern Based Design.

UNIT IV SOFTWARE TESTING STRATEGIES 9

Introduction to Software Testing – Software Testing Life Cycle (STLC) – Strategic Approach to Software Testing – Strategic Issues – Test Strategies for Conventional Software – Unit Testing – Integration Testing – System Testing – The Art of Debugging – Conventional Applications: Basis Path Testing – Control Structure Testing – Black Box Testing – White Box Testing – Model Based Testing – Testing Object Oriented Applications.

UNIT V SOFTWARE PROJECT MANAGEMENT 9

Software Configuration Management: SCM Process – Configuration management for WebApps – Software Cost Estimation – Risk Management – Maintenance and Reengineering.

TOTAL : 45 PERIODS

TEXT BOOK:

1. R.S. Pressman, “Software Engineering – A Practitioner’s Approach”, Seventh Edition, McGraw Hill, International Edition, 2014.

2 M.G. Limaye, “Software Testing – Principles, Techniques and Tools”, Tata McGraw Hill, 2011.

REFERENCES:

1. Stephan Schach, “Software Engineering”, Tata McGraw Hill, 2007.
2. Pfleeger and Lawrence “Software Engineering: Theory and Practice”, Pearson Education, Second edition, 2001.

COURSE OUTCOMES:

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

1. Explain the process models and the principles of framework activity.
2. Demonstrate the UML model for software projects.
3. Develop suitable models for designing application software.
4. Make use of software testing procedures in software development process.
5. Illustrate the software project management and software maintenance practices.

ONLINE REFERENCES:

1. https://nptel.ac.in/courses/106/105/106105182/
2. https://www.udemy.com/topic/software-testing/

UMG1052	TOTAL QUALITY MANAGEMENT	L	T	P	C
		3	0	0	3

OBJECTIVES:

- Knowing prerequisites of evolution of total quality management and significance of quality gurus' works to the management of modern organizations.
- Understanding the principles of total quality management and peculiarities of their implementation
- Using quality management methods analyzing and solving problems of organization
- Understanding the tools and techniques for the quality improvement
- Knowing about the quality management system and its implementation

UNIT I INTRODUCTION 9

Quality – Vision, Mission and Policy Statements. Customer Focus – Customer Perception of Quality, Translating Needs into Requirements, Customer Retention. Dimensions of Product and Service Quality. Cost of Quality. TQM Framework, Benefits, Awareness and Obstacles.

UNIT II PRINCIPLES AND PHILOSOPHIES OF QUALITY MANAGEMENT 9

Overview of the contributions of Deming, Juran Crosby, Masaaki Imai, Feigenbaum, Ishikawa, Taguchi Techniques – Loss Function, Concepts of Quality Circle, Japanese 5S Principles Supplier Partnership - Partnering, Supplier Selection, Supplier Rating.

UNIT III STATISTICAL PROCESS CONTROL 9

Meaning and Significance of Statistical Process Control (SPC) – Construction of Control Charts for Variables and Attributed. Process Capability – Meaning, Significance and Measurement – Six Sigma - Concepts of Process Capability. Total Productive Maintenance (TMP), Terotechnology. Business Process Improvement (BPI) – Principles, Applications, Reengineering Process, Benefits and Limitations.

UNIT IV TOOLS AND TECHNIQUES FOR QUALITY MANAGEMENT 9

Quality Functions Development (QFD) – Benefits, Voice of Customer, Information Organization, House of Quality (HOQ), Building a HOQ, QFD Process. Failure Mode Effect Analysis (FMEA) – FMEA Stages, Types, Seven Tools (Old & New). Bench Marking – Reasons to Benchmark, Process.

UNIT V QUALITY SYSTEMS ORGANIZING AND IMPLEMENTATION 9

Introduction to IS/ISO 9004:2000 – Quality Management Systems – Guidelines for Performance Improvements. Quality Audits. TQM Culture, Leadership – Quality Council, Employee Involvement, Motivation, Empowerment, Recognition and Reward.

TOTAL : 45 PERIODS

TEXT BOOK:

1. Dale H.Besterfield, Carol Besterfield – Michna, Glen H. Besterfield, Mary Besterfield – Sacre, Hermant – Urdhwareshe, Rashmi Urdhwareshe, Total Quality Management, Revised Third edition, Pearson Education, 2011.

REFERENCES:

1. Shridhara Bhat K, "Total Quality Management – Text and Cases", Himalaya Publishing House, II Edition 2010
2. Douglas C. Montgomory, "Introduction to Statistical Quality Control", Wiley Student Edition, 4th Edition, Wiley India Pvt Limited, 2008.
3. James R. Evans and William M. Lindsay, "The Management and Control of Quality", Sixth Edition, Thomson, 2005.
4. Poornima M.Charantimath, "Total Quality Management", Pearson Education, Second Edition , 2011
5. Indian standard – quality management systems- Guidelines for performance improvement (Fifth Revision), Bureau of Indian standards, New Delhi.

COURSE OUTCOMES:

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

1. Communicate why Total Quality Management (TQM) is fundamental to partnering for mutual benefit.
2. Evaluate the principles of quality management and to explain how these principles can be applied within quality management systems
3. Demonstrate the applicability of the statistical process controls for analyzing and solving problems
4. Identify the key aspects of the quality improvement cycle and to select and use appropriate tools and techniques for controlling, improving and measuring quality.
5. Communicate the aspects of quality management system and to devise and evaluate quality implementation plans.

UCS1411	**OPERATING SYSTEMS LABORATORY**	**L**	**T**	**P**	**C**
		0	**0**	**4**	**2**

OBJECTIVES:

- To learn and program simple Unix commands.
- To implement various CPU scheduling algorithms.
- To implement semaphores and inter process communication.
- To avoid, detect and recover from deadlock and to allocate and organize files.
- To manage memory and page replacement algorithms.

LIST OF EXERCISES:

1. Write a C program to implement the Basics of Unix commands.
2. Write C programs for the system calls of Unix operating system: fork, exec, getpid, exit, wait, close, stat, opendir, readdir.
3. Write a C program to simulate the Unix commands: cp, ls, grep, etc.
4. Write a C program to implement the following CPU scheduling algorithms:
   i. FCFS ii. Round robin
   iii. SJF iv. Priority
5. i. Write a C program to implement semaphores.
   ii. Write a C program to implement inter-process communication.
6. Write a C program to prevent deadlock using bankers algorithm.
7. Write a C program to detect and recover from a deadlock.
8. Write a C program for the following memory management functions:
   i. Best fit
   ii. First fit
   iii. Worst fit
9. Write a C program to implement the following page replacement algorithms
   i. FIFO ii. LRU iii.LFU
10. Write a C program to perform the various file organization techniques.
11. Write a C program for the following file allocation strategies:
    i. Abstract ii. Indexed iii. Linked

TOTAL : 60 PERIODS

PLATFORM NEEDED:

Standalone desktops with C compiler 30 Nos.

(Or)

Server with C compiler supporting 30 terminals or more.

COURSE OUTCOMES:

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

1. Analyze simple Unix commands.

2. Compare various CPU scheduling algorithms like FCFS, RR, SJF and priority.
3. Analyze semaphores and inter process communication.
4. Determine, avoid and recover from deadlocks using bankers algorithm.
5. Interpret page replacements and manage memories and organizing files

ONLINE REFERENCES:

1. https://nptel.ac.in/courses/106/102/106102132/
2. https://nptel.ac.in/courses/106/108/106108101/
3. https://onlinecourses.nptel.ac.in/noc21_cs72

		L	T	P	C
UCS1412	DATABASE MANAGEMENT SYSTEMS LABORATORY	0	0	4	2

OBJECTIVES:

- To manipulate data manipulation commands using SQL and PL/SQL.
- To apply nested and join queries to manipulate a database.
- To develop an enterprise application with user interface and database.
- To create and drop triggers and to create a cursor to manipulate table in PL/SQL.
- To design database using ER model and implement normalization

LIST OF EXERCISES:

1. a) Manipulate a database by creating, inserting, deleting, updating and retrieving tables.
   b) Using DDL commands create a table and alter and drop table.
2. Apply the following DML commands for
   i. Data insertion using different ways.
   ii. Integrity constraints
   iii. Usage of truncate command.
3. Manipulate tables in a database using simple queries, nested queries, sub queries and joins.
4. Manipulate tables in a database using aggregation functions, grouping and ordering commands.
5. a) Using DCL and TCL commands set privileges and revoke privileges.
   b) Using DCL and TCL commands save-point, roll back and roll back to commands.
6. Introduction on PL/SQL and conditional statements.
7. Using implicit and explicit cursor manipulate a table in PL/SQL.
8. Create and drop a trigger in PL/SQL.
9. Using procedure and function manipulate a database using PL/SQL.
10. Write query to handle an exception that has occurred.
11. Design a database using ER modelling and normalization.
12. Develop an enterprise application using user interface and database.

TOTAL : 60 PERIODS

PLATFORM NEEDED:

Standalone desktops with PL/SQL or ORACLE 30 Nos.

COURSE OUTCOMES:

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

1. Design a database with data models.
2. List the SQL queries for manipulating a table in a database.
3. Interpret privileges and revoking the privileges provided.

4. Applying procedure and function using PL/SQL.
5. Create an enterprise application with user interface and database.

ONLINE REFERENCES:

1. https://onlinecourses.swayam2.ac.in/cec21_cs11
2. https://onlinecourses.nptel.ac.in/noc21_cs52
3. https://onlinecourses.swayam2.ac.in/nou21_lb02

		L	T	P	C
UCS1413	**MINI PROJECT**	**0**	**0**	**4**	**2**

OBJECTIVES:

- To analyze object oriented programming concepts.
- To formulate the SQL queries for manipulating a table in a database.
- To interpret the various data warehousing and data mining techniques.
- To formulate techniques for data visualization.
- To create an enterprise application for information security.

SUGGGESTED DOMAINS:

1. Object oriented programming
2. Database Management Systems
3. Computer networks
4. Artificial Intelligence
5. Machine Learning
6. Data warehousing and data mining
7. Cloud computing
8. Data visualization
9. Computer Graphics
10. Information Security

TOTAL : 60 PERIODS

COURSE OUTCOMES:

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

1. Analyze object oriented programming concepts.
2. Formulate the SQL queries for manipulating a table in a database.
3. Interpret the various data warehousing and data mining techniques.
4. Formulate techniques for data visualization.
5. Create an enterprise application for information security.

UHS1451	PROFESSIONAL SKILLS - III	L	T	P	C
	(Common to CSE,ECE, EEE,MECH,AIDS,IT & AIML)	0	0	2	1

OBJECTIVES:

- To improve the problem-solving skills to deal with financial aspects and to improve logical thinking with respect to directions and to make the students to communicate effectively through email in proper format.
- To make the students to deal with day to day transactions and to improve the confidence levels and to help the students to speak with greater accuracy and fluency by providing them with opportunities to talk about their own personal experiences and about familiar topics.
- To enable the students to solve real world concepts and to make the learners to be proficient in different types of writing skills.
- To make the students to solve problems in financial aspects by analyzing logically and to help the students to understand the purpose of different sections of written communication along with its appropriate style.
- To enable the students to solve problems involving investments and interests and to explore them the essential aspects of preparing and recording the outcomes of efficient and effective meetings.

UNIT I **6**

APTITUDE

Percentages – Basic Concepts – Types – Problems on percentages - Direction Sense Test – Concepts and Problems on directions

COMMUNICATION

E-mail writing - Column based fillers

UNIT II **6**

APTITUDE

Profit & Loss–Concepts and Formulae – Problems on Profit and loss

COMMUNICATION

JAM - Reading comprehension(Both MNC & Competitive pattern)

UNIT III **6**

APTITUDE

Time & Distance – Concepts and Conversions – Problems on Time & Distance - Problems on Trains – Concepts and Types – Problems on different Types

COMMUNICATION

Critical Reasoning - Report and Proposal writing

UNIT IV **6**

APTITUDE

Simple Interest – Concepts and Formulae – Problems on Simple Interest - Statement and Conclusions

COMMUNICATION

Writing practices on circulars, notices & Memo

UNIT V **6**

APTITUDE

Compound Interest – Concepts and Formulae – Problems on Compound Interest – Compound Interest Vs Simple Interest

COMMUNICATION

Writing practices on Agenda preparation and Minutes of meeting - Highlight incorrect words

TOTAL : 30 PERIODS

TEXT BOOK:

1. Quantitative Aptitude for Competitive Examination-IV Edition by Dinesh Khattar
2. Quantitative Aptitude by S.Chand and Dr.R.S.Aggarwal
3. Objective English – VII Edition by Edgar Thorpe and Showick Thorpe

REFERENCES:

1. https://www.pteexampreparation.com/about/
2. https://www.tutorialspoint.com/business_writing_skills/agenda_writing.htm
3. https://www.toppr.com/guides/business-correspondence-and-reporting/official-communication/circulars/
4. https://www.hitbullseye.com/Critical-Reasoning-Practice-Questions.php
5. https://www.indiabix.com

COURSE OUTCOMES:

1. Student's problem solving skills will be improved in financial aspects and be able to communicate through emails in effective manner.
2. Students will be able to deal with day to day transactions and will deliver their contents with confidence by utilizing the opportunity.
3. Students will be able to solve complex problems in real world context and will realize the importance of writing skills.
4. Students will be able to analyze the problems logically and will be able to impart the appropriate style for different business writings.
5. Students will be able to solve problems related to finance and will understand the essential aspects of meeting.

K. RAMAKRISHNAN COLLEGE OF ENGINEERING

TIRUCHIRAPPALLI

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

REGULATION 2020

Semester V

UCS1501	THEORY OF AUTOMATA	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the basics of language hierarchy.
- To construct computing models like Finite Automata, Pushdown Automata, and Turing Machine for languages.
- To understand regular expressions and their role in real-life.
- To construct grammars for different types of languages.
- To understand the properties of context free languages with normal forms.

UNIT I FINITE AUTOMATA AND REGULAR EXPRESSIONS 9

Basic Mathematical Notation and techniques – Introduction to formal proof – Additional forms of Proof – Inductive Proofs. Finite Automata (FA) – Formal Definition – Deterministic Finite Automata – Non-deterministic Finite Automata – Finite Automata with Epsilon Transitions – Regular Expression - Pumping Lemma for regular sets.

UNIT II CONTEXT FREE GRAMMARS AND LANGUAGES 9

Grammar –Formal Definition– Types of Grammar – Context Free Grammars and Languages– Derivations– Ambiguity – Normal Forms of CFG – Elimination of Useless symbols – Unit productions – Null productions – Greibach Normal form – Chomsky normal form – Closure properties of CFL.

UNIT III PUSH DOWN AUTOMATA 9

Pushdown Automata – Formal Definition – Languages of Pushdown Automata – Equivalence of PDA and CFG, Deterministic Pushdown Automata. Equivalence of CFL and PDA

UNIT IV TURING MACHINES 9

Definitions of Turing machines – Models – Language of a Turing Machine –Programming Techniques of Turing machine – Multi tape and Multi Track Turing Machines -– Problems about Turing machine – Chomskian hierarchy of languages

UNIT V UNDECIDABILITY 9

Undecidability – Rice's Theorem – The Halting problem – Post's Correspondence Problem, Class P and NP – Tractable and Intractable problems – P and NP completeness – Polynomial time reductions

TOTAL : 45 PERIODS

TEXT BOOK:

1. J.E. Hopcroft, R. Motwani and J.D Ullman, "Introduction to Automata Theory, Languages and Computations", Second Edition, Pearson Education, 2003.
2. John C Martin, "Introduction to Languages and the Theory of Computation", Third Edition, Tata McGraw Hill Publishing Company, New Delhi, 2007. (UNIT 4,5)

REFERENCES:

1. Micheal Sipser, "Introduction of the Theory and Computation", Thomson Brokecole, 1997.
2. Mishra K L P and Chandrasekaran N, "Theory of Computer Science - Automata, Languages and Computation", Third Edition, Prentice Hall of India, 2004.

3. Peter Linz, "An Introduction to Formal Language and Automata", Third Edition, Narosa Publishers, New Delhi, 2002.

COURSE OUTCOMES:

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

1. Outline the concept of finite automata and regular languages.
2. Construct context free grammars for programming languages.
3. Experiment with push down automata for languages defined by a grammar.
4. Demonstrate turing machines for both mathematical and logical problems.
5. Inspect the tractable and intractable problems.

ONLINE REFERENCES:

1. https://www.tutorialspoint.com/automata_theory/index.htm
2. https://www.youtube.com/watch?v=EtYsnFGIUkA
3. https://www.javatpoint.com/automata-tutorial

UCS1502	COMPUTER NETWORKS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the flow of information from one node to another node in a network.
- To understand the data link layer of the network architecture.
- To understand the routing protocols of the network layer.
- To understand the transport layer protocols.
- To understand the principles of the application layer.

UNIT I INTRODUCTION 9

Evolution of computer networks – components – representation of data – classification of computer networks – network topology – OSI layered architecture – TCP/ IP model – networking devices – modems – routers – switches – gateways – transmission media – signal encoding techniques – channel access techniques.

UNIT II DATA LINK LAYER 9

Link layer services – introduction to switches and routes – framing – Error detection and correction – flow control – media access control – Ethernet – IEEE standards – CSMA/CD – token ring – FDDI – wireless LANs – CSMA/CA.

UNIT III NETWORK LAYER 9

Circuit switching – packet switching – IPV4 – IPV6 – subnetting – unicast routing protocol: distance vector routing – link state routing – path vector routing – ARP – DHCP – ICMP.

