



SRI SHAKTHI
INSTITUTE OF ENGINEERING AND TECHNOLOGY
(An Autonomous Institution, Affiliated to Anna University)
Coimbatore – 62.



DEPARTMENT OF INFORMATION TECHNOLOGY



CURRICULAM AND SYLLABI
B.TECH – INFORMATION TECHNOLOGY

REGULATION – 2019



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DEPARTMENT OF INFORMATION TECHNOLOGY

VISION AND MISSION OF THE INSTITUTION

Vision

To make the institution one of our nation's great engineering schools, recognized nationally and internationally for excellence and teaching, research and public service. We seek to be the preferred destination for students, practitioners seeking an engineering education, employers hiring engineering graduates and organizations seeking engineering knowledge.

Mission

To provide an engineering environment to develop the intellectual capacity, critical thinking, creativity and problem solving ability of the students.

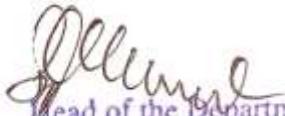
VISION AND MISSION OF THE DEPARTMENT

Vision

The Information Technology Department will be a recognized centre of excellence in creating engineers for ever changing technologies of Information Technology and IT Enabled service industries.

Mission

The department of Information Technology is dedicated to create learning environment for students to gain core knowledge in the field of Information technology and to provide opportunities to acquire knowledge in various tools and programming languages by the way of self-learning, and to solve engineering problems for the betterment of mankind.


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CHOICE BASED CREDIT SYSTEM

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

1. To ensure graduates will be proficient in utilizing the fundamental knowledge of basic sciences, mathematics and Information Technology for the applications relevant to various streams of Engineering and Technology.
2. To enrich graduates with the core competencies necessary for applying knowledge of computers and telecommunications equipment to store, retrieve, transmit, manipulate and analyse data in the context of business enterprise.
3. To enable graduates to think logically, pursue lifelong learning and will have the capacity to understand technical issues related to computing systems and to design optimal solutions.
4. To enable graduates to develop hardware and software systems by understanding the importance of social, business and environmental needs in the human context.
5. To enable graduates to gain employment in organizations and establish themselves as professionals by applying their technical skills to solve real world problems and meet the diversified needs of industry, academia and research.

PROGRAM OUTCOMES (POs)

ENGINEERING GRADUATES WILL BE ABLE TO:

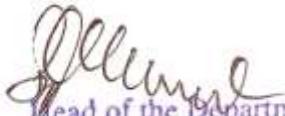
1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyse complex engineering problems reaching 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.


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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 modelling 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 OBJECTIVES (PSOs)

1. **Professional Skills:** To create, select, and apply appropriate techniques, resources, modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
2. **Problem Solving Skills:** To manage complex IT projects with consideration of the human, financial, ethical and environmental factors and an understanding of risk management processes, and operational and policy implications.
3. **Career and Entrepreneurship:** The ability to employ recent technologies, programming languages, and platforms.


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MAPPING OF PROGRAMME EDUCATIONAL OBJECTIVES WITH PROGRAMME OUTCOMES

A broad relation between the programme objective and the outcomes is given in the following table

PROGRAMME EDUCATIONAL OBJECTIVES	PROGRAMME OUTCOMES											
	A	B	C	D	E	F	G	H	I	J	K	L
1	3	2										
2	3	3	1	1								2
3			3			1						3
4			3		1	2	3	1				
5				3				1	1	2	2	1

MAPPING OF PROGRAM SPECIFIC OBJECTIVES WITH PROGRAMME OUTCOMES

A broad relation between the Program Specific Objectives and the outcomes is given in the following table

PROGRAM SPECIFIC OBJECTIVES	PROGRAMME OUTCOMES											
	A	B	C	D	E	F	G	H	I	J	K	L
1	3	2			3				2	2		
2				3			3	3			3	
3								2	1	3		

Contributions 1: Reasonable 2: Significant 3: Strong


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B.TECH – INFORMATION TECHNOLOGY
REGULATION – 2019
CHOICE BASED CREDIT SYSTEM

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

A broad relation between the Course Outcomes and Program Outcomes is given in the following table