UNIT IV TRANSPORT LAYER 9

Overview of transport layer – Transport layer protocols: UDP – TCP – TCP connection management – Flow control – Retransmission – Congestion control in transport layer – TCP congestion control

UNIT V APPICATION LAYER 9

Needs and principles of application layer protocols – web and HTTP – FTP – Electronic mail: SMTP – POP3 – IMAP – MIME –DNS – SNMP – Telnet – SSH.

TOTAL : 45 PERIODS

TEXT BOOK:

1. Larry L. Peterson, Bruce S. Davie, “Computer Networks: A system approach”, Fifth Edition, Morgan Kaufmann Publishers, 2012.
2. Behrouz A Forouzan,“Data Communication and Networking”, Fourth Edition, Mcgraw Hill, 2016.

REFERENCES:

1. Ying-Dar Lin, Ren - Hung Hwang, Fred Baker, “Computer Networks: An Open Source Approach”, McGraw Hill publisher, 2011.
2. James F. Kurose, Keith W. Ross, “Computer Networking - A Top DownApproach Featuring the Internet”, Fifth Edition, Pearson Education, 2009.
3. Nader. F. Mir, “Computer and Communication Networks”, Pearson Prentice Hall Publishers, 2010.

COURSE OUTCOMES:

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

1. Outline computer networks and encoding techniques.
2. Illustrate the various data link layer services.
3. Choose the path vector routing protocols of the network layer.
4. Interpret the connection between remote systems using transport layer.
5. Identify the role of application layer in establishing communication.

ONLINE REFERENCES:

1. https://onlinecourses.swayam2.ac.in/cec22_cs05/preview
2. https://onlinecourses.nptel.ac.in/noc22_cs19/preview
3. https://getpdfs.blogspot.com/2021/01/computer-network-3150710-technical.html
4. https://www.javatpoint.com/computer-network-tutorial

UCS1503 ARTIFICIAL INTELLIGENCE

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the various characteristics of intelligent agents.
- To learn about the different search strategies in AI.
- To learn to represent knowledge in solving AI problems.
- To understand the different ways of designing software agents.
- To know about the various applications of AI.

UNIT I INTRODUCTION 9

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 – Searching with Partial Observations – Constraint Satisfaction Problems – Constraint Propagation – Backtracking Search – Game Playing – Optimal Decisions in Games – Alpha – Beta Pruning – Stochastic Games.

UNIT III KNOWLEDGE REPRESENTATION 9

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 SOFTWARE AGENTS 9

Architecture for Intelligent Agents – Agent communication – Negotiation and Bargaining – Argumentation among Agents – Trust and Reputation in Multi-agent systems.

UNIT V APPLICATIONS 9

AI applications – Language Models – Information Retrieval – Information Extraction – Natural Language Processing – Machine Translation – Speech Recognition – Robot – Hardware – Perception – Planning – Moving.

TOTAL : 45 PERIODS

TEXT BOOK:

1. S. Russell and P. Norvig, “Artificial Intelligence: A Modern Approach”, Prentice Hall, Third Edition, 2009.
2. Bratko, “Prolog: Programming for Artificial Intelligence”, Fourth edition, Addison-Wesley Educational Publishers Inc., 2011.

REFERENCES:

1. M. Tim Jones, “Artificial Intelligence: A Systems Approach (Computer Science)”, Jones and Bartlett Publishers, Inc.; First Edition, 2008.
2. Nils J. Nilsson, “The Quest for Artificial Intelligence”, Cambridge University Press, 2009.
3. William F. Clocksin and Christopher S. Mellish, “Programming in Prolog: Using the

ISO Standard", Fifth Edition, Springer, 2003.
4. Gerhard Weiss, "Multi Agent Systems", Second Edition, MIT Press, 2013.
5. David L. Poole and Alan K. Mackworth, "Artificial Intelligence: Foundations of Computational Agents", Cambridge University Press, 2010.

COURSE OUTCOMES:

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

1. Demonstrate the fundamentals and characteristics of AI.
2. Experiment various problem solving methods in AI.
3. Make use of various knowledge representation techniques in AI.
4. Organize the different ways of designing software agents.
5. Summarize the various applications of AI.

ONLINE REFERENCES:

1. https://onlinecourses.nptel.ac.in/noc22_cs56/preview
2. https://onlinecourses.nptel.ac.in/noc22_cs02/preview
3. https://onlinecourses.swayam2.ac.in/cec21_cs08/preview

UCS1504	MOBILE COMPUTING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To know the different modes of radio transmissions.
- To know the basis of transport and application layer protocols.
- To explain the architecture and operations of WLANS.
- To illustrate the functionalities of Mobile IP and optimizations.
- To gain understanding on mobile platforms and application development.

UNIT I INTRODUCTION 9

Introduction to mobile computing – Applications of mobile computing – Frequencies for radio transmission – Signal Propagation – Multiplexing – Modulation – Spread spectrum – Cellular Systems – Medium access control: SDMA – FDMA – TDMA – CDMA – Satellite systems – Broadcast systems.

UNIT II WIRELESS LAN AND TELECOMMUNICATION SYSTEMS 9

Infrastructure and Adhoc Network – IEEE 802.11: Architecture – MAC Management – Newer Developments – HiperLAN – Bluetooth – Sensor Networks – Zigbee Technology – Mobile communication system: Introduction to cellular systems – GSM and services – Architecture.

UNIT III MOBILE IP 9

Mobile IP – agent discovery and registration – DHCP – AdHoc – Proactive protocol – DSDV, Reactive Routing Protocols – DSR, AODV, Hybrid routing – ZRP, Multicast Routing – ODMRP, Vehicular Ad Hoc networks(VANET) – MANET Vs VANET – Security.

UNIT IV MOBILE TCP AND WAP 9

MOBILE TCP: Traditional TCP – Classical TCP improvements – TCP over 2.5/3G wireless networks. Wireless Application Protocol – Architecture – Transport Layer Security – Transaction and Session protocols – Application Environment – Telephony Application – WAP 2.0 – WDP – WTLS.

UNIT V COMMUNICATION TECHNOLOGIES AND APPLICATIONS 9

GSM: Architecture – Mobility Management – GPRS – 4G – Long Term Evolution and LTE – Advanced: 5G System concept and Architecture. Software Development Kit: iOS, Android, BlackBerry, Windows Phone.

TOTAL : 45 PERIODS

TEXT BOOK:

1. Jochen Schiller, “Mobile Communications”, Second Edition, Pearson India, 2009.
2. Prasant Kumar Pattnaik, Rajib Mall, “Fundamentals of Mobile Computing”, PHI Learning Pvt.Ltd, New Delhi – 2012.

REFERENCES:

1. Martin Sauter, “From GSM to LTE – Advanced”, Second Edition, John Wiley & Sons, 2014.
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 McGraw Hill Edition, 2006.

COURSE OUTCOMES:

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

1. Classify the different modes of wireless transmission and medium access control techniques.
2. Explain the architecture and operational principle of various wireless local area network technologies.
3. Model the functionalities of MANET and VANET.
4. Rephrase the improvements in TCP for mobile communication and the architectural components of Wireless Application protocol.
5. Contrast the 4G, LTE and the software development kit.

ONLINE REFERENCES:

1. https://www.javatpoint.com/mobile-computing
2. https://www.tutorialspoint.com/mobile_computing/index.htm
3. https://mjginfologs.com/tutorials-on-mobile-computing/
4. Android Developers : http://developer.android.com/index.html
5. Apple Developer : https://developer.apple.com/
6. Windows Phone DevCenter : http://developer.windowsphone.com
7. BlackBerry Developer : http://developer.blackberry.com

UCS1505	INTERNET OF THINGS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the basics of internet of things.
- To learn about the hands on training for building simple applications using appropriate sensors.
- To understand the working of microcontroller boards and its associated components.
- To understand the protocols of Internet of things.
- To outline the data analytics and IoT platforms.

UNIT I INTRODUCTION 9

Evolution of Internet - IoT Architecture – Web 3.0 View of IoT – Protocol Standardisation for IoT – Protocols for IoT: IEEE 802.15.1 – IEEE 802.15.4 – BACNet Protocol – Modbus – KNX – Zigbee Architecture.

UNIT II PROGRAMMING MICROCONTROLLER FOR IOT 9

Basics of microcontroller – Setting up – Programming the Board – Reading from Sensors – Connecting Microcontroller with Mobile Devices – Communication via Bluetooth and USB – Connection with Internet via WIFI/Ethernet.

UNIT III PROGRAMMING MICROPROCESSOR FOR IOT 9

Installation and Setting up of the Microprocessor board – Programming the Microprocessor – Communication via Bluetooth and USB – Connection with Internet via WIFI/Ethernet.

UNIT IV IOT IN CLOUD AND SECURITY 9

Internet of Things (IoT) as Interconnection of Threats (IoT) – Privacy Preservation for IoT used in Smart Buildings – Preventing Unauthorized Access to Sensor Data – Authentication in IoT – Security Protocols for IoT Access Networks – Cloud and IoT – Drivers for Integration – Cloud Platforms – Applications.

UNIT V IOT ANALYTICS AND PLATFORMS 9

IOT Analytics: Role of Analytics in IOT – Data visualization Techniques – Introduction to R Programming – Statistical Methods – IoT Platforms – Future Trends of IoT.

TOTAL : 45 PERIODS

TEXT BOOK(S):

1. Charalampos Doukas, “Building Internet of Things with the Arduino”, Create space, April 2012.
2. Bratko, “Prolog: Programming for Artificial Intelligence”, Fourth edition, Addison, Wesley Educational Publishers Inc., 2011
3. Fei Hu, “Security and Privacy in Internet of Things (IoTs): Models, Algorithms, and Implementations”, CRC press, 2016.

REFERENCES:

1. Dieter Uckelmann, Mark Harrison, Florian Michahelles, “Architecting the Internet of Things”, Springer, 2011.
2. Donald Norris, “The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi and Beagle Bone Black”, Mc.Graw Hill, 2015.

3. Cuno Pfister, “Getting Started with the Internet of Things, O'Reilly Media”, Inc., 2011.
4. Honbo Zhou, “The Internet of Things in the Cloud: A Middleware Perspective”, CRC Press,2012.
5. “Internet of Things with Arduino Cookbook”, Packt Publications. Author(s): Marco Schwatrz Olivier.
6. Hersent, David Boswarthick, Omar Elloumi, “The Internet of Things, Key applications and Protocols”, Wiley, 2012.

COURSE OUTCOMES:

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

1. Rephrase the internet of things and the protocols of IoT.
2. Identify the various IoT components.
3. Experiment with connection with internet through wifi/ethernet.
4. Inspect the role of cloud and security in IoT.
5. Organize data analytics and IoT platforms.

ONLINE REFERENCES:

1. NPTEL: Introduction To Industry 4.0 And Industrial Internet Of Things.
2. NPTEL: Introduction to Internet of things
3. Coursera: An Introduction to Programming the Internet of things

UCS1511	MOBILE COMPUTING LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

- To write test and debug simple android application.
- To implement a simple calculator application.
- To develop menus in an android application.
- To develop an application that aids in location tracking.
- To familiarize in developing applications that makes use of sensors.

LIST OF EXERCISES:

1. Create an application that uses GUI components, font and colors.
2. Create an android application using Layouts, Widgets and Event listeners.
3. Create a native calculator application.
4. Create an android application using Activities, Indents, Fragments and Notifications.
5. Create an android application using Menus.
6. Create an application that implement multithreading.
7. Create an android application Storage, Media and Animations.
8. Create an android application using Location and Google Map.
9. Create an android application using Database Framework.
10. Create an android application using Localization and Sensors.

TOTAL : 60 PERIODS

PLATFORM NEEDED:

Standalone desktops with Windows or Android

or

iOS or Equivalent Mobile Application Development Tools with appropriate emulators and debuggers 30 nos.

COURSE OUTCOMES:

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

1. Examine and construct simple android application.
2. Interpret a simple calculator application.
3. Formulate menus in an android application.
4. Develop an application that aids in location tracking.
5. Develop application that makes use of sensors.

ONLINE REFERENCES:

1. https://www.javatpoint.com/mobile-computing
2. https://www.tutorialspoint.com/mobile_computing/index.htm
3. https://mjginfologs.com/tutorials-on-mobile-computing/
4. Android Developers : http://developer.android.com/index.html
5. Apple Developer : https://developer.apple.com/
6. Windows Phone DevCenter : http://developer.windowsphone.com
7. BlackBerry Developer : http://developer.blackberry.com

UCS1512 COMPUTER NETWORKS LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVES:

- To write test and debug simple computer networks program.
- To implement the TCP sockets.
- To analyze the performance of TCP and UDP.
- To study simple routing protocols.
- To build a simple network using OPNET.

LIST OF EXERCISES:

1. Study of network components, basic network commands and network configuration commands.
2. Write a JAVA program to use commands like tcpdump, netstat, ifconfig, nslookup and trace route.
3. Using a HTTP web client program download a web page using TCP sockets.
4. Write a JAVA program to develop the following applications using TCP sockets
    1. Echo client and echo server
    2. Chat
    3. File transfer
5. Write a JAVA program for socket programming.
6. Study of network simulator and simulation of congestion control algorithms using NS.
7. Simulate the basic network components.
8. Simulate the performance of TCP.
9. Simulate the performance of UDP.
10. Compare the performance of routing protocols using a simulating tool.
11. Install OPNET and build a simple network using OPNET.

TOTAL : 60 PERIODS

PLATFORM NEEDED:

Standalone desktops with JAVA 30 Nos.

COURSE OUTCOMES:

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

1. Test and interpret simple computer networks program.
2. Analyze the TCP sockets.
3. Evaluate on TCP and UDP.
4. Interpret simple routing protocols.
5. Formulate a simple network using OPNET

ONLINE REFERENCES:

1. https://onlinecourses.swayam2.ac.in/cec22_cs05/preview
2. https://onlinecourses.nptel.ac.in/noc22_cs19/preview
3. https://getpdfs.blogspot.com/2021/01/computer-network-3150710-technical.html
4. https://www.javatpoint.com/computer-network-tutorial

UHS1561	PROFESSIONAL COMMUNICATION LABORATORY (Common to CSE & ECE)	L	T	P	C
		0	0	4	2

OBJECTIVES:

- To help the students to develop their soft skills and enable transition from college to workplace scenario and excel in their job.
- To enhance proficiency in language and performance of the students during interviews.
- To improve employability skills of the students with a special focus on writing skills
- To develop their speaking skills for attending interviews, participating in group discussions and doing presentations.
- To prepare the students to be competent and laudable in a global business environment.

UNIT I **12**

Introduction to Soft Skills – Leadership Skills – Team Management - Time Management – Assertiveness –Stress Management – Communication –Creativity and Innovation – Verbal & Nonverbal Communication - Importance of Body Language – Postures and Gestures.

UNIT II **12**

Presentation Skills - Tips and Techniques for Public Speaking – Situational Conversations Analysis of Oral Presentations & Seminars – Debates (Planning and Preparation) – Visual Presentation – PPT.

UNIT III **12**

Importance of writing skills – Common Errors in technical writing – Job Application Letter – CV / Resume / Bio Data – Writing Business Proposals –Writing Permission Letters (In-plant Training) – Writing Emails – Writing SoP - Paragraph Writing - Interpretation of graphics. Vocabulary Enrichment – Verbal Ability - Sentence Completion.

UNIT IV **12**

Group Discussion & Group Dynamics - Dos and Don'ts / Expressions used in GD / Flexibility – Concept of Six Thinking Hats – Practice - Interview and its Types – Dos and Don'ts – Mock Interview – Psychometric Test – Big Five Personality Traits. SWOC Analysis.

UNIT V **12**

Pronunciation & Enunciation - Training and Mock test for TOEFL, IELTS, GRE, BEC – Reading Comprehension – Listening Comprehension – Life Skills – importance and necessity – Thinking skill – Social skill – Emotional skills.

TOTAL : 60 PERIODS

TEXT BOOK:

1. Lewis Lansford and Peter Astley. Oxford English for careers: Engineering 1: Student's Book. USA: Oxford University Press. 2013.

REFERENCES:

1. Business English Certificate Materials, Cambridge University Press.
2. Graded Examinations in Spoken English and Spoken English for Work downloadable materials from Trinity College, London.
3. International English Language Testing System Practice Tests, Cambridge University Press.
4. Personality Development (CD-ROM), Times Multimedia, Mumbai.
5. Robert M Sherfield and et al. "Developing Soft Skills" 4th edition, New Delhi: Pearson Education, 2009.
6. Bailey, Stephen. Academic Writing: A Handbook for Students. Routledge publication. 2018.
7. Covey Sean. Seven Habits of Highly Effective Teens. New York: Fireside Publishers. 1998
8. Aruna Koneru, Professional Communication. New Delhi: Tata McGraw-Hill Publishing Company
9. Kumar Sanjay, Pushpa Latha. English Language and Communication Skills for Engineers. India: Oxford University Press. 2018.

WEB SOURCES :

- http://www.slideshare.net/rohitjsh/presentation-on-group-discussion http://www.washington.edu/doit/TeamN/present_tips.html
- http://www.oxforddictionaries.com/words/writing-job-applications http://www.kent.ac.uk/careers/cv/coveringletters.htm
- http://www.mindtools.com/pages/article/newCDV_34.htm
- http://www.bbc.co.uk/learningenglish/

COURSE OUTCOMES:

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

1. Speak appropriately and effectively in varied formal and informal contexts.
2. Write short business messages and reports
3. Listen and comprehend lectures and talks effectively in their area of specialisation.
4. Write reports and winning job applications
5. Participate effectively in conversations; introduce themselves and their friends and express opinions

HOD PRINCIPAL

UHS1551	PROFESSIONAL SKILLS - IV	L	T	P	C
	(Common to CSE,ECE, EEE,MECH,AIDS,IT & AIML)	0	0	2	1

OBJECTIVES:

- To make the students understand the key skills, behaviors and some possible strategies to facilitate group discussion and to make them recognize the difference between outcomes that are equally likely and not equally likely to occur.
- To develop and strengthen student's writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience and to help the students to be proficient on logical reasoning in view of placements and competitive examinations.
- To recognize common interview pitfalls and to understand how to prepare for pre-interviews and to make them determine the number of outcomes in a problem.
- To make the students to identify and extract the main ideas and details from a reading and/or listening text and to impart analytical approach to solve the problem.
- To discover the importance of follow-up and to become aware of Interview preparation resources and to impart the basic formulaic knowledge that are relatable to real time scenarios.

UNIT I **6**

APTITUDE

Probability – Concepts and Formulae – Different Types of Problems in Probability

COMMUNICATION

Group discussion – Interpreting and Inferring visual

UNIT II **6**

APTITUDE

Seating arrangements – Linear – Circular – Square/Rectangular – Combination of Linear, Circular, Square

COMMUNICATION

Essay writing – Mechanics of writing

UNIT III **6**

APTITUDE

Permutation & Combination – Concepts and Formulae – Difference between Permutation and Combination – Problems on Permutation – Problems on Combination

COMMUNICATION

Job application: Cover letter, Resume, CV

UNIT IV **6**

APTITUDE

Syllogism – Rules and Tricks – Problems on syllogism

COMMUNICATION

Extempore - Add it up (listening) / MCQ - Summarize written text

UNIT V **6**

APTITUDE

Alligation & Mixtures – Concepts and Alligation Rule – Applications of Alligation rule – Problems on Alligation & mixtures

COMMUNICATION

Interview skills: General instructions, Review of interview questions – Mock Interview (Both virtual and offline – Role play)

TOTAL : 30 PERIODS

TEXT BOOK:

1. Quantitative Aptitude for Competitive Examination-IV Edition by Dinesh Khattar
2. Quantitative Aptitude by S.Chand and Dr.R.S.Aggarwal
3. Objective English – VII Edition by Edgar Thorpe and Showick Thorpe

REFERENCES:

1. https://www.pteexampreparation.com/about/
2. https://www.groupdiscussionideas.com/top-gd-topics-of-2021/
3. https://career.guru99.com/how-to-answer-50-most-common-interview-questions/
4. https://www.thebalancecareers.com/how-to-write-a-job-application-letter-2061569#
5. https://prepinsta.com/wipro-essay-writing-topics-sections/

COURSE OUTCOMES:

1. Students will be able to participate confidently in Group discussion and will be able to apply probabilistic reasoning to draw conclusions, make decisions,
2. Students will be able to understand the purpose and strategies involved in writing and will be proficient in logical aspects.
3. Students will be able to write professional documents (resume, cover letter, thank you letter) to use for jobs, internships and post graduate program applications and to strengthen them in evaluating the outcomes of decision.
4. Learners can paraphrase and summarize what they hear and/or read and can impart their analytical approach in problem solving.
5. Students can face job interview in an optimistic approach and be successful in it and they can relate their formulaic knowledge in real life scenarios.

K. RAMAKRISHNAN COLLEGE OF ENGINEERING

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(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

REGULATION 2020

Semester VI

UCS1601	DATA WAREHOUSING AND DATA MINING	L	T	P	C
		3	1	0	4

OBJECTIVES:

- To understand the concepts of data warehouse and mining.
- To understand data mining and the process of data preprocessing.
- To access frequent item sets and perform classification.
- To understand the basic partitioning and clustering methods.
- To explore and learn WEKA tool.

UNIT I INTRODUCTION 12

Data mining – data warehousing – data warehouse models – metadata – data cube: a multidimensional data model – schemas for multidimensional data model – dimensions – measures – OLAP: types of OLAP – ROLAP, MOLAP, HOLAP.

UNIT II DATA MINING 12

Data Mining Functionalities – issues – applications – data objects and attribute types – Data Preprocessing: An Overview – Data Cleaning – Data Integration – Data Reduction – Data Transformation.

UNIT III ASSOCIATION RULE AND CLASSIFICATION 12

Association Rule Mining: Basic Concepts – Frequent Itemset Mining Methods- Finding Frequent Itemsets by Confined Candidate Generation – Finding Frequent Itemsets without Candidate Generation – Classification: Basic Concepts – Decision Tree Induction – Bayes Classification Methods – Rule Based Classification.

UNIT IV CLUSTER ANALYSIS 12

Basic Concepts – Requirements for Cluster Analysis – Overview of Basic Clustering Methods – Partitioning Methods – Hierarchical Based Clustering – Density Based Methods –evaluation – cluster constraints – outlier analysis.

UNIT V WEKA TOOL AND APPICATIONS OF DATA MINING 12

Datasets – Introduction, Iris plants database, Breast cancer database, Auto imports database – data preprocessing – Introduction to WEKA, The Explorer – Getting started, Exploring the explorer, Learning algorithms, Clustering algorithms, Association–rule learners – attribute selection – application: text mining – multimedia mining.

TOTAL : 60 PERIODS

TEXT BOOK:

1. Jiawei Han and Micheline Kamber, “Data Mining Concepts and Techniques”, 3rd Edition, Elsevier, Reprinted 2012.

REFERENCES:

1. Alex Berson and Stephen J. Smith, “Data Warehousing, Data Mining & OLAP”, Tata McGraw – Hill Edition, 27th Reprint 2013.
2. Panging Tan, Michael Steinbach and Vipin Kumar, “Introduction To Data Mining”, Pearson Education, 2016.
3. Ian Witten, Eibe Frank, Mark Hall, Christopher Pal, “Data Mining: Practical Machine Learning Tools and Techniques”, Elsevier, 4th Edition, 2016.
4. K.P. Soman, Shyam Diwakar and V. Ajay, “Insight into Data Mining Theory and Practice”, Eastern Economy Edition, Prentice Hall of India, 2006.

COURSE OUTCOMES:

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

1. Demonstrate the concepts of data warehouse and mining.
2. Experiment with data mining and data preprocessing.
3. Organize frequent itemsets and perform classification.
4. Outline the basic partitioning and clustering analysis.
5. Interpret and learn WEKA tool along with its applications.

ONLINE REFERENCES:

1. NPTEL – Data Mining
2. Coursera – Data Mining Specialization
3. Udemy – Learn Machine learning with Weka

UCS1602 COMPILER DESIGN

L	T	P	C
3	1	0	4

OBJECTIVES:

- To learn the design principles of a compiler
- To learn to choose the different types of parsers for a given grammar.
- To learn to design a scanner and parser with LEX-YACC tools
- To identify the syntax directed translation methods for programming constructs
- To learn to how to optimize and effectively generate target machine code.

UNIT I INTRODUCTION TO COMPILERS 12

Translator –Types – Compiler – Types – Language Processing System – Analysis – Synthesis model of compilation – The Phases of Compiler – Errors Encountered in Different Phases – The Grouping of Phases – Compiler Construction Tools – Passes and Phases. Need and Role of Lexical Analyzer – Input buffering – Specification of tokens – Recognition of tokens – Regular Expressions – Regular Expression to DFA – Minimization of DFA – Language for Specifying Lexical Analyzers – LEX.

UNIT II SYNTAX ANALYSIS 12

Syntax Analysis – The role of the parser – Context – free grammars –Top down parsing – Recursive Descent Parser Predictive Parser – LL(1) Parser – Bottom-up Parsing – LR parsers – LR(k) Item – Shift Reduce Parser – LR Parser – LR (0)Item – Construction of SLR Parsing Table – CLR Parser – LR(1) Item – LALR Parser – Error Handling in Syntax Analyzer – YACC – Design of a syntax Analyzer for a Sample Language.

UNIT III INTERMEDIATE CODE GENERATION 12

Intermediate languages – Declarations – Assignment statements – Boolean expressions. Case statements – Backpatching – Procedure calls.

UNIT IV CODE OPTIMIZATION 12

Introduction – The principle sources of optimization – Peephole optimization – Optimization of basic blocks – Loops in flow graphs – Introduction to global dataflow analysis – Code improving transformations.

UNIT V CODE GENERATION 12

Issues in the design of a code generator – The target machine – Run-time storage management – Basic blocks and flow graphs – Next-use information – A simple code generator – Register allocation and assignment – The DAG representation of basic blocks – Generating code from DAG.

TOTAL : 60 PERIODS

TEXT BOOK(S):

1. Alfred V. Aho, Ravi Sethi Jeffrey D. Ullman, “Compilers- Principles, Techniques, and Tools”, Pearson Education Asia, 2007

REFERENCES:

1. David Galles, "Modern Compiler Design", Pearson Education Asia, 2007
2. Steven S. Muchnick, "Advanced Compiler Design & Implementation", Morgan Kaufmann Publishers, Reprint 2003.
3. C. N. Fisher and R. J. LeBlanc "Crafting a Compiler with C", Pearson Education, 2008.
4. Keith D Cooper and Linda Torczon, "Engineering a Compiler", Morgan Kaufmann Publishers Elsevier Science, 2004.

COURSE OUTCOMES:

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

1. Analyze all the phases of compiler.
2. Apply different parsing algorithms to construct different parser.
3. Experiment with back patching.
4. Summarize the data flow analysis
5. Model DAG representation of basic blocks.

ONLINE REFERENCES:

1. https://onlinecourses.nptel.ac.in/noc22_cs14/preview
2. https://www.tutorialspoint.com/compiler_design/index.htm
3. https://www.youtube.com/watch?v=Qkwj65l_96I

UCS1603 OBJECT ORIENTED ANALYSIS AND DESIGN

L	T	P	C
3	0	0	3

OBJECTIVES:

- To know the fundamental concepts of object oriented analysis and design.
- To explore tools and practices for working with object oriented analysis and design.
- To explore the use of UML design diagrams.
- To apply appropriate design patterns.
- To improve the software quality using software quality assurance techniques.

UNIT I INTRODUCTION 9

Introduction – OOAD – Two Orthogonal Views of the Software – Why object orientation – Object basics – Object oriented systems development life cycle.

UNIT II OBJECT ORIENTED METHODOLOGIES 9

Rumbaugh methodology − Booch methodology − Jacobson methodology − Patterns – GRASP - Frameworks – Unified approach − Unified modeling language – UML Diagrams: Use case diagram − Class diagram − Interaction diagram – Activity diagram.

UNIT III OBJECT ORIENTED ANALYSIS 9

Identifying use cases – Identifying Tentative classes – Identifying Classes and their Behaviors using SCM – Identifying object relationships – Attributes and methods

UNIT IV OBJECT ORIENTED DESIGN 9

Design axioms – Designing classes – Object storage – Introduction – Object store and persistence overview – Database Management Systems – Case Study: Traffic Management, Weather Monitoring Station, Vacation Tracking System.

UNIT V SOFTWARE QUALITY AND USABILITY 9

Introduction to SQA – Quality Assurance Tests – Testing Strategies – Impact of object orientation on Testing – Test cases – Test Plan – System usability and measuring user satisfaction.

TOTAL : 45 PERIODS

TEXT BOOK:

1. Ali Bahrami, “Object Oriented Systems Development”, McGraw Hill Education, Indian Edition, 2004.
2. Martin Fowler, “UML Distilled“, 2nd Edition, Prentice Hall of India / Pearson Education, 2002.

REFERENCES:

1. Stephen R. Schach, “Introduction to Object Oriented Analysis and Design”, Tata McGraw - Hill, 2003.
2. James Rumbaugh, Ivar Jacobson and Grady Booch,” The Unified Modeling Language Reference Manual”, Addison Wesley, 1999.

3. Hans – Erik Eriksson, Magnus Penker, Brain Lyons and David Fado, "UML Toolkit", OMG Press Wiley Publishing Inc., 2004.
4. Barclay, "Object-Oriented Design with UML and Java", Elsevier, 2008.

COURSE OUTCOMES:

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

1. Illustrate the basics of object oriented system development concepts.
2. Apply conventional frameworks and data modelling concepts for designing software.
3. Identify attributes, objects to define relationships using decision support models for software design.
4. Utilize object oriented design principles to design software.
5. Use software quality assurance techniques to improve the software quality.

ONLINE REFERENCES:

1. NPTEL - Object Oriented System Development using UML, Java and Patterns
2. Coursera - Object-Oriented Design

UCS1604	MACHINE LEARNING	L	T	P	C
		3	1	0	4

OBJECTIVES:

- To recognize definition, goals and applications of Machine Learning techniques.
- To understand the concepts of Descriptive Statistics.
- To study the various supervised algorithms and its applications in machine learning.
- To study the various algorithms and its applications in unsupervised algorithm.
- To understand the latest trends in machine learning and the fundamentals of Neural Networks and genetic algorithms.
-

UNIT I INTRODUCTION 12

Definition – Goals and Machine learning – Types of Learning – Supervised, Unsupervised and supervised – Learning System – Training Data – Concept Representation – Training Vs Testing – Characteristics of ML tasks – Descriptive, Predictive and Prescriptive Tasks.

UNIT II DESCRIPTIVE STATISTICS 12

Central Tendency, Mean, Median, Mode – Dispersion Measures – Standard Deviation ,Variance – Measures of Shape – Skewness, kurtosis, Percentile, Five number summary – Data Visualization : Box plot, Histogram, Bar Chart, Pie Chart, Scatter plot – Association Analysis: Covariance, Correlation – Correlation Types : Pearson, Spearman, Kendall – Two way tables, Chi-squared Test.

UNIT III SUPERVISED LEARNING 12

Supervised Learning: Regression – Simple Linear Regression – Multiple Linear Regression – Logistic Regression – Classification – Decision Tree, SVM, K-Nearest Neighbour - Applications of Supervised Learning.

UNIT IV UNSUPERVISED LEARNING 12

Clustering – Distance Measure – Clustering Methods – Partitioning Methods: K-means – K-Medoids – Hierarchical Methods: Agglomerative and Divisive clustering – BIRCH – Density based method: DBSCAN – Grid based clustering: STING – CLIQUE – Cluster Tendency Assessment – Applications of Unsupervised Learning.

UNIT V NEURAL NETWORKS AND GENETIC ALGORITHMS 12

Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evaluation and Learning.

TOTAL : 60 PERIODS

TEXT BOOK(S):

1. Tom M. Mitchell, “Machine Learning”, McGraw-Hill Education (India) Private Limited, 2013.

REFERENCES:

1. Ethem Alpaydin, "Introduction to Machine Learning (Adaptive Computation and Machine Learning)", The MIT Press 2004.
2. Stephen Marsland, "Machine Learning: An Algorithmic Perspective", CRC Press, 2009.

COURSE OUTCOMES:

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

1. Compare supervised, unsupervised, semi-supervised machine learning approaches.
2. Demonstrate various terminologies of Descriptive Statistics.
3. Describe various supervised learning algorithm in real-world problems.
4. Discuss various unsupervised learning algorithm in real time applications.
5. Model back propagation algorithm and genetic algorithms to various problems.

ONLINE REFERENCES:

1. NPTEL – Introduction to Machine Learning
2. Coursera - Supervised Machine Learning: Regression and Classification

UCS1611	DATA MINING LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

- To perform statistical analysis using R language.
- To understand WEKA tool in detail.
- To implement association mining algorithms.
- To perform data clustering using partitioning and hierarchical algorithms.
- To analyze datasets using RapidMiner tool and KNIME tool.

LIST OF EXERCISES:

1. Statistical Analysis using R.
2. Study on WEKA tool.
3. Association Mining Algorithms.
4. Data Classification Algorithms.
5. Data Prediction Algorithms.
6. Data Clustering using Partitioning Algorithms.
7. Data Clustering using Hierarchical Algorithms.
8. Web Page Ranking Algorithms.
9. Text Mining Algorithms.
10. Analysis of benchmark datasets using RapidMiner Tool, KNIME Tool.

TOTAL : 60 PERIODS

PLATFORM NEEDED:

Standalone desktops with R language 30 Nos.

COURSE OUTCOMES:

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

1. Perform statistical analysis using R language.
2. Analyze WEKA tool in detail.
3. Implement the association mining algorithms.
4. Analyze data clustering using partitioning and hierarchical algorithms.
5. Analyze datasets using RapidMiner tool and KNIME tool.

ONLINE REFERENCES:

1. Coursera – Text Mining and Analytics
2. Coursera – Data Visualization
3. NPTEL – Introduction to R Software

UCS1612	COMPILER DESIGN LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

- To write test and debug simple compiler writing tools.
- To implement the different phases of compiler.
- To analyze the data flow and the control flow of a program.
- To study simple optimization techniques.
- To use assembly language program like a source language program.

LIST OF EXERCISES:

1. Implement symbol table.
2. Develop a lexical analyzer to recognize a few patterns in C. (Ex. identifiers, constants, comments, operators etc.). Create a symbol table, while recognizing identifiers.
3. Implement a Lexical Analyzer using LEX Tool
4. Generate YACC specification for a few syntactic categories.
   a) Program to recognize a valid arithmetic expression that uses operator +, - , * and /.
   b) Implementation of Calculator using LEX and YACC.
5. Implement an Arithmetic Calculator using LEX and YACC.
6. Generate three address code for a simple program using LEX and YACC.
7. Convert the BNF rules into YACC form and write code to generate Abstract Syntax Tree.
8. Implement control flow analysis and Data flow Analysis
9. Implement any one storage allocation strategies (Heap,Stack,Static)
10. Implement the back end of the compiler which takes the three address code and produces the 8086 assembly language instructions that can be assembled and run using a 8086 assembler. The target assembly instructions can be simple move, add, sub, jump. Also simple addressing modes are used.
11. Implement simple code optimization techniques (Constant folding, Strength reduction and Algebraic transformation)

TOTAL : 60 PERIODS

PLATFORM NEEDED:

Standalone desktops with LEX/YACC 30 Nos.