COURSE OUTCOMES		PROGRAM OUTCOMES												
Sem	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	
I	Communicative English						✓	✓	✓	✓	✓		✓	
	Matrices and Calculus for CSE & IT	✓	✓	✓		✓							✓	
	Applied Chemistry	✓	✓											
	Information Technology Essentials	✓	✓	✓		✓	✓				✓	✓	✓	
	Computational Thinking and Problem Solving	✓	✓	✓		✓				✓		✓	✓	
	Engineering Exploration-I	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	
	Crop Production	✓	✓		✓	✓	✓	✓						
	Language - Tamil Language - Malayalam Foundation English								✓	✓	✓	✓	✓	✓
	Information Technology Essentials Laboratory	✓	✓	✓		✓					✓	✓	✓	
	Computational Thinking and Problem-Solving Laboratory	✓	✓	✓	✓					✓	✓		✓	
	Applied Chemistry Laboratory	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	


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II	English for Engineers						✓	✓	✓	✓	✓		✓
	Advance Calculus and Set Algebra	✓	✓	✓		✓							✓
	Physics For Information Science	✓	✓										
	C Programming	✓	✓	✓	✓	✓							
	Basic Electronics	✓	✓	✓									
	Computer Architecture	✓	✓	✓									
	Basic Electronics Laboratory	✓	✓	✓	✓	✓							
	Physics For Information Science Laboratory	✓	✓										
	C Programming Laboratory	✓	✓	✓	✓	✓							
	Engineering Exploration-II	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓
English for Engineers Laboratory						✓	✓	✓	✓				✓
Engineering Exploration – III	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	
Discrete Mathematics	✓	✓	✓		✓								✓
Object oriented Programming	✓	✓	✓	✓									
Web Scripting	✓	✓	✓		✓								✓
Data Structures	✓	✓	✓	✓									✓
Digital Principles and System Design	✓	✓	✓	✓	✓	✓					✓	✓	✓
Database Technology	✓	✓	✓		✓								✓
Object oriented Programming Laboratory	✓	✓	✓		✓								
Web Scripting Laboratory	✓	✓	✓	✓							✓		
Data Structures Laboratory	✓	✓	✓	✓									✓
Career Enhancement Program - I	✓	✓				✓	✓	✓	✓	✓			✓
Digital Principles And	✓	✓	✓		✓								


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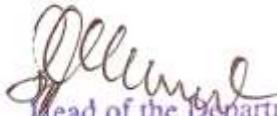
	System Design Laboratory												
	Database Technology Laboratory	✓	✓	✓									✓

IV	Probability, Statistics and Queueing Theory	✓	✓	✓		✓							✓
	Operating Systems	✓	✓	✓									
	Embedded Systems	✓	✓	✓			✓	✓					
	Design and Analysis of Algorithms	✓	✓	✓									
	Advanced Java Programming		✓	✓		✓							✓
	Advanced Databases	✓	✓	✓	✓	✓							
	Engineering Exploration-IV	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓
	Career Enhancement Program - II		✓	✓				✓	✓		✓	✓	
	Advanced Databases Laboratory	✓	✓	✓	✓	✓							
	Advanced Java Programming Laboratory		✓	✓		✓							✓
	Operating Systems Laboratory	✓	✓	✓									
	Embedded Systems Laboratory	✓	✓	✓		✓					✓		
	Design and Analysis of Algorithms Laboratory	✓	✓	✓	✓	✓							✓
	Computer Networks	✓	✓	✓									
	Compiler Design	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓
	Software Engineering	✓	✓	✓	✓			✓			✓	✓	
	Computational Intelligence	✓	✓	✓	✓		✓						
	Professional Elective - I												
	Computer Networks Laboratory	✓	✓	✓		✓							

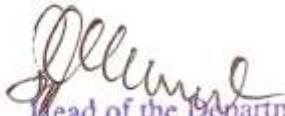

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	Compiler Design Laboratory	✓	✓			✓							
	Software Engineering Laboratory	✓	✓	✓	✓			✓			✓	✓	
	Engineering Exploration -V	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓
	Career Enhancement Program- III		✓	✓				✓	✓		✓	✓	
	Web development Laboratory	✓	✓	✓		✓			✓	✓	✓		✓