COURSE OUTCOMES:

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

1. Implement compiler using tools.
2. Analyze the control flow and data flow of a program.
3. Optimize a problem.
4. Implement storage allocation strategies.
5. Utilize assembly language like any other source language.

ONLINE REFERENCES:

1. NPTEL – Principles of Compiler Design
2. NPTEL - Linux Basics-I

UCS1613	OBJECT ORIENTED ANALYSIS AND DESIGN LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

- To capture the requirements specification for an intended software system.
- To draw UML diagrams for the given specification.
- To test the software system thoroughly for all scenarios.
- To map the design properly to code.
- To improve the design by applying appropriate design patterns.

LIST OF EXERCISES:

Draw standard UML diagrams using an UML modeling tool for a given case study and map design to code and implement a 3 layered architecture. Test the developed code and validate whether the SRS is satisfied.

1. Identify a software system that needs to be developed.
2. Document the Software Requirements Specification (SRS) for the identified system.
3. Identify use cases and develop the Use Case model.
4. Identify the conceptual classes and develop a Domain Model and also derive a Class Diagram from that.
5. Using the identified scenarios, find the interaction between objects and represent them using UML Sequence and Collaboration Diagrams.
6. Draw relevant State Chart and Activity Diagrams for the same system.
7. Implement the system as per the detailed design.
8. Test the software system for all the scenarios identified as per the usecase diagram.
9. Improve the reusability and maintainability of the software system by applying appropriate design patterns.
10. Implement the modified system and test it for various scenarios.

SUGGESTED DOMAINS FOR MINI-PROJECT:

1. Online quiz.
2. Train reservation system.
3. E-voting system.
4. Online payment system.
5. Library management system.
6. Conference management system.
7. Online course reservation system.
8. Online shopping system.
9. Online gaming system.
10. Online exam registration.

TOTAL : 60 PERIODS

PLATFORM NEEDED:

Standalone desktops with ArgoUML that supports UML 1.4 or higher, selenium, JUnit or Apache JMeter. (30nos.)

COURSE OUTCOMES:

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

1. Perform object oriented analysis and design for a given problem specification
2. Utilize UML mapping to identify and map basic software requirements.
3. Apply specific design patterns to improve the software quality.
4. Develop state chart and activity diagram for real time examples.
5. Test the compliance using SRS.

ONLINE REFERENCES:

1. NPTEL - Object Oriented System Development using UML, Java and Patterns
2. COURSERA – Software Design and Architecture Specialization

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REGULATION 2020

Semester VII

UCS1701	CLOUD COMPUTING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand cloud computing.
- To understand the evolution of cloud computing.
- To know the applications of cloud computing.
- To understand the emergence of cloud computing.
- To be exposed to the security and its challenges in cloud computing.

UNIT I INTRODUCTION 9

Introduction to Cloud Computing – Definition of Cloud – Evolution of Cloud Computing – Underlying Principles of Parallel and Distributed Computing – Cloud Characteristics – Elasticity in Cloud – On-demand Provisioning.

UNIT II CLOUD ENABLING TECHNOLOGIES 9

Broadband networks and internet architecture – Service Oriented Architecture – REST and Systems of Systems – Web Services – Publish-Subscribe Model – Basics of Virtualization – Types of Virtualization – Implementation Levels of Virtualization – Virtualization Structures – Tools and Mechanisms – Virtualization of CPU – Memory – I/O Devices –Virtualization Support and Disaster Recovery.

UNIT III CLOUD ARCHITECTURE, SERVICES AND STORAGE 9

Layered Cloud Architecture Design – NIST Cloud Computing Reference Architecture – Public, Private and Hybrid Clouds - laaS – PaaS – SaaS – Architectural Design Challenges – Cloud Storage – Storage-as-a-Service – Advantages of Cloud Storage – Cloud Storage Providers – S3, cost metrics: Business Cost Metrics, Cloud Usage Cost Metrics, Cost Management Considerations

UNIT IV RESOURCE MANAGEMENT AND SECURITY IN CLOUD 9

Inter Cloud Resource Management – Resource Provisioning and Resource Provisioning Methods – Global Exchange of Cloud Resources – Security Overview – Cloud Security Challenges – Software-as-a-Service Security – Security Governance – Virtual Machine Security – IAM – Security Standards.

UNIT V CLOUD TECHNOLOGIES AND ADVANCEMENTS 9

Hadoop – MapReduce – Virtual Box -- Google App Engine – Programming Environment for Google App Engine — Open Stack – Federation in the Cloud – Four Levels of Federation – Federated Services and Applications – Future of Federation – fundamental cloud security – cloud security mechanisms.

TOTAL : 45 PERIODS

TEXT BOOK(S):

1. Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
2. Rittinghouse, John W., and James F. Ransome, “Cloud Computing: Implementation, Management and Security:, CRC Press, 2017.

REFERENCES:

1. Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi, “Mastering Cloud Computing”, Tata Mcgraw Hill, 2013.
2. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing - A Practical Approach”, Tata Mcgraw Hill, 2009.
3. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud: Transactional Systems for EC2 and Beyond (Theory in Practice)”, O'Reilly, 2009.
4. Ian Lim, E. Coleen Coolidge, Paul Hourani, "Securing Cloud and Mobility: A Practitioner's Guide", CRC Press, 2013.
5. William (Chuck) Easttom, “Computer Security Fundamentals”, Pearson Education, First edition, 2011.

COURSE OUTCOMES:

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

1. Understand the main concepts, key technologies, strengths and limitations of cloud.
2. Learn the key technologies that help in developing cloud.
3. Use the architecture of compute and store cloud, service and delivery modes.
4. Handling the issue of resource management and security.
5. Familiarize current cloud technologies and choose the correct technology and algorithm for implementing the cloud.

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ONLINE REFERENCES:

1. NPTEL: Cloud Computing
2. NPTEL: Cloud computing and distributed systems.
3. Coursera: Introduction to cloud computing.

UCS1702	COMPUTER GRAPHICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To develop an understanding and awareness how computer graphics form effective and compelling interactive experiences for a wide range of audiences and end users.
- To understand the importance of technical ability and creativity within design practice.
- To gain knowledge about hardware devices and software used in implementing multi-media.
- To understand the two-dimensional and three-dimensional graphics and their transformations.
- To understand the different file formats.

UNIT I INTRODUCTION 9

Application Areas of Computer Graphics – Overview of Graphics Systems – Video Display Devices – Raster Scan Systems – Random Scan Systems – Graphics Monitors and Workstation – Input Devices – light sources – basic illumination model – RGB color model – Output Primitives: Points and Lines – Line Drawing Algorithms – Mid-Point Circle and Ellipse Algorithms – Attributes of Output Primitives.

UNIT II TWO DIMENSIONAL CONCEPTS 9

Two-Dimensional Geometric Transformations – matrix representation and homogeneous coordinates – Two-Dimensional Viewing – Two-Dimensional Point and Line Clipping – Sutherland-Hodgernan Polygon Clipping – Weiler-Atherton Polygon Clipping – Text Clipping – Exterior Clipping – clipping operations.

UNIT III THREE DIMENSIONAL CONCEPTS 9

Three-Dimensional Display Methods – Three-Dimensional Object Representations – curved lines and surfaces – spline representations – Three-Dimensional Geometric and Modeling Transformations – Three-Dimensional Viewing and Clipping.

UNIT IV MULTIMEDIA SYSTEM DESIGN & FILE HANDLING 9

Multimedia basics − Multimedia applications − Multimedia system architecture − Evolving technologies for multimedia − Defining objects for multimedia systems − Multimedia data interface standards − Multimedia databases. Compression and decompression − Data and fileformat standards − Multimedia I/O technologies − Digital voice and audio − Video image and animation − Full motion video − Storage and retrieval technologies.

UNIT V HYPERMEDIA 9

Multimedia authoring and user interface – Hypermedia messaging – Mobile messaging − Hypermedia message component − Creating hypermedia message − Integrated multimedia message standards − Integrated document management − Distributed multimedia systems. CASE STUDY: BLENDER GRAPHICS Blender Fundamentals – Drawing Basic Shapes – Modelling – Shading & Textures.

TOTAL : 45 PERIODS

TEXT BOOK:

1. Donald Hearn and Pauline Baker M, “Computer Graphics C Version”, Pearson Education, Second Edition, Asia, 2011.
2. Andleigh,P.Kand KiranThakrar,“Multimedia Systemsand Design”, PHI,2003.

REFERENCES:

1. Foley, Vandam, Feiner and Huges, “Computer Graphics: Principles & Practice”, Pearson Education, Asia, Third edition, 2013.
2. Zhigand Xiang and Roy Plastock, “Schaum‘s outlines of Computer Graphics”, Tata McGraw Hill, USA, 2000.
3. David F Rogers, “Procedural elements for Computer Graphics”, Tata McGraw Hill, USA, Second Edition, 2000.
4. Samit Bhattacharya, "Computer Graphics*”,* 2015. Oxford University Press, ISBN13: 978-0-19-809619 -1.
5. Peter Shirley, Michael Ashikhmin and Steve Marschner, "Fundamentals of Computer Graphics", 3rd Edition, 2009, ISBN13: 9781568814698.

COURSE OUTCOMES:

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

1. Understand the basics of computer graphics.
2. Design two-dimensional graphics and apply two dimensional transformations.
3. Design three-dimensional graphics and apply three dimensional transformations.
4. Handle multimedia and file formats.
5. Analyse different hypermedia file formats.

ONLINE REFERENCES:

1. NPTEL: Computer Graphics
2. NPTEL: Introduction to computer graphics
3. Coursera: Interactive computer graphics.

UCS1703 **DATA VISUALIZATION**

L	T	P	C
3	0	0	3

OBJECTIVES:

- To learn about different Visualization Techniques.
- To study the Interaction techniques in information visualization fields.
- To understand Various abstraction mechanisms.
- To create textual methods of abstraction.
- To create interactive visual interfaces.

UNIT I INTRODUCTION 9

Introduction to Visualization – Visualization stages – Experimental Semiotics based on Perception – Gibson's Affordance theory – A Model of Perceptual Processing – Cost and Benefits of Visualization – Types of Data

UNIT II COMPUTER VISUALIZATION 9

Non-Computer Visualization – Computer Visualization: Exploring Complex Information Spaces – Fisheye Views – Applications – Comprehensible Fisheye views – Fisheye views for 3D data – Non-Linear Magnification – Comparing Visualization of Information Spaces – Abstraction in computer Graphics – Abstraction in user interfaces

UNIT III MULTIDIMENSIONAL VISUALIZATION 9

1D, 2D, 3D – Multiple Dimensions – Trees – Web Works – Data Mapping: Document Visualization – Workspaces

UNIT IV TEXTUAL METHODS OF ABSTRACTION 9

From Graphics to Pure Text – Figure Captions in Visual Interfaces – Interactive 3D illustrations with images and text – Images and their textual labels - Data visualization tools: Google Charts, FusionCharts and DataWrapper.

UNIT V ABSTRACTION IN TIME AND INTERACTIVE SYSTEMS 9

Animation Non-Photorealistic Computer Graphics – Interaction Facilities and High-Level Support for Animation Design – Zoom Navigation in User Interfaces – Animation design for Simulation – Case studies: Geographic visualizations – spies in the sky – Uber: data-driven Maps – A person's diet chart.

TOTAL: 45 PERIODS

TEXTBOOK:

1. Colin Ware, "Information Visualization Perception for Design", edition 3, Morgan Kaufmannn, 2012.
3. Thomas Strothotte, "Computer Visualization–Graphics Abstraction and Interactivity", Springer Verlag Berlin Heidelberg.

REFERENCES:

1. Chaomei Chen, "Information Visualization", Beyond the horizon, second edition, Springer Verlag, 2006.

COURSE OUTCOMES:

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

1. Explain the basics of data visualization and principle of perception.
2. Understand the concept of computer visualization.

3. Make use of various multidimensional visualization techniques in real time system.
4. Summarize the basics of textual methods.
5. Extend the animation design for the real time systems.

ONLINE REFERENCES:

1. NPTEL: Introduction To Learning Analytics.
2. Youtube: Data Visualization Part I
3. Coursera: Data Visualization with Python.

UCS1704 HUMAN COMPUTER INTERACTION

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the basics of Human Computer Interaction.
- To design and evaluate technologies for individuals and persons with disabilities.
- To be aware of mobile HCI.
- To learn the guidelines for user interface.
- To design and evaluate interactive systems.

UNIT I FOUNDATIONS OF HCI **9**

Evolution of HCI – HCI in usability engineering – The Human: I/O channels – Memory – Reasoning and problem solving; the human characteristics – The Computer: Devices – Memory – processing and networks; Interaction: Models – frameworks – Ergonomics – styles – elements – interactivity – Paradigms – impact – Case Studies.

UNIT II DESIGN & SOFTWARE PROCESS **9**

Interactive Design: Basics – design rationale – rules – process – scenarios – navigation – screen design – Iteration and prototyping – HCI in software process: Software life cycle – usability engineering – Prototyping in practice – design rationale – Design rules: principles – standards - guidelines – rules – Shneiderman's eight golden rules – Evaluation Techniques – Universal Design

UNIT III MODELS AND THEORIES **9**

HCI Models: Cognitive models – hierarchical model – linguistic model – physical and device models – Socio-Organizational issues and stakeholder requirements – Communication and collaboration models – task models – iterative design principles – Hypertext – Multimedia and WWW – Case study: design an interface for an online banking system.

UNIT IV MOBILE HCI **9**

Mobile Ecosystem: Platforms, Application frameworks- Types of Mobile Applications: Widgets, Applications, Games- Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools. – Case study: design a chat application in mobile.

UNIT V WEB INTERFACE DESIGN **9**

Designing Web Interfaces – Nielsen's Ten heuristic principle for evaluation – expert analysis – Drag & Drop – Direct Selection – Contextual Tools – Overlays – Inlays and Virtual Pages – Process Flow – Case Study: Evaluate interface of a chat application in a mobile.

TOTAL : 45 PERIODS

TEXT BOOK(S):

1. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, "Human Computer Interaction", 3rd Edition, Pearson Education, 2004.
2. Brian Fling, "Mobile Design and Development", First Edition, O'Reilly Media Inc., 2009.
3. Bill Scott and Theresa Neil, "Designing Web Interfaces", First Edition, O'Reilly, 2009.

REFERENCES:

1. Mullet, Kevin, and Darrell Sano, "Designing Visual Interfaces: Communication Oriented Techniques", Prentice Hall, 1994.
2. John M. Carroll, "Human- Computer Interaction in the New Millennium", Pearson Education, ACM Press, 2002.

COURSE OUTCOMES:

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

1. Design effective foundations of HCI.
2. Analyze HCI in software process.
3. Interpret the interface for HCI.
4. Describe the HCI mobile applications.
5. Design a meaningful web interface.

ONLINE REFERENCES:

NPTEL: Introduction to Human Computer Interaction.
Coursera: Human-centered design: an introduction.

UCS1711	CLOUD COMPUTING LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

- To install the virtual box/VMware.
- To develop web applications in cloud.
- To learn the design and development process involved in creating a cloud-based application.
- To transfer files from one virtual machine to another.
- To learn to implement and use parallel programming using Hadoop.

LIST OF EXERCISES:

1. Install Virtualbox/VMware Workstation with different flavours of linux or windows OS on top of windows7 or 8.
2. Install a C compiler in the virtual machine created using virtual box and execute Simple Programs
3. Install Google App Engine. Create *hello world* app and other simple web applications using python/java.
4. Use GAE launcher to launch the web applications.
5. Simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim.
6. Find a procedure to transfer the files from one virtual machine to another virtual machine.
7. Find a procedure to launch virtual machine using trystack (Online Openstack Demo Version)
8. Install Hadoop single node cluster and run simple applications like wordcount

TOTAL: 60 PERIODS

PLATFORM NEEDED:

Standalone desktops with Hadoop. (30nos.)

COURSE OUTCOMES:

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

1. Configure various virtualization tools.
2. Design and deploy a web application.
3. Install and use a generic cloud environment to use new schedulers.
4. Simulate a cloud environment to implement new schedulers.
5. Manipulate large datasets.

ONLINE REFERENCES:

1. NPTEL: Cloud Computing
2. NPTEL: Cloud computing and distributed systems.
3. Coursera: Introduction to cloud computing.

UCS1712	COMPUTER GRAPHICS LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

- Implement the shapes along with attributes using Bresenhams Algorithm.
- Build basic transformations used to reposition and resize the two-dimensional objects and compare it.
- Perform the line clipping and polygon clipping algorithm of Cohen Sutherland.
- Build basic conventions for object transformations in 3D including Translation, Rotation, Scaling and compare it.
- Generate 3D scenes and Fractal images

LIST OF EXERCISES:

1. Implementation of Bresenhams Algorithm – Line, Square, rectangle, Circle.
2. Implementation of Line, Circle and ellipse Attributes
3. Two Dimensional transformations – Translation, Rotation, Scaling, Reflection, Shear.
4. Composite 2D Transformations.
5. Cohen Sutherland 2D line clipping and Windowing.
6. Sutherland – Hodgeman Polygon clipping Algorithm.
7. Three dimensional transformations – Translation, Rotation, Scaling.
8. Composite 3D transformations.
9. Drawing three dimensional objects and Scenes.
10. Generating Fractal images.

TOTAL: 60 PERIODS

PLATFORM NEEDED:

Standalone desktops with Hadoop. (30nos.)

COURSE OUTCOMES:

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

1. Implement the shapes along with attributes using Bresenhams Algorithm.
2. Build basic transformations used to reposition and resize the two-dimensional objects and compare it.
3. Perform the line clipping and polygon clipping algorithm of Cohen Sutherland.
4. Build basic conventions for object transformations in 3D including Translation, Rotation, Scaling and compare it.
5. Generate 3D scenes and Fractal images.

ONLINE REFERENCES :

1. NPTEL: Computer Graphics
2. NPTEL: Introduction to computer graphics
3. Coursera: Interactive computer graphics.

K. RAMAKRISHNAN COLLEGE OF ENGINEERING

TIRUCHIRAPPALLI

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

REGULATION 2020

Semester VIII

UCS1811	**PROJECT WORK**	**L**	**T**	**P**	**C**
		0	**0**	**12**	**6**

OBJECTIVES:

- To apply the knowledge in engineering to complex problems.
- To investigate and provide valid conclusions.
- To create modern tools and apply appropriate techniques with an understanding of limitations.
- To understand the impact of engineering solutions in the environment.
- To develop independent and lifelong sustainable projects.

SUGGESTED DOMAINS:

1. Wireless sensor network.
2. Software Engineering.
3. Big data.
4. Image processing.
5. Edge computing.
6. Cloud computing.
7. IoT.
8. Cyber security.
9. Computer networks.
10. Bio-informatics.
11. Artificial Intelligence.
12. Robotics.
13. Virtual reality.
14. Computer vision.
15. Natural Language Processing.

*Additional domains may be included.

TOTAL: 180 PERIODS

COURSE OUTCOMES:

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

1. Apply the knowledge in engineering to complex problems.
2. Conduct investigations and provide valid conclusions.
3. Create modern tools and apply appropriate techniques with an understanding of limitations.
4. Understand the impact of engineering solutions in the environment.
5. Develop independent and lifelong sustainable projects.

UCS1001	NEURAL NETWORKS (Professional Elective I for semester V)	L 3	T 0	P 0	C 3

OBJECTIVES:

- To understand the basics of neural networks and its architecture.
- To understand the back propagation methods.
- To be aware of fuzzy logics.
- To learn the functions of fuzzy logic.
- To familiarize in genetic algorithms.

UNIT I INTRODUCTION 9

Introduction and Architecture – 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 Hetro – Associative Memory.

UNIT II ARCHITECTURE AND BACK PROPAGATION 9

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

UNIT III FUZZY LOGIC 9

Introduction – Basic Concepts of Fuzzy Logic – Fuzzy Sets and Crisp Sets – Fuzzy Set Theory and Operations – Properties of Fuzzy Sets – Fuzzy and Crisp Relations – Fuzzy to Crisp Conversion.

UNIT IV FUNCTIONS 9

Fuzzy Membership – Rules – Interference in Fuzzy Logic – Fuzzy If-Then Rules – Fuzzy Implications and Fuzzy Algorithms – Fuzzy Fications and Defuzzificataions – Fuzzy Controller – Industrial Applications.

UNIT V GENETIC ALGORITHM 9

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

TOTAL : 45 PERIODS

TEXT BOOK:

1. S. Rajasekar anand G.A. Vijayalakshmi Pai, “Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis and Applications”, Prentice Hall of India, 2003.
2. N.P.Padhy, “Artificial Intelligence and Intelligent Systems”, Oxford University Press, 2005.
3. J.S.R.Jang, C.T.Sun and E.Mizutani, “Neuro-Fuzzy and Soft Computing”, Pearson Education, 2004.

REFERENCES:

1. Siman Haykin, “Neural Networks”, Prentice Hall of India, 1999.

2. Timothy J. Ross, "Fuzzy Logic with Engineering Applications", Third Edition, Wiley India, 2010
3. S.Y.Kung, "Digital Neural Network", Prentice Hall International, 1993.
4. Aliev, R.A, Aliev, R.R, "Soft Computing and its Application", World Scientific Publishing Company, 2001.
5. Wulfram Gerstner, Wenner Kristler, "Spiking Neural Networks", Cambridge University Press.
6. Bart Kosko, "Neural Networks and Fuzzy Systems: Dynamical Systems Application to Machine Intelligence", Prentice Hall, 1992.

COURSE OUTCOMES:

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

1. Illustrate the basics of neural networks and its architecture.
2. Analyze the back propagation algorithm.
3. Explain the fuzzy logics.
4. Analyze the functions of fuzzy logic.
5. Discover the genetic algorithms.

ONLINE REFERENCES:

1. https://onlinecourses.nptel.ac.in/noc22_ge04/preview
2. https://www.tutorialspoint.com/artificial_neural_network/index.htm
3. https://www.javatpoint.com/artificial-neural-network
4. https://www.youtube.com/watch?v=ob1yS9g-Zcs

UCS1002	AGILE METHODOLOGIES (Professional Elective I for semester V)	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To practically understand the agile software development practices and applying them to create high-quality software.
- To provide a good understanding of software design and a set of software technologies and APIs.
- To do a detailed examination and demonstration of Agile development and testing techniques.
- To understand the benefits and pitfalls of working in an Agile team.
- To understand Agile development and testing.

UNIT I INTRODUCTION 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 REQUIREMENTS ENGINEERING 9

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

UNIT V AGILITY AND QUALITY ASSURANCE 9

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

TOTAL : 45 PERIODS

TEXT BOOK:

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 manager's Guide", Addison-Wesley, 2004.
2. Kevin C. Desouza, "Agile information systems: conceptualization, construction, and management", Butterworth-Heinemann, 2007.

COURSE OUTCOMES:

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

1. Understand the importance of agile project management.
2. Perform iterative software development processes: how to plan them, how to execute them.
3. Analyze the impact of agility and project management.
4. Develop techniques and tools for improving requirements.
5. Understand the importance of agile quality assurance.

ONLINE REFERENCES:

1. https://onlinecourses.nptel.ac.in/noc22_ge04/preview
2. http://neuralnetworksanddeeplearning.com/
3. https://www.xenonstack.com/blog/artificial-neural-network-applications

UCS1003	R LANGUAGE (Professional Elective I for semester V)	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the basics in R programming in terms of constructs, control statements and functions.
- To learn to apply R programming for Text and Image processing.
- To discuss the use of R in machine learning techniques.
- To appreciate and apply the R programming from a statistical perspective
- To analyze the P2P computing.

UNIT I INTRODUCTION 9

Introducing to R – R Installation – R Data Structures – Vectors – Scalars – Declarations – recycling – Common Vector operations – Using all and any – Vectorized operations – NA and NULL values – Filtering.

UNIT II VECTORS AND MATRICES 9

Vectorized if-then else – Vector Equality – Vector Element names Matrices, Arrays And Lists Creating matrices – Matrix operations – Applying Functions to Matrix Rows and Columns – Adding and deleting rows and columns – Vector/Matrix Distinction – Higher Dimensional arrays.

UNIT III LISTS AND FRAMES 9

Lists – Creating lists – General list operations – Accessing list components and values – applying functions to lists – recursive lists. Data Frames Creating Data Frames – Matrix -like operations in frames – Merging Data Frames – Applying functions to Data frames.

UNIT IV FACTORS AND TABLES 9

Factors and Tables – factors and levels – Common functions used with factors – Working with tables – Other factors and table related functions – Control statements – Arithmetic and Boolean operators and values – Default values for arguments – Returning Boolean values – functions are objects – Environment and Scope issues – Writing Upstairs – Recursion – Replacement functions – Tools for composing function code

UNIT V SIMULATION AND BASIC STATISTICS 9

Math and Simulations in R: Creating Graphs – Customizing Graphs – Saving graphs to files – Creating 3D plots. Interfacing: Interfacing R to other languages – Parallel R – Basic Statistics: Text – Image – Linear Model – Non - linear models – Time Series and Auto - correlation – Clustering – PCA – RDA.

TOTAL : 45 PERIODS

TEXT BOOK:

1. Norman Matloff, "The Art of R Programming: A Tour of Statistical Software Design", No Starch Press, 2011.
2. Jared P. Lander, "R for Everyone: Advanced Analytics and Graphics", Addison-Wesley Data Analytics Series, 2013.

REFERENCES:

1. Mark Gardener, "Beginning R – The Statistical Programming Language", Wiley, 2013.
2. Robert Knell, "Introductory R: A Beginner's Guide to Data Visualisation, Statistical

Analysis and Programming in R", Amazon Digital South Asia Services Inc, 2013.

COURSE OUTCOMES:

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

1. Illustrate the basics of R programming.
2. Select functions to matrix row and column.
3. Identify the list components.
4. Discover the factors and table related functions.
5. Survey on graph and linear models.

ONLINE REFERENCES:

1. https://www.tutorialspoint.com/r/index.htm
2. https://www.geeksforgeeks.org/r-programming-language-introduction/
3. https://www.youtube.com/watch?v=7NLPPFU0O3w

UEC1402	MICROPROCESSORS AND MICROCONTROLLERS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To apprehend the physical abstraction of 8086 microprocessor.
- To learn the design aspects of I/O, Memory Interfacing and with the supporting chips interfacing.
- To study the Architecture of 8051 microcontroller.
- To Illustrate the interrupts handling and demonstrate peripherals applications in C for the target 8051 board
- To demonstrate an application by accessing the peripherals in C programming of the target Galileo board

UNIT 1 INTRODUCTION AND ARCHITECTURE OF MICROPROCESSORS **9**

Evolution of Microprocessors-VonNeumann and Harvard Architectures -Concept of Pipelining - 8086 Architecture- Signal Description -Addressing Modes-Instruction set and Assembler Directives- Interrupts-Procedure and Macros.

UNIT II 8086 BUS STRUCTURE AND INTERFACING **9**

Bus operation, I/O Addressing, Modes of Operations- Memory Interfacing and I/O Interfacing - Parallel Communication Interface – Serial Communication Interface - Timer — keyboard and display controller-DMA Controller. Introduction to Mobile Processors: Apple A13 Bionic, Qualcomm Snapdragon 865, HiSilicon Kirin 990, Samsung Exynos 990, MediaTekHelio G90T, Intel Atom Z3580

UNIT III 8051 MICROCONTROLLER AND INTERFACING **9**

8051 Microcontroller Architecture- Special Function Registers(SFRS)- Port Structures - Instructions Sets and Addressing Modes- Memory Organization- Interrupts- Programming 8051 Timers- Serial Port Programming and Interrupt - LCD, Keyboard, ADC and DAC Interfacing.

UNIT IV 8051 PROGRAMMING IN C **9**

Cross Compiler C -Programming Structure, Data Types, Memory Models, Infinite Loops and Handling Interrupts in C. Intel Hex File Format. C-Programming for LED, LCD Display, Temperature Sensor with ADC, Measuring Pulse Width and Frequency.

UNIT V INTEL GALILEO - ARDUINO PROGRAMMING **9**

Galileo Board Overview - Arduino IDE, Sketch Programming and In-Built Libraries.Controlling DC Motor, Stepper Motor and Servo Motor - Acquisition of Temperature Data and Serial Communication - WI-FI and Blue Tooth Shield-Application in Internet of Things (IOT).

TOTAL : 45 PERIODS

TEXT BOOKS:

1. William Stallings "Computer Organization and architecture designing for Performance", 8th Edition, Prentice Hall, 2013
2. Muhammad Ali Mazidi, Janice Gillespie Mazidi, RolinD.Mckinlay , "The 8051 Microcontroller and Embedded systems Using Assembly and C", Second Edition, Pearson Education,2013
3. Matt Richardson, "Getting started with Intel Galileo", 2014
4. Microcomputer Systems: The 8086 / 8088 Family - Architecture, Programming and Design‖, Second Edition, Prentice Hall of India, 2007 Yu-Cheng Liu, Glenn A.Gibson, ―Microcomputer.

REFERENCES:

1. MunirBannoura, Rudan Bettelheim and Richard Soja, "ColdFire Microprocessors & Microcontrollers" –, AMT Publishing, 2005.
2. DoughlasV.Hall, ―Microprocessors and Interfacing, Programming and Hardware‖,TMH,2012
3. A.K.Ray,K.M.Bhurchandi, "Advanced Microprocessors and Peripherals" 3rd edition, Tata McGrawHill, 2012

COURSE OUTCOMES:

On completion of course students will be able to

1. Understand and execute programs based on 8086 microprocessor.
2. Understand the Concepts of Memory Interfacing and I/O circuits.
3. Design and implement 8051 microcontroller based system.
4. Design applications in 8051 microcontroller using C program.
5. Propose different design schemes using intel Galileo and Arduino.

HOD

PRINCIPAL

UAD1304	DATA ANALYTICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the basic principles of Data Analytics
- To apply classification and prediction algorithms on real-world datasets
- To learn the various Data Analytic methods
- To understand the various clustering algorithms and its application on data
- To work with stream data model and computing

UNIT I INTRODUCTION TO DATA ANALYTICS 9

Introduction to Data Analytics - Types of Data Analytics - Predictive Analytics - Simple linear regression - Multiple linear regression - Auto regression - Moving Average - Autoregressive Integrated Moving Average - Data Pre-processing - Data Cleaning - Data Integration and Transformation - Data Reduction - Descriptive data analytics - measures of central tendency - measures of location of dispersions.

UNIT II CLASSIFICATION AND PREDICTION 9

Classification and Prediction: Classification by Decision Tree Introduction – Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Lazy Learners – Other Classification Methods – Prediction – Accuracy and Error Measures – Evaluating the Accuracy of a Classifier or Predictor – Ensemble Methods – Model Section.

UNIT III ASSOCIATION AND CLUSTER ANALYSIS 9

Association Rule Mining: Efficient and Scalable Frequent Item set Mining Methods - Mining Various Kinds of Association Rules - Association Mining to Correlation Analysis - Constraint Based Association Mining - Cluster Analysis: Types of Data in Cluster Analysis - A Categorization of Major Clustering Methods - Partitioning Methods - Hierarchical methods.

UNIT IV STREAM COMPUTING 9

Introduction to Streams Concepts - Stream data model and architecture - Stream Computing - Sampling data in a stream - Filtering streams - Counting distinct elements in a stream - Estimating moments - Counting oneness in a window - Decaying window - Real Time Analytics Platform (RTAP) applications - case studies - real time sentiment analysis - stock market predictions.

UNIT V NOSQL DATABASES 9

NoSQL Databases - Schema-less Models - Increasing Flexibility for Data Manipulation - Key Value Stores - Document Stores - Tabular Stores - Object Data Stores - Graph Databases Hive-Sharding-Hbase - Analyzing big data with twitter - Big data for E-Commerce - Big data for blogs - Review of Basic Data Analytic Methods using R.

TOTAL : 45 PERIODS

TEXT BOOK:

1 Jiawei Han, MichelineKamber, Jian Pei, "Data Mining Concepts and Techniques", Third Edition, Elsevier, 2011.
2 A. Rajaraman, J. Ullman, "Mining Massive Data Sets", Cambridge University Press, 2012.
3 David Loshin, "Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, No SQL, and Graph", 2013.

REFERENCES:

1. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, "Probability & Statistics for Engineers & Scientists", Ninth Edition, Prentice Hall Inc.
2. Trevor Hastie, Robert Tibshirani, Jerome Friedman, "The Elements of Statistical Learning, Data Mining, Inference, and Prediction", Second Edition, Springer, 2014.
3. G James, D. Witten, T Hastie, R. Tibshirani, "An Introduction to Statistical Learning: With Applications in R", Springer, 2013.
4. Mohammed J. Zaki, Wagner Meira, "Data Mining and Analysis", Cambridge, 2012.
5. E. Alpaydin, "Introduction to Machine Learning", MIT Press, 2014.

COURSE OUTCOMES:

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

1. Evaluate the use of data from acquisition through cleaning, warehousing, analytics, and visualization to the ultimate business decision
2. Analyze real-world datasets with different classification and prediction algorithms.
3. Mine data and carry out predictive modeling and analytics to support business decision-making
4. Suggest prescriptive modeling techniques for real-world problems
5. Execute real-time analytical methods on streaming datasets to react quickly to customer needs

ONLINE REFERENCES:

1. http://myweb.sabanciuniv.edu/rdehkharghani/files/2016/02/The-Morgan-Kaufmann-Series-in-Data-Management-Systems-Jiawei-Han-Micheline-Kamber-Jian-Pei-Data-Mining.-Concepts-and-Techniques-3rd-Edition-Morgan-Kaufmann-2011.pdf
2. http://web.stanford.edu/class/cs246/index.html#content
3. http://infolab.stanford.edu/~ullman/mmds/book.pdf
4. http://digilib.stmik-banjarbaru.ac.id/data.bc/5.%20Computer%20Graphic/2013%20Big%20Data%20Analytics%20From%20Strategic%20Planning%20to%20Enterprise%20Integration%20with%20Tools%2C%20Techniques%2C%20NoSQL%2C%20and%20Graph.pdf
5. https://nptel.ac.in/courses/106/107/106107220/
6. https://www.ee.columbia.edu/~cylin/course/bigdata/EECS6893-BigDataAnalytics-Lecture4.pdf

UCS1004	FAULT TOLERANT COMPUTING (Professional Elective II for Semester VI)	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the key concepts in fault-tolerant computing.
- To understand the use of modern fault-tolerant hardware and software design.
- To use the design techniques based on information redundancy.
- To understand the reliability evaluation techniques.
- To perform fault tolerant computing using case study of space shuttle.

UNIT I INTRODUCTION 9

Fault models: faults – errors and Failures Causes and Characteristics of Faults Logical and Physical Faults Error Models – goals and applications of fault tolerant computing: reliability – Long Life – Critical Computation – High Availability Applications – Fault Tolerance as a Design Objective.