VI	Machine Learning Techniques	✓	✓	✓	✓		✓						
	Object Oriented Analysis and Design	✓	✓	✓	✓	✓					✓	✓	
	Mobile Communication	✓	✓	✓									
	Cloud Computing	✓	✓	✓	✓		✓						
	Information Security	✓	✓	✓	✓		✓						
	Professional Elective - II												
	Object Oriented Analysis and Design Laboratory	✓	✓	✓	✓	✓							
	Machine Learning Techniques Laboratory	✓	✓	✓	✓		✓						
	Cloud Computing Laboratory	✓	✓	✓	✓	✓	✓						
	Mini Project	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Career Enhancement Program - IV		✓	✓				✓	✓		✓	✓	


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VII	Professional Elective – III												
	Professional Elective – IV												
	Open Elective - I												
	Professional Readiness for Innovation, Employability and Entrepreneurship	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Project Phase I	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
VIII	Professional Elective - V												
	Open Elective - II												
	Project Phase II	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓


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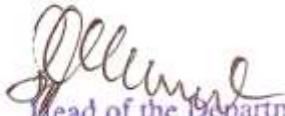
SEMESTER I

S.No	Course Code	Course name	Category	Contact Periods	L	T	P	C
	THEORY							
1	U19ENTL101T	Communicative English	HS	2	2	0	0	2
2	U19MATH105	Matrices and Calculus For CSE and IT	BS	4	3	1	0	4
3	U19CHTL101T	Applied Chemistry	BS	3	3	0	0	3
4	U19ITTL101T	Information Technology Essentials	ES	3	3	0	0	3
5	U19CSTL101T	Computational Thinking and Problem Solving	ES	3	3	0	0	3
	PRACTICALS							
6	U19ENTL101L	Communicative English Laboratory	HS	2	0	0	2	1
7	U19CHTL101L	Applied Chemistry Laboratory	BS	2	0	0	2	1
8	U19ITTL101L	Information Technology Essentials Laboratory	ES	2	0	0	2	1
9	U19CSTL101L	Computational Thinking and Problem Solving Laboratory	ES	2	0	0	2	1
10	U19CCEX101	Engineering Exploration-I	EEC	3	1	0	2	2
11	U19AEPC101	Crop Production Laboratory-I	BS	5	0	0	4	2
	LANGUAGES							
12	U19LATH101 U19LATH102 U19LAEN101	Language - Tamil Language - Malayalam Foundation English	HS	4	2	0	0	2
		TOTAL		35	17	1	14	25


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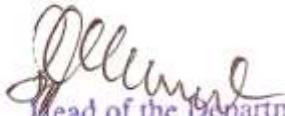
SEMESTER II

S.No	Course Code	Course name	Category	Contact Periods	L	T	P	C
	THEORY							
1	U19ENTL202T	English for Engineers	HS	2	2	0	0	2
2	U19MATH214	Advance Calculus and Set Algebra	BS	3	3	0	0	3
3	U19PHTL205T	Physics For Information Science	BS	2	2	0	0	2
4	U19CSTL203T	C Programming	ES	3	3	0	0	3
5	U19ECTL101T	Basic Electronics	ES	3	3	0	0	3
6	U19ITTH201	Computer Architecture	PC	3	3	0	0	3
	PRACTICALS							
7	U19ECTL101L	Basic Electronics Laboratory	ES	2	0	0	2	1
8	U19PHTL205L	Physics For Information Science Laboratory	BS	2	0	0	2	1
9	U19CSTL203L	C Programming Laboratory	ES	2	0	0	2	1
10	U19CCEX202	Engineering Exploration-II	EEC	3	1	0	2	2
11	U19ENTL202L	English for Engineers Laboratory	HS	2	0	0	2	1
		TOTAL		27	17	0	10	22


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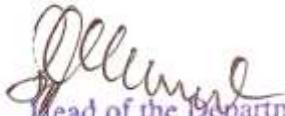
SEMESTER III

S.No	Course Code	Course name	Category	Contact Periods	L	T	P	C
	THEORY							
1	U19MATH322	Discrete Mathematics	BS	4	3	1	0	4
2	U19ITTL304T	Database Technology	PC	3	3	0	0	3
3	U19CSTL305T	Data Structures	PC	3	3	0	0	3
4	U19ECTL309T	Digital Principles And System Design	ES	3	3	0	2	4
5	U19CSTL307T	Object oriented Programming	PC	3	3	0	0	3
6	U19ITTL303T	Web Scripting	PC	3	3	0	0	3
	PRACTICALS							
7	U19ITTL304L	Database Technology Laboratory	PC	2	0	0	2	1
8	U19CSTL305L	Data Structures Laboratory	PC	2	0	0	2	1
9	U19ECTL309L	Digital Principles And System Design Laboratory	ES	2	0	0	2	1
10	U19CSTL307L	Object oriented Programming Laboratory	PC	2	0	0	2	1
11	U19ITTL303L	Web Scripting Laboratory	PC	2	0	0	2	1
12	U19CCEX303	Engineering Exploration – III	EEC	3	1	0	2	1
13	U19CCLC301	Career Enhancement Program - I	EEC	2	1	0	1	1
		TOTAL		34	20	1	15	27


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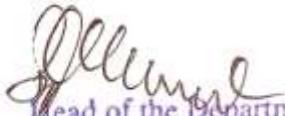
SEMESTER IV

S.No	Course Code	Course name	Category	Contact Periods	L	T	P	C
	THEORY							
1	U19MATH429	Probability, Statistics and Queueing Theory	BS	4	3	1	0	4
2	U19CSTL304T	Operating Systems	PC	3	3	0	0	3
3	U19ECTL412T	Embedded Systems	PC	3	3	0	0	3
4	U19CSTL410T	Design and Analysis of Algorithms	PC	3	3	0	0	3
5	U19ITTL405T	Advanced Java Programming	PC	3	3	0	0	3
6	U19CSTL408T	Advanced Databases	PC	3	3	0	0	3
	PRACTICALS							
7	U19CSTL410L	Design and Analysis of Algorithms Laboratory	PC	2	0	0	2	1
8	U19CSTL304L	Operating Systems Laboratory	PC	2	0	0	2	1
9	U19ECTL412L	Embedded Systems Laboratory	PC	2	0	0	2	1
10	U19ITTL405L	Advanced Java Programming Laboratory	PC	2	0	0	2	1
11	U19CSTL408L	Advanced Databases Laboratory	PC	2	0	0	2	1
12	U19CCEX404	Engineering Exploration-IV	EEC	3	1	0	2	1
13	U19CCLC402	Career Enhancement Program - II	EEC	2	1	0	1	1
		TOTAL		34	20	1	13	26


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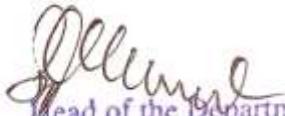
SEMESTER V

S.No	Course Code	Course name	Category	Contact Periods	L	T	P	C
	THEORY							
1	U19ITTL506T	Computer Networks	PC	3	3	0	0	3
2	U19CSTL511T	Compiler Design	PC	3	3	0	0	3
3	U19CSTL614T	Software Engineering	PC	3	3	0	0	3
4	U19ITTH502	Computational Intelligence	PC	3	3	0	0	3
5	U19CSPE009	Full Stack Web Development(PE1)	PE	3	3	0	0	3
	PRACTICALS							
6	U19ITTL506L	Computer Networks Laboratory	PC	2	0	0	2	1
7	U19CSTL511L	Compiler Design Laboratory	PC	2	0	0	2	1
8	U19CSTL614L	Software Engineering Laboratory	PC	2	0	0	2	1
9	U19CSLC501	Web development Laboratory	PC	2	0	0	2	1
10	U19CCEX505	Engineering Exploration -V	EEC	2	0	0	2	1
11	U19CCLC503	Career Enhancement Program- III	EEC	2	0	0	2	1
		TOTAL		27	15	0	12	21


 Head of the Department
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 Coimbatore - 641 014

SEMESTER VI

S.No	Course Code	Course name	Category	Contact Periods	L	T	P	C
	THEORY							
1	U19ITTL607T	Machine Learning Techniques	PC	3	3	0	0	3
2	U19CSTL512T	Object Oriented Analysis and Design	PC	3	3	0	0	3
3	U19ITTH603	Mobile Communication	PC	3	3	0	0	3
4	U19ITTL608T	Cloud Computing	PC	3	3	0	0	3
5	U19ITTH604	Information Security	PC	3	3	0	0	3
6	U19ITPE007	Data Privacy (PE II)	PE	3	3	0	0	3
	PRACTICALS							
7	U19CSTL512L	Object Oriented Analysis and Design Laboratory	PC	2	0	0	2	1
8	U19ITTL607L	Machine Learning Techniques Laboratory	PC	2	0	0	2	1
9	U19ITTL608L	Cloud Computing Laboratory	PC	2	0	0	2	1
10	U19ITPR601	Mini Project	EEC	2	0	0	2	1
11	U19CCLC604	Career Enhancement Program IV	EEC	2	0	0	2	1
		TOTAL		28	18	0	10	23