UNIT II DESIGN TECHNIQUES BASED ON HARDWARE REDUNDANCY 9

Hardware Redundancy – TMR – N-modular Redundancy – Voting Methods – Duplication – Standby Sparing – Watchdog Timers – Hybrid Hardware Redundancy – N-modular Redundancy with Spares – Sift-out Modular Redundancy – Triple-duplex Architecture – Fault Tolerant Interconnection Networks.

UNIT III DESIGN TECHNIQUES BASED ON INFORMATION REDUNDANCY 9

Parity – M-of-N, Duplication Codes – Checksums – Cyclic Codes – Arithmetic Codes – Berger Codes – Hamming Error Correcting – Codes – Code Selection Issues – Time Redundancy – Recomputing with Shifted Operands (RESO) – Software Redundancy – Checks – and N-version Programming

UNIT IV RELIABILITY EVALUATION TECHNIQUES 9

Failure Rate – Mean Time to Repair – Mean Time Between Failure – Reliability Modeling – Fault Coverage – M-of-N Systems – Markov Models – Safety – Maintainability – Availability.

UNIT V FAULT TOLERANCE IN VLSI CIRCUITS 9

Redundancy Techniques in VLSI – Self-checking Logic – Reconfiguration Array Structures – Effect on Yield – Case study: Space Shuttle.

TOTAL : 45 PERIODS

TEXT BOOK(S):

1. Shooman, Martin, “Reliability of Computer Systems and Networks: Fault Tolerance, Analysis, and Design”, Wiley Interscience, 2002. ISBN 9780471293422.

REFERENCES:

1. K.K.Pradhan, “Fault Tolerant computing theory and techniques” volume III. Prentice Hall, 1989.

2. Anderson and Lee, “Fault Tolerant principles and practice”, PHI 1989.
3. Parag K. Lala, “Fault Tolerant and Fault Testable, Hardware design”, PHI 1985.
4. LALA, “Digital systems design using PLD’s “,PHI 1990.
5. N. N. Biswas, “Logic Design theory”, PHI 1990.
6. Shem , Toy Levei , Ashok K.Agarwala , “Fault Tolerant System design”, Tata McGraw Hill, 1994.

COURSE OUTCOMES:

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

1. Outline the key concepts in fault-tolerant computing.
2. Demonstrate techniques based on hardware redundancy in fault tolerant computing.
3. Interpret techniques based on information redundancy in fault tolerant computing.
4. Examine the safety, maintainability and availability of the fault tolerant systems.
5. Interpret fault tolerant computing for real time systems.

ONLINE REFERENCES:

1. NPTEL – Hardware security
2. NPTEL - VLSI Design Verification and test

UCS1005	GREEN COMPUTING (Professional Elective II for Semester VI)	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To learn the fundamentals of Green Computing.
- To analyze the green computing grid computing.
- To understand the issues related with green compliance.
- To analyze the reliability evaluation techniques.
- To study and develop various case studies.

UNIT I FUNDAMENTALS 9

Green IT fundamentals: introduction – information technology and environment – business and environment – green enterprise characteristics – green vision – green strategic points – green value – green IT opportunity – environmental intelligence – envision the green future.

UNIT II GREEN IT STRATEGIES 9

Green strategies – philosophical considerations – range of impact – alignment – strategies mix – drivers – business dimensions – developing an ERBS – steps in developing ERBS – KPIs in green strategies.

UNIT III ENVIRONMENTALLY RESPONSIBLE BUSINESS AND GREEN ASSESTS 9

Policies and practices in ERBS – environmental areas covered – mobility and environment – renewable energy resources – green IT metrics and measurements – Green assests: building and facility management – data centers – data servers – cloud computing and data center – end-user devices – smart meters in real time.

UNIT IV PROCESS MANAGEMENT AND GREEN ENTERPRISE 9

Green business process management – reengineering – processes – BPM and standards – business analysis – requirements modeling- applications – QoS – documenting process goals – Green enterprise architecture: views – categories of requirements – green IT and organizational systems – green solutions architecture – aspects.

UNIT V GREEN INFORMATION SYSTEMS 9

GIS – requirements – package diagrams and system scope – use case diagram – class diagram – sequence diagram – state machine diagrams – objects – case study: package industry.

TOTAL : 45 PERIODS

TEXT BOOK(S):

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 center: 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.

COURSE OUTCOMES:

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

1. Demonstrate the fundamentals of Green Computing.
2. Analyze the green computing strategies.
3. Demonstrate the green business process management and green computing assets.
4. Demonstrate the issues related with green enterprise architecture and documenting process.
5. Inspect on various case studies.

ONLINE REFERENCES:

1. NPTEL - Advanced Green Manufacturing Systems
2. COURSERA –Six Sigma Green Belt

UCS1006	INFORMATION SECURITY (Professional Elective II for Semester VI)	L 3	T 0	P 0	C 3

OBJECTIVES:

- To understand the basics of Information Security
- To identify the legal, ethical and professional issues in Information Security
- To understand the aspects of risk management.
- To become aware of various standards in information security.
- To review the technological aspects of Information Security.

UNIT I INTRODUCTION 9

Introduction to Information Security – The History of Information Security – Critical Characteristics of Information – NSTISSC Security Model – Components of an Information System – Securing Components – Balancing Information Security and Access – The Systems Development Life Cycle – The Security Systems Development Life Cycle. The Need for Security: Introduction – Business Needs First – Threats – Attacks – Ethics and Information Security – Codes of Ethics and Professional Organizations.

UNIT II RISK MANAGEMENT AND INFORMATION SECURITY 9

Introduction – An Overview of Risk Management – Risk Identification – Risk Assessment – Risk Control Strategies – Selecting a Risk Control Strategy – Risk Management Discussion Points – Documenting Results – Recommended Practices in Controlling Risk.

UNIT III POLICIES, STANDARDS, PRACTICES AND BUSINESS CONTINUITY 9

Introduction – Information Security Policy – Standards and Practices – The Information Security Blueprint: ISO 17799/BS 7799, ISO 27001and its controls – NIST Security Models – Design of Security Architecture – Security Education – Training and Awareness Program – Continuity Strategies.

UNIT IV SECURITY TECHNOLOGY 9

Introduction – Intrusion Detection and Prevention Systems: IDPS – Terminology – Use of IDPS – Strengths and Limitations of IDPS – Honey Pots – Honey Nets and Padded Cell Systems – Scanning and Analysis Tools – Access Control Devices – Physical Security – Security and Personnel.

UNIT V BIOMETRIC CONTROLS 9

Biometrics – Nature of Biometrics Identification/Authentication Techniques – Biometric Techniques – Matching and Enrollment Process in Biometrics – Benefits Over Traditional Authentication Methods.

TOTAL : 45 PERIODS

TEXT BOOK(S):

1. Michael E Whitman and Herbert J Mattord, "Principles of Information Security", Course

Technology, New Delhi, Fourth Edition, 2012.
2. Nina Godbole, "Information Systems Security-Security Management, Metrics, Frameworks and Best Practices", Wiley India Pvt. Ltd., New Delhi, First Edition, 2009.

REFERENCES:

1. Thomas R.Peltier, "Information Security Fundamentals", Auerbach Publications, Second Edition, 2013.
2. Micki Krause and Harold F.Tipton, "Information Security Management Handbook", Auerbach Publications, Sixth Edition,2008.
3. Mark Merkow and Jim Breithaupt, "Information Security - Principles & Practices", Second Edition,Pearson Education,2014.

COURSE OUTCOMES:

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

1. Identify and analyze the security threats and attacks.
2. Outline risk management and information security.
3. Apply device suitable security policies and standards.
4. Experiment with intrusion detection and prevention systems to ensure information security.
5. Discuss various matching and enrollment process in biometrics.

ONLINE REFERENCES:

1. https://nptel.ac.in/courses/106/106/106106129/
2. https://nptel.ac.in/courses/106/106/106106178/
3. https://nptel.ac.in/courses/106/106/106106157/

UCS1007	ADHOC AND SENSOR NETWORKS (Professional Elective III for Semester VII)	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the design issues in ad hoc and sensor networks
- To learn the different types of MAC protocols
- To be familiar with different types of ad hoc routing protocols
- To be exposing to the TCP issues in ad hoc networks
- To learn the architecture and protocols of wireless sensor networks

UNIT I INTRODUCTION **9**

Cellular and Ad Hoc Networks – Issues in Ad Hoc Wireless Networks – MAC Protocols: Design Issues and Design Goals of MAC Protocols for Ad Hoc Wireless Networks – Classification of MAC Protocols – Contention Based Protocols – Reservation and Scheduling Mechanisms – Other MAC Protocols.

UNIT II ROUTING PROTOCOLS FOR AD HOC WIRELESS NETWORKS **9**

Design Issues and Classification of Routing Protocols –Table-Driven Routing Protocol – On-Demand Routing Protocol – Hybrid Routing Protocols – Multicast Routing: Design Issues and Classification – Tree Based and Mesh Based Multicast Protocols – Energy Efficient and QoS Guarantees Multicast Protocols.

UNIT III TRANSPORT LAYER AND SECURITY PROTOCOLS **9**

Design Issues – Design Goals – Classification of Transport Layer Protocols for Ad Hoc Wireless Network – TCP over Ad Hoc Wireless Network – Security in Ad Hoc Wireless Network – Network Security Requirements – Network Security Attacks – Key Management – Secure Routing in Ad hoc Networks

UNIT IV INTRODUCTION TO SENSOR NETWORKS **9**

Unique Constraints and Challenges – Advantages and Applications – Collaborative Processing – Key Definitions – Localization and Tracking – Network Sensor: MAC – General Issues – Geographic Energy Aware Routing – Attribute Based Routing.

UNIT V TRANSPORT, QOS AND SECURITY IN WIRELESS SENSOR NETWORKS **9**

Data centric and Contention Based Networking – Transport Layer and QoS in Wireless Sensor Networks – Broadcast Authentication WSN protocols – TESLA – Biba – Sensor Network Security Protocols.

TOTAL : 45 PERIODS

TEXT BOOK:

1. C. Siva Ram Murthy and B.S. Manoj, “Ad Hoc Wireless Networks – Architectures and Protocols”, Pearson Education, First Edition, 2011.
2. Feng Zhao and Leonidas Guibas, “Wireless Sensor Networks – An Information Processing Approach”, Elsevier Publications, 2004.

REFERENCES:

1. Subir Kumar Sarkar, T G Basavaraju and C Puttamadappa, “Ad Hoc Mobile Wireless Networks”, Auerbach Publications, 2016.

2. Holger Karl and Andreas Willig, “Protocols and Architectures for Wireless Sensor Networks”, John Wiley and Sons, 2009.
3. ErdalCayirci and Chunming Rong, “Security in Wireless Ad Hoc and Sensor Networks”, John Wiley and Sons, 2009.
4. C.K. Toh, “Adhoc Mobile Wireless Networks – Protocols and Systems”, Pearson Education, First Edition, 2002.

COURSE OUTCOMES:

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

1. Explain basics of ad hoc wireless networks and MAC protocols.
2. Explain the routing protocols of wireless sensor networks.
3. Interpret the transport and security protocols in ad hoc wireless networks.
4. Describe the basic principles to sensor networks.
5. Outline the performance of protocols from a QOS perspective in wireless sensor networks.

ONLINE REFERENCES:

1. NPTEL: Wireless Ad Hoc and Sensor Networks.
2. Coursera: IOT communications and networks.

UCS1008	DIGITAL CURRENCY PROGRAMMING (Professional Elective III for Semester VII)	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To explain how bitcoin works.
- To analyze the construction and use of private and public keys.
- To understand the bit coin scripting language.
- To analyze the various development environments.
- To understand smart contracts.

UNIT I INTRODUCTION 9

From Transactions to Blocks – Blocks and Distributed Consensus – Basic interaction with a Bitcoin node Keys and Addresses – Basic cryptography – From private keys to addresses.

UNIT II BITCOIN SCRIPTING LANGUAGE 9

Introduction to the Bitcoin Script language – Script writing and execution – Advanced scripting – Tools and libraries to access Bitcoin's API and scripting capabilities – Blockchain deployment – Mining and forking – Upgrading the network – Related BIPs – Segregated Witness (SegWit).

UNIT III BLOCK CHAIN ARCHITECTURE 9

Abstract Architecture – Ways to dive deeper – Introduction to major blockchain platforms – Smart contracts and Ethereum – Technical introduction to smart contracts – Ethereum overview – Web3 proposition for a decentralized internet – Using Ethereum sub-protocols – storage and ways of interacting with the external world.

UNIT IV DEVELOPMENT ENVIRONMENT 9

Historical comparison – Conceptual distinction between a payment system and a decentralized applications platform – Differences in their architectures from security-first aspect to a rich feature set – Future roadmap for them, following their own paths with probable interconnections – Development environment – Multitude of clients in Ethereum – Production and test networks in Ethereum – Public, private and development deployments.

UNIT V BUILDING BLOCKS 9

Contract code walk-through – Demonstration of smart contract – Introduction to Solidity – Contract lifecycle – Solidity in depth – Building blocks – Popular contracts already in deployment – Considerations for production deployment – Quality of decentralized applications – Code patterns – Security – Other smart contract platforms – Discussion of prospects.

TOTAL : 45 PERIODS

TEXT BOOK:

1. Andreas Antonopoulos, "Mastering Bitcoin", O'Reilly Publishing, 2014.

REFERENCES:

1. Narayanan, J. Bonneau, E. Felten, Miller, S. Goldfeder, "Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction", Princeton University Press, 2016.
2. Roger Wattenhofer, "The Science of the Blockchain", CreateSpace Independent Publishing Platform, 2016.

COURSE OUTCOMES:

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

1. Explain the basic technology components of bitcoin.
2. Develop scripts using the bitcoin scripting language.
3. Understand the architectural component of blockchain system.
4. Analyze the architecture development environment.
5. Discuss on building blocks of blockchain.

ONLINE REFERENCES:

1. NPTEL: Introduction to Blockchain Technology and Applications
2. Coursera: Cryptocurrency and blockchain: An introduction to digital currencies.

UCS1009	Parallel Computing (Professional Elective III for Semester VII)	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To learn basic models of parallel machines and tools.
- To introduce and analyze parallel programming.
- To implement tools like MPI and POSIX threads.
- To write a parallel program to solve a problem.
- To examine the algorithms employed in computing.

UNIT I INTRODUCTION 9

Parallel computing – architecture – Synchronous – vector/array – SIMD – Systolic; Asynchronous – MIMD – reduction paradigm – Hardware taxonomy: Flynn's classifications – Handler's classifications – Software taxonomy: Kung's taxonomy – SPMD.

UNIT II PARALLEL COMPUTATIONAL MODELS 9

Combinational circuits – Sorting network – PRAM models – Interconnection RAMs – Parallelism approaches – data parallelism – control parallelism.

UNIT III PARALLEL COMPUTER ARCHITECTURES 9

Shared memory systems and cache coherence – distributed memory systems – interconnection networks and routing – Programming shared address space systems: OpenMP – Pthreads – Collective communication – Synchronization – performance of parallel computers.

UNIT IV PARALLEL ALGORITHMS 9

Parallel algorithms – Principles of parallel algorithm design: decomposition techniques mapping & scheduling computation – templates – non-numerical algorithms: Sorting – graphs – dynamic programming – Numerical algorithms: dense matrix algorithms – sparse matrix algorithms.

UNIT V PARALLEL PROGRAMMING 9

Parallel programming models – Message passing: MPI – global address space languages – Performance Metrics: speedups – efficiency – utilization – communication overheads – single/multiple program performances – benchmarks – Case Study: GPU Programming – Problem solving on clusters using Map Reduce.

TOTAL: 45 PERIODS

TEXT BOOK(S):

1. Peter S Pacheco, “An Introduction to Parallel Programming”, Morgan Kaufmann,2011
2. MJ Quinn, “Parallel Computing: Theory and Practice”, Tata McGraw Hill, 2002.

REFERENCES:

1. M J Quinn, “Parallel Programming in C with MPI and OpenMP”, McGraw-Hill Education, 2008
2. DB Kirk and W-m W Hwu, “Programming Massively Parallel Processors”, Morgan Kaufmann, 2016.
3. Andrew S. Tanenbaum and Maarten Van Steen, “Distributed Systems: Principles and Paradigms, 2nd edition, Pearson Education, 2013.
4. M.R. Bhujade, “Parallel Computing”, 2nd edition, New Age International Publishers 2009.

5. George Coulouris, Jean Dollimore, Tim Kindberg, "Distributed Systems: Concepts and Design" (4th Edition), Addison Wesley/Pearson Education, 2009.
6. Pradeep K Sinha, "Distributed Operating Systems: Concepts and design", IEEE computer society press, 2012.

COURSE OUTCOMES:

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

1. Understand and describe parallel algorithms and architectures.
2. Understand parallel computational model.
3. Write a parallel program for the algorithm.
4. Generate a report on the algorithm that is designed.
5. Examine the cost of the algorithm.

ONLINE REFERENCES:

1. NPTEL: Parallel Computing
2. NPTEL: Introduction to Parallel Programming in OpenMP.
3. Coursera: Introduction to high-performance and parallel computing.

UCS1010	SOFTWARE TESTING (Professional Elective III for Semester VII)	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To learn the fundamentals of Green Computing.
- To analyze the green computing grid computing.
- To understand the issues related with green compliance.
- To analyze the various test selection methods.
- To study and develop various case studies.

UNIT I INTRODUCTION 9

Principles of Testing – Black Box testing – White Box testing –Integration testing – System Testing – Acceptance Testing – Performance Testing – Internationalization Testing – Ad Hoc Testing.