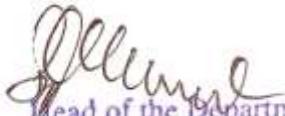

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SEMESTER VII

S.No	Course Code	Course name	Category	Contact Periods	L	T	P	C
THEORY								
1	U19ITPE015	Software Project Management (Professional Elective – III)	PE	3	3	0	0	3
2	U19ITPE018	Electronic Commerce (Professional Elective – IV)	PE	3	3	0	0	3
3	U19BTOE001	Basics of Bioinformatics (OE I)	OE	3	3	0	0	3
PRACTICALS								
4	U19ITPR703	Professional Readiness for Innovation, Employability and Entrepreneurship	EEC	10	0	0	6	3
5	U19ITPR702	Project Phase I	EEC	4	0	0	4	2
TOTAL				23	9	0	10	14

SEMESTER VIII

S.No	Course Code	Course name	Category	Contact Periods	L	T	P	C
THEORY								
1	U19CSPE004	Software Testing (Professional Elective V)	PE	3	3	0	0	3
2	U19EDOE001	Intellectual Property Rights - (OE II)	OE	3	3	0	0	3
PRACTICALS								
3	U19ITPR804	Project Phase II	EEC	12	0	0	12	6
TOTAL				18	6	0	12	12


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HUMANITIES AND SOCIAL SCIENCES (HS)

Sem	Course Code	Course name	Category	Contact Periods	L	T	P	C
I	U19ENTL101T	Communicative English	HS	2	2	0	0	2
I	U19ENTL101L	Communicative English Laboratory	HS	2	0	0	2	1
I	U19LATH101 U19LATH102 U19LAEN101	Language - Tamil Language - Malayalam Foundation English	HS	4	2	0	0	2
II	U19ENTL202T	English for Engineers	HS	2	2	0	0	2
II	U19ENTL202L	English for Engineers Laboratory	HS	2	0	0	2	1

BASIC SCIENCES (BS)

Sem	Course Code	Course name	Category	Contact Periods	L	T	P	C
I	U19MATH105	Matrices and Calculus For CSE and IT	BS	4	3	1	0	4
I	U19CHTL101T	Applied Chemistry	BS	3	3	0	0	3
I	U19CHTL101L	Applied Chemistry Laboratory	BS	2	0	0	2	1
I	U19AEPC101	Crop Production Laboratory - I	BS	5	3	0	2	2
II	U19MATH214	Advance Calculus and Set Algebra	BS	3	3	0	0	3
II	U19PHTL205T	Physics For Information Science	BS	2	2	0	0	2
II	U19PHTL205L	Physics For Information Science Laboratory	BS	2	0	0	2	1
III	U19MATH322	Discrete Mathematics	BS	4	3	1	0	4
IV	U19MATH429	Probability, Statistics and Queueing Theory	BS	4	3	1	0	4


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 Information Technology
 Sri Shakthi Inst. of Engg. & Tech.
 Coimbatore - 641 014

ENGINEERING SCIENCES (ES)

Sem	Course Code	Course name	Category	Contact Periods	L	T	P	C
I	U19ITTL101T	Information Technology Essentials	ES	3	3	0	0	3
I	U19CSTL101T	Computational Thinking and Problem Solving	ES	3	3	0	0	3
I	U19ITTL101L	Information Technology Essentials Laboratory	ES	2	0	0	2	1
I	U19CSTL101L	Computational Thinking and Problem Solving Laboratory	ES	2	0	0	2	1
II	U19CSTL203T	C Programming	ES	3	3	0	0	3
II	U19ECTL101T	Basic Electronics	ES	3	3	0	0	3
II	U19CSTL203L	C Programming Laboratory	ES	2	0	0	2	1
II	U19ECTL101L	Basic Electronics Laboratory	ES	2	0	0	2	1
III	U19ECTL309T	Digital Principles And System Design	ES	3	3	0	0	3
III	U19ECTL309L	Digital Principles And System Design Laboratory	ES	2	0	0	2	1

PROFESSIONAL CORE (PC)

Sem	Course Code	Course name	Category	Contact Periods	L	T	P	C
II	U19ITTH201	Computer Architecture	PC	3	3	0	0	3
III	U19ITTL304T	Database Technology	PC	3	3	0	0	3
III	U19CSTL305T	Data Structures	PC	3	3	0	0	3
III	U19CSTL307T	Object oriented Programming	PC	3	3	0	0	3
III	U19ITTL303T	Web Scripting	PC	3	3	0	0	3
III	U19ITTL304L	Database Technology Laboratory	PC	2	0	0	2	1
III	U19CSTL305L	Data Structures Laboratory	PC	2	0	0	2	1
III	U19CSTL307L	Object oriented Programming Laboratory	PC	2	0	0	2	1
III	U19ITTL303L	Web Scripting Laboratory	PC	2	0	0	2	1


 Head of the Department
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 Sri Shakthi Inst. of Engg. & Tech.
 Coimbatore - 641 014

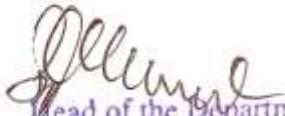
IV	U19CSTL304T	Operating Systems	PC	3	3	0	0	3
IV	U19ECTL412T	Embedded Systems	PC	3	3	0	0	3
IV	U19CSTL410T	Design and Analysis of Algorithms	PC	3	3	0	0	3
IV	U19ITTL405T	Advanced Java Programming	PC	3	3	0	0	3
IV	U19CSTL408T	Advanced Databases	PC	3	3	0	0	3
IV	U19CSTL408L	Advanced Databases Laboratory	PC	2	0	0	2	1
IV	U19ITTL405L	Advanced Java Programming Laboratory	PC	2	0	0	2	1
IV	U19CSTL304L	Operating Systems Laboratory	PC	2	0	0	2	1
IV	U19ECTL412L	Embedded Systems Laboratory	PC	2	0	0	2	1
IV	U19CSTL410L	Design and Analysis of Algorithms Laboratory	PC	2	0	0	2	1
V	U19ITTL506T	Computer Networks	PC	3	3	0	0	3
V	U19CSTL511T	Compiler Design	PC	3	3	0	0	3
V	U19CSTL614T	Software Engineering	PC	3	3	0	0	3
V	U19ITTH502	Computational Intelligence	PC	3	3	0	0	3
V	U19ITTL506L	Computer Networks Laboratory	PC	2	0	0	2	1
V	U19CSTL511L	Compiler Design Laboratory	PC	2	0	0	2	1
V	U19CSTL614L	Software Engineering Laboratory	PC	2	0	0	2	1
V	U19CSLC501	Web development Laboratory	PC	2	0	0	2	1
VI	U19ITTL607T	Machine Learning Techniques	PC	3	3	0	0	3
VI	U19CSTL512T	Object Oriented Analysis and Design	PC	3	3	0	0	3
VI	U19ITTH603	Mobile Communication	PC	3	3	0	0	3
VI	U19ITTL608T	Cloud Computing	PC	3	3	0	0	3
VI	U19ITTH604	Information Security	PC	3	3	0	0	3
VI	U19CSTL512L	Object Oriented Analysis and Design Laboratory	PC	2	0	0	2	1


 Head of the Department
 Information Technology
 Sri Shakthi Inst. of Engg. & Tech.
 Coimbatore - 641 014

VI	U19ITTL607L	Machine Learning Techniques Laboratory	PC	2	0	0	2	1
VI	U19ITTL608L	Cloud Computing Laboratory	PC	2	0	0	2	1

PROFESSIONAL ELECTIVES (PE)