UNIT II TEST GENERATION 9

Identifying test conditions and designing test cases – Boundary Value Analysis – Equivalence Partitioning – Category partitioning method – Cause Effect Graphing – Test Generation from Predicates – Test Generation from finite state Machines.

UNIT III TEST ADEQUACY ASSESSMENT AND ENHANCEMENT 9

Basics – Adequacy criteria based on Control Flow – Adequacy criteria based on data flow – Mutation and Mutants – Test Assessment using mutation – mutation operators – Principles of Mutation Testing – Equivalent Mutants – Fault Detection using Mutation.

UNIT IV TEST SELECTION, MINIMIZATION AND PRIORITIZATION 9

Selecting Regression Tests – Test selection using Execution trace – Test Selection Using Dynamic Slicing – Scalability of test Selection Algorithms – Test Minimization and Prioritization.

UNIT V TEST MANAGEMENT AND APPLICATIONS 9

Test Plans – Test Management – Test progress monitoring and control – Testing Web based Systems – Testing Off-the shelf software – Tracking Defects – Case Study: Open Source Testing Tools such as R.T.M.R, Tarauntula.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Srinivasan Desikan, Gopalasamy Ramesh, “Software Testing – principles and Practices”, Pearson Education, First Edition, 2009.
2. Aditya P. Mathur “Foundations of Software Testing”, Pearson education, First Edition, 2014.

REFERENCES:

1. William E. Perry, “Effective methods for software testing”, John Wiley & Sons, Second Edition, 2007.
2. Roger S. Pressman, “Software Engineering: A Practitioner‘s Approach”, McGraw Hill International Edition, Seventh Edition, 2015.

COURSE OUTCOMES:

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

1. Explain the various testing techniques and processes.
2. Apply various test generation approaches.

3. Identify the test adequacy criteria for white box and black box testing techniques.
4. Analyze the various test selection methods.
5. Comparing test techniques for real world applications.

ONLINE REFERENCES:

1. NPTEL: Software Testing
2. Coursera: Introduction to software testing.

UCS1011 DISTRIBUTED SYSTEMS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To explain the modes of computation of the distributed systems.
- To learn issues related to clock synchronization and the need for global state in distributed systems.
- To understand deadlock detection algorithms.
- To learn the significance of agreement, fault tolerance and recovery protocols.
- To perform peer-to-peer computing and distributed shared memory systems.

UNIT I INTRODUCTION 9

Definition – issues – Motivation – goals – types – distributed system models – Relation to parallel systems – Message-passing systems versus shared memory systems – Primitives for distributed communication – Synchronous versus asynchronous executions – Design issues and challenge – A model of distributed executions – Models of communication networks – Global state – Cuts – Past and future cones of an event – Models of process communications

UNIT II MESSAGE ORDERING, SNAPSHOTS AND LOGICAL TIME 9

Message ordering and group communication: Message ordering paradigms – Asynchronous execution with synchronous communication – Synchronous program order on an asynchronous system – Group communication – Causal order (CO) – Total order – logical time: global state and snapshot algorithms – mutual exclusion clock synchronization – leader election.

UNIT III DEADLOCK AND MUTUAL EXCLUSION ALGORITHMS 9

Distributed mutual exclusion algorithms – Preliminaries – Lamport‘s algorithm – Ricart-Agrawala algorithm – Maekawa‘s algorithm – Suzuki–Kasami‘s broadcast algorithm. Deadlock detection in distributed systems: Introduction – System model – Preliminaries – Models of deadlocks – Knapp‘s classification – Algorithms for the single resource model, the AND model and the OR model.

UNIT IV RECOVERY AND AGREEMENT ALGORITHMS 9

Check pointing and rollback recovery – Background and definitions – Issues in failure recovery – Checkpoint-based recovery – Log-based rollback recovery – Coordinated check pointing algorithm – Algorithm for asynchronous check pointing and recovery. Consensus and agreement algorithms: Problem definition – Overview of results – Agreement in a failure –free system – Agreement in synchronous systems with failures.

UNIT V P2P COMPUTING AND DISTRIBUTED SHARED MEMORY 9

Peer-to-peer computing and overlay graphs – Data indexing and overlays – Chord – Content addressable networks – Tapestry – Distributed shared memory – Abstraction and advantages – Memory consistency models – Shared memory Mutual Exclusion.

TOTAL : 45 PERIODS

TEXT BOOK(S):

1. Kshemkalyani, Ajay D., and Mukesh Singhal, “Distributed computing: principles, algorithms, and systems”, Cambridge University Press, 2011.
2. George Coulouris, Jean Dollimore and Tim Kindberg, “Distributed Systems Concepts and Design”, Fifth Edition, Pearson Education, 2012.
3. Andrew S. Tanenbaum, Maarten Van Steen, “Distributed Systems”, Pearson Education,Second Edition, 2013.

REFERENCES:

1. Pradeep K Sinha, "Distributed Operating Systems: Concepts and Design", Prentice Hall of India, 2007.
2. Mukesh Singhal and Niranjan G. Shivaratri, “Advanced concepts in operating systems”. McGraw-Hill, Inc., 1994.
3. Tanenbaum A.S., Van Steen M., “Distributed Systems: Principles and Paradigms”, Pearson Education, 2007.
4. Liu M.L., “Distributed Computing, Principles and Applications”, Pearson Education, 2004.
5. Nancy A Lynch, “Distributed Algorithms”, Morgan Kaufman Publishers, USA, 2003.

COURSE OUTCOMES:

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

1. Summarize the foundations and issues in distributed systems.
2. Outline message ordering and snapshots.
3. Experiment with mutual exclusive algorithms.
4. Utilize the algorithm for asynchronous check pointing and recovery
5. Summarize the features of peer-to-peer and distributed shared memory.

ONLINE REFERENCES:

1. https://onlinecourses.nptel.ac.in/noc22_cs18/preview
2. https://www.tutorialspoint.com/Distributed-Systems
3. https://www.youtube.com/watch?v=VNRmsACNSaY
4. https://www.javatpoint.com/distributed-operating-system

UCS1012	CYBER FORENSIC AND MALWARE (Professional Elective IV for Semester VII)	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the concepts of cyber forensic and its technique.
- To analyze the various forensic tools.
- To analyze the various forensic data and validation techniques.
- To analyze malware and virtual machine.
- To describe the features of dynamic analysis tools.

UNIT I INTRODUCTION **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.

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 MALWARE ANALYSIS AND VIRTUAL MACHINE **9**

What is malware? – malware analysis – goals of malware analysis – malware analysis techniques – types of malware –rules for malware analysis – antivirus scanning – hashing – Packed and Obfuscated Malware – Portable Executable File Format – Linked Libraries and Functions – Static Analysis in Practice– The PE File Headers and Sections– The Structure of a Virtual Machine – Creating Your Malware Analysis Machine – Using Your Malware Analysis Machine – The Risks of Using VMware for Malware Analysis

UNIT V DYNAMIC ANALYSIS AND MALICIOUS WINDOWS PROGRAMS **9**

Dynamic analysis – Sandboxes: The Quick-and-Dirty Approach – Running Malware – Monitoring with Process Monitor – Viewing Processes with Process Explorer – Basic Dynamic Tools in Practice– The Windows API – The Windows Registry – Networking APIs – Following Running Malware – Kernel vs. User Mode – The Native API

TOTAL: 45 PERIODS

TEXT BOOK:

1. Nelson, Phillips, Enfinger, Steuart, “Computer Forensics and Investigations”, Cengage Learning, India Edition, 2018.
2. Michael Sikorski, Andrew Honig, “Practical Malware Analysis: The Hands-On Guide to Dissecting Malicious Software”, No Starch Press,2012.

REFERENCES:

1. John R.Vacca, “Computer Forensics”, Cengage Learning, 2005.
2. MarjieT.Britz, “Computer Forensics and Cyber Crime: An Introduction”, 3rd Edition, Prentice Hall, 2020.

UCS1013	ETHICAL HACKING (Professional Elective IV for Semester VII)	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To learn the basics of cyber-crime and ethical hacking.
- To become familiar with ethical hacking in web.
- To learn to analyze Bluetooth hacking.
- To understand the various worms and Trojan.
- To understand the DOS attacks in mobiles.

UNIT I ETHICAL HACKING 9

Introduction to Ethical Hacking –Footprinting and Reconnaissance – Scanning Networks – Enumeration – System Hacking – Malware Threats – Sniffing

UNIT II 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.

UNIT III BLUETOOTH HACKING 9

Introduction – working – types of Bluetooth threats – the Bluejack attack – OBEX push – modifying a remote mobile phone's address book – countermeasures – the Bluesnarf arrack – OBEX pull – the blue Backdoor attack – the BlueBug attack – short pairing code attacks – default pairing attack – privacy concerns – brute force attacks – cracking pair codes – countermeasures.

UNIT IV VIRUSES AND WORMS 9

Introduction – working – types of malicious files – the cabir worm – the mabir worm – the lasco worm – the commwarrior MMS virus – the skulls Trojan – the MOS Trojan – the fontal Trojan – the drever Trojan – the onehop Trojan – the damping file dropper – the doomboot Trojan.

UNIT V MOBILE DOS ATTACKS 9

Introduction – working – types – case studies – bluesmacking – ping flooding – jamming – malformed OBEX message attack – extreme bluejacking – malformed SMS text message attack – vulnerable mobile phone handsets – live attack logged data.

TOTAL: 45 PERIODS

TEXT BOOK:

1. CEH official Certified Ethical Hacking Review Guide, Wiley India Edition, 2015.
2. Ankit fadia, "An ethical guide to hacking mobile phones", Macmillan publishers India, Second Edition, 2010.

REFERENCES:

1. Ankit Fadia, "Ethical Hacking", Second Edition, Macmillan India Ltd, 2006.
2. Kenneth C.Brancik, "Insider Computer Fraud", Auerbach Publications Taylor, Francis Group, 2019.

COURSE OUTCOMES:

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

1. Understand the basics of ethical hacking.

2. Analyze a number of different ethical hacking tools.
3. Analyze various trojan and worms.
4. Identify the vulnerabilities in a given network infrastructure
5. Implement real-world hacking techniques to test system security.

ONLINE REFERENCES:

1. NPTEL: Ethical Hacking
1. Coursera: Introduction to Cybersecurity tools &cyber attacks

UCS1014	FUZZY LOGIC	L	T	P	C
	(Professional Elective IV for Semester VII)	3	0	0	3

OBJECTIVES:

- To understand the basics of artificial neural network.
- To analyze the fuzzy sets and its related functions.
- To model and control using fuzzy logic.
- To understand the concepts of modelling and control of neural and fuzzy control schemes.
- To understand the features of hybrid control schemes.

UNIT I INTRODUCTION 9

Fuzzy set theory – Fuzzy sets – Operation on fuzzy sets – Scalar cardinality – fuzzy cardinality –union and intersection – complement(Yager and Sugeno) – equilibrium points – aggregation – projection – composition – cylindrical extension – fuzzy relation – Fuzzy membership functions.

UNIT II FUZZY LOGIC FOR MODELING AND CONTROL 9

Modelling of non-linear systems using fuzzy models – TSK model – Fuzzy logic controller – Fuzzification – Knowledge base – Decision making logic – Defuzzification – Adaptive fuzzy systems – Familiarization with fuzzy logic toolbox.

UNIT III ARTIFICIAL NEURAL NETWORKS 9

Review of fundamentals – Biological neuron – artificial neuron – activation function – single layer perceptron – Limitation – Multi layer perceptron – Back Propagation Algorithm (BPA) – Recurrent Neural Network (RNN) – Adaptive Resonance Theory (ART) based network – Radial basis function network – online learning algorithms – BP through time – RTRL algorithms – Reinforcement learning.

UNIT IV NEURAL NETWORKS FOR MODELLING AND CONTROL 9

Modelling of non-linear systems using ANN – Generation of training data – Optimal architecture – Model validation – Control of non-linear systems using ANN – Direct and indirect neuro control schemes – Adaptive neuro controller – Familiarization with neural network toolbox.

UNIT V HYDRID CONTROL SCHEMES 9

Fuzzification and rule base using ANN – Neuro fuzzy systems – ANFIS – Fuzzy neuron – GA – Optimization of membership function and rule base using Genetic Algorithm – Introduction to other evolutionary optimization techniques – support vector machine – Case study: Familiarization with ANFIS toolbox.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Laurence Fausett, “Fundamentals of Neural Networks”, Prentice Hall, Englewood Cliffs, N.J., 2006.
2. Timothy J. Ross, “Fuzzy Logic with Engineering Applications”, McGraw Hill Inc., 2005.

REFERENCES:

1. Goldberg, “Genetic Algorithm in Search, Optimization and Machine learning”, Addison Wesley Publishing Company Inc. 2004.

2. Millon W.T., Sutton R.S. and Webrose P.J., "Neural Networks for Control", MIT press, 1992.
3. Ethem Alpaydin, "Introduction to Machine learning (Adaptive Computation and Machine Learning series)', MIT Press, Second Edition, 2014.

COURSE OUTCOMES:

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

1. Explain the concepts ofdifferent features of fuzzy logic.
2. Illustrate on modelling and control of fuzzy logic.
3. Survey on artificial neural networks.
4. Interpret on modelling and control of artificial neural networks.
5. Analyze various functions and algorithms of artificial neural networks.

ONLINE REFERENCES:

1. NPTEL: Fuzzy Logic and neural networks
2. NPTEL: Fuzzy Sets, Logic and Systems & Applications
3. Coursera: Qualitative Comparative Analysis (QCA).

UGE1051	HUMAN RIGHTS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To sensitize the Engineering students to various aspects of Human Rights.
- To Know the Evolution of Human rights concept
- To Explore the various theories and perspectives of UN Laws
- To Examine Human rights in India
- Identifying the human rights of Disadvantaged People

UNIT I INTRODUCTION OF HUMAN RIGHTS 9

Human Rights – Meaning, origin and Development. Notion and classification of Rights – Natural, Moral and Legal Rights. Civil and Political Rights, Economic, Social and Cultural Rights; Collective / Solidarity Rights.

UNIT II EVOLUTION OF HUMAN RIGHTS 9

Evolution of the concept of Human Rights Magana Carta – Geneva Convention of 1864. Universal Declaration of Human Rights, 1948. Theories of Human Rights.

UNIT III THEORIES OF UN LAWS 9

Theories and perspectives of UN Laws – UN Agencies to monitor and compliance.

UNIT IV HUMAN RIGHTS IN INDIA 9

Human Rights in India – Constitutional Provisions / Guarantees.

UNIT V APPLICATIONS OF HUMAN RIGHTS 9

Human Rights of Disadvantaged People – Women, Children, Displaced Persons and Disability of Disabled persons, including Aged and HIV Infected People. Implementation of Human Rights – National and State Human Rights Commission – Judiciary – Role of NGO's, Media, Educational Institutions, Social Movements.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Kapoor S.K., "Human Rights under International law and Indian Laws", Central Law Agency, Allahabad, 2014.
2. Chandra U., "Human Rights", Allahabad Law Agency, Allahabad, 2014.
3. Upendra Baxi, The Future of Human Rights, Oxford University Press, New Delhi.

COURSE OUTCOMES:

1. Engineering students will acquire the basic knowledge of human rights
2. Students can understand the origin of human rights evolution
3. They can explore the UN Laws and its perspectives related to human rights
4. Students can understand the constitutional provisions for human rights
5. Engineering students can learn the institutional responsibility towards human rights for Disadvantaged people.

UCS1015	QUANTUM COMPUTING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the concept of quantum computing.
- To implement Schmidt decomposition and purification.
- To understand quantum computing and search algorithms.
- To understand the quantum error correction models.
- To handle quantum information.

UNIT I INTRODUCTION 9

Global perspective – quantum bits – computation – algorithms: classical computations on a quantum computer – quantum parallelism – Deutsch's algorithm – experimental quantum information processing – the Stern-Gerlach experiment – prospects for practical quantum information processing – quantum information: examples.

UNIT II QUANTUM MECHANICS 9

Linear algebra – basics – linear operators and matrices – inner products – Eigen vectors and Eigen values – tensor products – operator functions – commutator and anti-commutator – postulates – application – Schmidt decomposition and purifications – EPR and the bell inequality.

UNIT III COMPUTER SCIENCE AND QUANTUM COMPUTATION 9

Models for computation – turing machines – analysis of computational problems – quantify computational resources – computational complexity – decision problems and the complexity classes of P and NP – a plethora of complexity classes – energy and computation – perspectives on Computer Science.

UNIT IV FILE STRUCTURE, INDEXING, HASHING AND TRANSACTIONS 9

The quantum search algorithm – quantum search as a quantum simulation – quantum counting – unstructured database search – optimality – black box algorithm limits.

UNIT V QUANTUM INFORMATION 9

Quantum operations – examples – applications – limitations – distance measures for quantum information – quantum error correction – entropy and information – Von Neumann entropy – strong subadditivity – data compression – quantum states vs the accessible information – quantum cryptography.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Michael A. Nielsen & Isaac L. Chuang, "Quantum Computation and Quantum Information", Cambridge University Press, 2016.

REFERENCE BOOKS:

1. Scott Aaronson, "Quantum Computing Since Democritus", Cambridge University Press, 2013.
2. N. David Mermin, "Quantum Computer Science: An Introduction", Cambridge University Press, 2007.

COURSE OUTCOMES:

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

1. Explain the concept of quantum computing.
2. Apply quantum mechanics.
3. Design quantum computing and search algorithms.
4. Apply quantum search algorithms.
5. Identify quantum information.