S.No	Course Code	Course name	Category	Contact Periods	L	T	P	C
1	U19ITPE001	Cyber Forensics	PE	3	3	0	0	3
2	U19ITPE002	High Speed Networks	PE	3	3	0	0	3
3	U19CSPE009	Full Stack Web Development	PE	3	3	0	0	3
4	U19CSPE008	Information Retrieval Techniques	PE	3	3	0	0	3
5	U19ITPE003	Agile Methodologies	PE	3	3	0	0	3
6	U19ITPE004	C# and .Net Programming	PE	3	3	0	0	3
7	U19ITPE005	Computer Graphics & Multimedia	PE	3	3	0	0	3
8	U19ITPE006	Network Management	PE	3	3	0	0	3
9	U19ITPE007	Data Privacy	PE	3	3	0	0	3
10	U19CSPE004	Software Testing	PE	3	3	0	0	3
11	U19ITPE008	Big Data Analytics	PE	3	3	0	0	3
12	U19ITPE009	Advanced Big Data and its Ecosystem	PE	3	3	0	0	3
13	U19ECTH706	Wireless Networks	PE	3	3	0	0	3
14	U19ITPE011	Software Architecture	PE	3	3	0	0	3
15	U19ITPE012	MERN Stack– Web Application Development	PE	3	3	0	0	3
16	U19ITPE013	Artificial Intelligence	PE	3	3	0	0	3
17	U19ITPE014	Digital Image Processing	PE	3	3	0	0	3
18	U19ITPE015	Software Project Management	PE	3	3	0	0	3
19	U19CSPE005	Software Test Automation	PE	3	3	0	0	3


 Head of the Department
 Information Technology
 Sri Shakthi Inst. of Engg. & Tech.
 Coimbatore - 641 014

20	U19ITPE016	Machine learning with Python Programming	PE	3	3	0	0	3
21	U19ITPE017	Open-Source Technologies	PE	3	3	0	0	3
22	U19CSPE006	Social Network Analysis	PE	3	3	0	0	3
23	U19ITPE018	Electronic Commerce	PE	3	3	0	0	3
24	U19ITPE019	Advanced Machine Learning	PE	3	3	0	0	3
25	U19ITPE020	Green Computing	PE	3	3	0	0	3
26	U19ITPE021	Client Server Architecture	PE	3	3	0	0	3
27	U19ITPE022	Natural Language Processing	PE	3	3	0	0	3
28	U19ITPE023	Speech Processing	PE	3	3	0	0	3

OPEN ELECTIVES (OE)

S.No	Course Code	Course name	Category	Contact Periods	L	T	P	C
1	U19ITOE001	UX/UI Design	OE	3	3	0	0	3
2	U19ITOE002	Multimedia Systems	OE	3	3	0	0	3
3	U19ITOE003	Foundations of Information Technology	OE	3	3	0	0	3
4	U19ITOE004	Web Design and Management	OE	3	3	0	0	3

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

Sem	Course Code	Course name	Category	Contact Periods	L	T	P	C
I	U19CCEX101	Engineering Exploration-I	EEC	3	1	0	2	2
II	U19CCEX202	Engineering Exploration-II	EEC	3	1	0	2	2
III	U19CCEX303	Engineering Exploration – III	EEC	3	1	0	2	1
III	U19CCLC301	Career Enhancement Program - I	EEC	2	1	0	1	1


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 Coimbatore - 641 014

IV	U19CCEX404	Engineering Exploration-IV	EEC	3	1	0	2	1
IV	U19CCLC402	Career Enhancement Program - II	EEC	2	1	0	1	1
V	U19CCEX505	Engineering Exploration -V	EEC	2	0	0	2	1
V	U19CCLC503	Career Enhancement Program- III	EEC	2	0	0	2	1
VI	U19ITPR601	Mini Project	EEC	2	0	0	2	1
VI	U19CCLC604	Career Enhancement Program IV	EEC	2	0	0	2	1
VII	U19ITPR703	Professional Readiness for Innovation, Employability and Entrepreneurship	EEC	10	0	0	6	3
VII	U19ITPR702	Project Phase I	EEC	4	0	0	4	2
VIII	U19ITPR804	Project Phase II	EEC	12	0	0	12	6

S.NO	SUBJECT AREA	CREDITS AS PER SEMESTER								CREDITS TOTAL	PERCENTAGE
		I	II	III	IV	V	VI	VII	VIII		
1	HS	5	3							8	4.71%
2	BS	10	6	4	4					24	14.12%
3	ES	8	8	5						21	12.35%
4	PC		3	16	20	16	18			73	42.94%
5	PE					3	3	6	3	15	8.82%
6	OE							3	3	6	3.53%
7	EEC	2	2	2	2	2	2	5	6	23	13.53%
TOTAL										170	
	Non Credit/ Mandatory										