ONLINE REFERENCES:

1. Introduction to Quantum Information (Coursera).

UCS1016	REAL TIME SYSTEMS (Professional Elective V for semester VIII)	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To learn real time system concepts, the associated issues & techniques.
- To understand the scheduling concepts of real time systems.
- To understand, design and synchronization problems in real time system.
- To explore the concepts of real time databases.
- To understand the evaluation techniques, present in real time system.

UNIT I REAL TIME SYSTEMS AND SCHEDULING 9

Introduction – Structure of a Real Time System – Task classes – Performance Measures for Real Time Systems – Estimating Program Run Times – Issues in Real Time Computing – Task Assignment and Scheduling – Classical uniprocessor scheduling algorithms – Fault Tolerant Scheduling – mode changes and fault tolerant scheduling.

UNIT II SOFTWARE REQUIREMENTS ENGINEERING 9

Requirements engineering process – types of requirements – requirements specification for real time systems – Formal methods in software specification – structured Analysis and Design – object-oriented analysis and design and unified modelling language – organizing the requirements document – organizing and writing documents – requirements validation and revision.

UNIT III INTERTASK COMMUNICATION AND MEMORY MANAGEMENT 9

Buffering data – Time relative Buffering – Ring Buffers – Mailboxes – Queues – Critical regions – Semaphores – other Synchronization mechanisms – deadlock – priority inversion – process stack management – run time ring buffer – maximum stack size – multiple stack arrangement – memory management in task control block – swapping – overlays – Block page management – replacement algorithms – memory locking – working sets – real time garbage collection – contiguous systems.

UNIT IV 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 V EVALUATION TECHNIQUES AND CLOCK SYNCHRONIZATION 9

Reliability Evaluation Techniques – Obtaining parameter values, Reliability models for Hardware Redundancy – Software error models. Clock Synchronization – Clock, A Nonfault–Tolerant Synchronization Algorithm – Impact of faults – Fault Tolerant Synchronization in Hardware – Fault Tolerant Synchronization in software.

TOTAL : 45 PERIODS

TEXT BOOK:

1. C.M. Krishna, Kang G. Shin, “Real-Time Systems”, McGraw-Hill Indian Edition, 2017.

REFERENCES:

1. Philip. A. Laplante, "Real Time System Design and Analysis", Prentice Hall of India, 3 rd Edition, 2004
2. Rajib Mall, "Real-time systems: theory and practice", Pearson Education, 2009
3. R.J.A Buhur, D.L Bailey, "An Introduction to Real-Time Systems", Prentice Hall International, 1999
4. Stuart Bennett, "Real Time Computer Control-An Introduction", Prentice Hall of India, 1998
5. Allen Burns, Andy Wellings, "Real Time Systems and Programming Languages", Pearson Education, 2009.

COURSE OUTCOMES:

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

1. Apply principles of real time system design techniques.
2. Explain the requirement for software for real time systems and document it.
3. Analyze the communication between tasks and manage memory.
4. Utilize database for real time systems.
5. Apply evaluation techniques in application.

ONLINE REFERENCES:

1. Real-Time Embedded Systems Concepts and Practices (Coursera).
2. Real-Time Embedded Systems (Coursera).

UCS1017 SERVICE ORIENTED ARCHITECTURE

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the concepts of service-oriented architecture.
- To model and design the service-oriented architecture methodologies.
- To apply a distributed SOA application over the internet.
- To analyze the functioning of XML fundamentals.
- To identify the XML structure.

UNIT I SOA AND WEB SERVICE FUNDAMENTALS 9

Introduction to SOA – Evolution of SOA – Fundamentals of SOA – Characteristics of SOA – benefits – Anatomy of SOA – service orientation and object orientation – Web services and Primitive – service layers – WSDL – Messaging with SOAP – Message exchange patterns – coordination – Atomic transactions – Case Study: Web services – SOAP – REST.

UNIT II SERVICE ORIENTED ANALYSIS AND DESIGN 9

SOA delivery strategies – Service oriented analysis – service modeling – Benefits of business-centric SOA – Service oriented design – composition guidelines and service design – business process design.

UNIT III WS EXTENSIONS 9

Additional features of SOA – WS-Addressing – WS-Reliable Messaging – WS-Policy Framework – WS-transactions – WS-Metadata Exchange – WS-Security Framework – examples.

UNIT IV SOA PLATFORM AND BPEL 9

Characteristics – SOA platform basics – benefits – SOA support in J2EE – SOA support in .NET – Integration – WS-BPEL basics Case Study: Service Orchestration Engine (workflow) using WS-BPEL.

UNIT V XML 9

XML document structure – Well-formed and valid documents – DTD – XML Schema – Parsing XML using DOM, SAX – XPath – XML Transformation and XSL – Xquery.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Thomas Erl, “Service-Oriented Architecture: Concepts, Technology and Design”, Pearson Education, 2016.

REFERENCES:

1. Thomas Erl, “SOA Principles of Service Design”, The Prentice Hall Service-Oriented Computing Series from Thomas Erl, 2016.
2. Newcomer, Lomow, “Understanding SOA with Web Services”, Pearson Education, 2005.

3. Sandeep Chatterjee, James Webber, "Developing Enterprise Web Services", An Architect's Guide, Pearson Education, 2005.
4. Dan Woods and Thomas Mattern, "Enterprise SOA Designing IT for Business Innovation", O'REILLY, First Edition, 2006.

COURSE OUTCOMES:

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

1. Outline the various SOA and web service fundamentals.
2. Demonstrate the steps involved in service-oriented analysis and design.
3. Implement SOA in development life cycle of web services experiment with the advanced concepts in SOA such as WS security.
4. Model the various business processes involved in a given application with the help of BPEL.
5. Understand the functioning of XML and XML transformations.

ONLINE REFERENCES:

1. Service-oriented architecture (Coursera).
2. Service-oriented architecture (https://www.geeksforgeeks.org/)

UCS1018	DIGITAL IMAGE PROCESSING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To learn digital image fundamentals.
- To be exposed to simple image processing techniques.
- To be familiar with image compression and segmentation techniques.
- To learn to represent image in the form of features.
- To analyze image representation and recognition.

UNIT I INTRODUCTION 9

Introduction – Origin – Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels – color models.

UNIT II IMAGE ENHANCEMENT 9

Spatial Domain: Gray level transformations – Histogram processing – Basics of Spatial Filtering Smoothing and Sharpening Spatial Filtering – Frequency Domain: Introduction to Fourier Transform – Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters.

UNIT III IMAGE RESTORATION AND SEGMENTATION 10

Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering Segmentation: Detection of Discontinuities – Edge Linking and Boundary detection – Region based segmentation – Morphological processing – erosion and dilation.

UNIT IV WAVELETS AND IMAGE COMPRESSION 9

Wavelets – Subband coding – Multiresolution expansions - Compression: Fundamentals – Image Compression models – Error Free Compression – Variable Length Coding – Bit-Plane Coding – Lossless Predictive Coding – Lossy Compression – Lossy Predictive Coding – Compression Standards.

UNIT V IMAGE REPRESENTATION AND RECOGNITION 8

Boundary representation – Chain Code – Polygonal approximation – signature - boundary segments – Boundary description – Shape number – Fourier Descriptor - moments - Regional Descriptors – Topological feature - Texture - Patterns and Pattern classes - Recognition based on matching.

TOTAL: 45 PERIODS

TEXT BOOKS:

1 Rafael C. Gonzales, Richard E. Woods, “Digital Image Processing”, Third Edition, Pearson Education, 2011.

REFERENCES:

1 Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, “Digital Image Processing Using MATLAB”, Third Edition Tata McGraw Hill Pvt. Ltd., 2018.

2 Anil Jain K. “Fundamentals of Digital Image Processing”, PHI Learning Pvt. Ltd., 2011.
3 William K Pratt, “Digital Image Processing”, John Willey, 2007.
4 Malay K. Pakhira, “Digital Image Processing and Pattern Recognition”, First Edition, PHI Learning Pvt. Ltd., 2011.

COURSE OUTCOMES:

On completion of course students will be able to,

1. Demonstrate digital image fundamentals.
2. Apply image enhancement techniques.
3. Interpret image restoration and segmentation techniques.
4. Apply image compression and wavelets techniques.
5. Summarize the features of images.

ONLINE REFERENCES:

1. http://www.caen.uiowa.edu/~dip/LECTURE/lecture.html
2. http://eeweb.poly.edu/~onur/lectures/lectures

UCS1019	SOFT COMPUTING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To Learn and understand the concepts involved in Soft Computing Techniques.
- To familiarize in neural networks, genetic algorithms and fuzzy systems.
- To apply soft computing techniques for real time problems.
- To familiarize in hybrid systems.
- To use MATLAB Tool for Programming the Soft Computing Techniques

UNIT I INTRODUCTION 9

Introduction-Artificial Intelligence-Artificial Neural Networks-Fuzzy Systems-Genetic Algorithm and Evolutionary Programming-Swarm Intelligent Systems-Classification of ANNs-McCulloch and Pitts Neuron Model-Learning Rules: Hebbian and Delta- Perceptron Network-Adaline Network-Madaline Network.

UNIT II GENETIC ALGORITHMS 9

Fundamentals of Genetic Algorithms: Basic Concepts – Creation of Offsprings – Working Principles – ENCODING – Fitness Function – Genetic Modeling: Crossover – Invertion & Deletion – Mutation Operator – Bitwise Operators.

UNIT III ARTIFICIAL NEURAL NETWORKS 9

Fundamentals of neural networks – architecture – Back propagation Neural Networks - Kohonen Neural Network – Learning Vector Quantization – Hamming Neural Network – Hopfield Neural Network – Bi-directional Associative Memory – Adaptive Resonance Theory Neural Networks – Support Vector Machines – Spike Neuron Models.

UNIT IV HYBRID SYSTEMS 9

Hybrid Systems – sequential hybrid systems – Neural Networks, Fuzzy Logic and Genetic – GA Based Weight Determination – LR-Type Fuzzy Numbers – Fuzzy Neuron – Fuzzy BP Architecture – Learning in Fuzzy BP – Inference by Fuzzy BP – Fuzzy Art Map: A Brief Introduction – Soft Computing Tools – GA in Fuzzy Logic Controller Design – Fuzzy Logic Controller.

UNIT V FUZZY SYSTEMS AND PROGRAMMING USING MATLAB 9

Fuzzy systems: fuzzy logic – classical relation and fuzzy relation – fuzzy decision making – MATLAB: Using Neural Network Toolbox – Using Fuzzy Logic Toolbox – Using Genetic Algorithm & Directed Search Toolbox.

TOTAL : 45 PERIODS

TEXT BOOK(S):

1. N.P.Padhy, S.P.Simon, "Soft Computing with MATLAB Programming", Oxford University Press, 2015.
2. S.Rajasekaran, G.A.Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithm, Synthesis and Applications ", PHI Learning Pvt. Ltd., 2017.
3. S.N.Sivanandam , S.N.Deepa, "Principles of Soft Computing", Wiley India Pvt. Ltd., 2nd Edition, 2011.

REFERENCES:

1. Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, "Neuro-Fuzzy and Soft Computing", Prentice-Hall of India, 2002.
2. Kwang H.Lee, "First course on Fuzzy Theory and Applications", Springer, 2005.
3. George J. Klir and Bo Yuan, "Fuzzy Sets and Fuzzy Logic-Theory and Applications", Prentice Hall, 1996.
4. James A. Freeman and David M. Skapura, "Neural Networks Algorithms, Applications, and Programming Techniques", Addison Wesley, 2003.

COURSE OUTCOMES:

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

1. Illustrate the importance of Neural Network.
2. Explain the basic knowledge on Genetic Algorithm.
3. Analyze the Back propagation Neural Networks
4. Infer the Algorithms based on Hybrid Systems
5. Integrate soft computing techniques for complex problems.
6. Use the MATLAB Tool for Solving Engineering or Real Life Problems in Soft Computing

ONLINE REFERENCES:

1. https://onlinecourses.nptel.ac.in/noc22_cs54/preview
2. https://www.sciencedirect.com/science/article/pii/S1877050916325467

		L	T	P	C
UCS1020	**SOFTWARE PROJECT MANAGEMENT (Professional Elective VI for semester VIII)**	**3**	**0**	**0**	**3**

OBJECTIVES:

- To understand the basics of software project, its planning and evaluation techniques.
- To learn various metrics of software quality.
- To manage projects during the Software Development Life Cycle (SDLC).
- To deliver successful software projects.
- To introduce concept behind designing of test cases.

UNIT I SOFTWARE PROJECT EVALUATION AND PLANNING 9

Introduction of Software Project Management – Activities – Methodologies – Categorization of Software Projects – Setting Objectives – Management Principles – Management Control – Project Portfolio Management – Cost-Benefit Evaluation Technology – Risk Evaluation – Strategic Program Management – Stepwise Project Planning.

UNIT II PROJECT LIFE CYCLE AND EFFORT ESTIMATION 9

Software Process and Process Models – Choice of Process Models – Rapid Application Development – Agile Methods – Extreme Programming – SCRUM – Managing Iterative Processes – Software Effort Estimation: Basics of Software Estimation – Effort and Cost Estimation Techniques – COSMIC Full Function Points – COCOMO II – A Parametric Productivity Model – Staffing Pattern.

UNIT III ACTIVITY PLANNING AND RISK MANAGEMENT 9

Objectives of Activity Planning – Project Schedules – Activities – Sequencing and Scheduling – Network Planning Models – Forward Pass & Backward Pass Techniques – Critical Path (CRM) Method – Risk Identification – Assessment – Monitoring – PERT Technique – Monte Carlo Simulation – Resource Allocation: Creation of Critical Path – Cost Schedules.

UNIT IV PROJECT MONITORING AND MANAGEMENT CONTROL 9

Framework – Collection of Data Project Termination – Visualizing Progress – Cost Monitoring – Earned Value Analysis – Change Control – Software Configuration Management – Managing Contracts – Contract Management.

UNIT V STAFFING IN SOFTWARE PROJECTS 9

Introduction – Organizational Behavior – Best Methods of Staff Selection – Motivation – the hackman job characteristic model – Decision Making – Team Structures – Virtual Teams – Communications Genres – Communication Plans – Project Management Tools – leadership.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Bob Hughes, Mike Cotterell and Rajib Mall "Software Project Management", Fifth Edition, Tata McGraw Hill, New Delhi, 2012.

REFERENCES:

1. Robert K. Wysocki, "Effective Software Project Management", Wiley Publication, 2011.
2. Walker Royce, "Software Project Management", Addison Wesley, 1998.

COURSE OUTCOMES:

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

1. Demonstrate the project planning strategies and the standards involved in cost – benefit evaluation strategy.
2. Plan the entire life cycle of a project along with the efforts needed for its completion.
3. Analyze the complete activities involved in planning a project and estimate risk factors along with cost criterion involved.
4. Organize the monitoring techniques associated with project, managing methods available in a project development.
5. Model the organizational plans in complete software project management.

ONLINE REFERENCES:

1. software-project-management (www.javatpoint.com)
2. software_project_management (www.tutorialspoint.com)
3. software-engineering-software-project-management-spm (https://www.geeksforgeeks.org)

UMG1051 INTELLECTUAL PROPERTY RIGHTS

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To introduce fundamental aspects of Intellectual property Rights to students who are going to play a major role in development and management of innovative projects in industries.
- To disseminate knowledge on patents, patent regime in India and abroad and registration aspects.
- To understand about various agreements that governs IPR.
- To provide comprehensive knowledge to the students regarding digital products and law.
- To introduce emerging issues in IPR and various enforcement measures.

UNIT I INTRODUCTION **9**

Introduction to IPRs, Basic concepts and need for Intellectual Property - Patents, Copyrights, Geographical Indications, IPR in India and Abroad – Genesis and Development – the way from WTO to WIPO –TRIPS, Nature of Intellectual Property, Industrial Property, technological Research, Inventions and Innovations – Important examples of IPR.

UNIT II REGISTRATION OF IPRs **9**

Meaning and practical aspects of registration of Copy Rights, Trademarks, Patents, Geographical Indications, Trade Secrets and Industrial Design registration in India and Abroad.

UNIT III AGREEMENTS AND LEGISLATIONS **9**

International Treaties and Conventions on IPRs, TRIPS Agreement, PCT Agreement, Patent Act of India, Patent Amendment Act, Design Act, Trademark Act, Geographical Indication Act.

UNIT IV DIGITAL PRODUCTS AND LAW **9**

Digital Innovations and Developments as Knowledge Assets – IP Laws, Cyber Law and Digital Content Protection – Unfair Competition – Meaning and Relationship between Unfair Competition and IP Laws – Case Studies.

UNIT V ENFORCEMENT OF IPRs **9**

Infringement of IPRs, Enforcement Measures, Emerging issues – Case Studies.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. V. Scople Vinod, Managing Intellectual Property, Prentice Hall of India pvt Ltd, 2012.

2. S. V. Satakar, “Intellectual Property Rights and Copy Rights, Ess Ess Publications, New Delhi, 2002

REFERENCES:

1. Deborah E. Bouchoux, “Intellectual Property: The Law of Trademarks, Copyrights, Patents and Trade Secrets”, Cengage Learning, Third Edition, 2012.
2. Prabuddha Ganguli, “Intellectual Property Rights: Unleashing the Knowledge Economy”, McGraw Hill Education, 2011.
3. Edited by Derek Bosworth and Elizabeth Webster, The Management of Intellectual Property, Edward Elgar Publishing Ltd., 2013

COURSE OUTCOMES :

1. Distinguish and explain various forms of IPRs.
2. Familiar with registration procedure of IPR.
3. Apply statutory provisions to protect particular form of IPRs
4. Identify procedure to protect different forms of IPRs national and international level.
5. Understand emerging issues in IPR and various infringements in IPR

PROFESSIONAL ELECTIVES