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SEMESTER I

U19ENTL101T

COMMUNICATIVE ENGLISH

L T P C
2 0 0 2

COURSE OBJECTIVES

The course aims to provide the students

- To enhance learners' listening skills so as to help them to comprehend conversations and lectures in diverse contexts.
- To develop the speaking skills of learners with fluency and appropriacy in order to express their ideas, views and opinions in varied formal and informal contexts and social situation.
- To inculcate the habit of reading using different types of reading strategies for understanding contextual situations.
- To develop the learners to write various writing forms effectively and coherently in an appropriate style.
- To develop linguistic competence and performance to express ideas effectively and appropriately in different contexts.

PREREQUISITES :Nil

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1							2	2	2	3		2			2
CO2								1	2	3		2			2
CO3						2		2	3	3		2			2
CO4							3	2	1	3		3			3
CO5						3	3	3	3	3		3			3

UNIT I	INTRODUCTION TO BUSINESS COMMUNICATION	6
	Parts of Speech - Jumbled words - Making mild Suggestions/offers/invitations - Discourse Markers - Letter writing (Request / Complaint / Thanking).	
UNIT II	EXTENDED WRITING	6
	Seeking advice / Information politely - Root words - Present Tense - Reading Comprehension (MCQ) - Paragraph writing.	
UNIT III	READING COMPREHENSION	6
	Past Tense - Phrasal Verbs - Jargon - Making polite requests - Reading and comprehending newspaper articles - Hints Development.	
UNIT IV	EXTENDED GRAMMAR CONCEPT	6
	Future Tense - Determiners - Making inquiries/requests indirectly and politely - Indicating Preference - Reading Comprehension (Short questions) - Constructing conversations (Formal and Informal).	
UNIT V	TECHNICAL COMMUNICATION	6

Pointing out mistakes and unpleasant things politely - Asking yes or no type questions and wh-questions indirectly and politely - Misspelled words - Cloze reading - Picture Description – Jumbled sentences..

Total: 30 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Listen and comprehend technical and non-technical spoken experts critically and functionally
- CO2:** Write different forms of writing effectively and apparently and create advance level of writing in English.
- CO3:** Read different genres of text, analyzing and interpreting it by guessing the meaning from the context and employ it for new ideas, to learn and present.
- CO4:** Speak fluently using the proper vocabulary, modulation, articulation and pronunciation.
- CO5:** Familiarize the soft skills needed for the employability and gaining functional understanding of the language.

TEXT BOOKS:

- T1:** Means, L. Thomas and Elaine Langlois. English & Communication for Colleges. Cengage Learning, USA: 2007
- T2:** Redston, Chris & Gillies Cunningham. Face2Face (Pre-intermediate Student's Book). Cambridge University Press, New Delhi: 2005.

REFERENCE BOOKS:

- R1:** Carter, R., & McCarthy, M. (2006). Cambridge grammar of English: A comprehensive guide: spoken and written English grammar and usage. Cambridge University Press.
- R2:** Comfort, Jeremy, et al. Speaking Effectively: Developing Speaking Skills for Business English. Cambridge University Press, Cambridge: Reprint 2011.
- R3:** Meenakshi Raman and Sangeeta Sharma. Technical Communication. Oxford University Press. 2018

WEB RESOURCES:

- W1:** <http://www.bbc.co.uk/worldservice/learningenglish/language/>
- W2:** <http://www.bbc.co.uk/learningenglish/english/features/pronunciation/introduction>
- W3:** http://toefl.uobabylon.edu.iq/papers/itp_2015_1817487.pdf

U19MATH105

MATRICES AND CALCULUS FOR CSE&IT

L T P C
3 1 0 4

COURSE OBJECTIVES

Engineering Mathematics is an essential tool for describing and analyzing engineering process and systems. It enables precise representation and communication of knowledge. The objective of the course is to expose students to understand the basics and importance of Matrix Theory, Differential Calculus, Integral Calculus and Ordinary Differential Equations which are being widely used in Information Sciences.

PREREQUISITES : Basic concepts of Matrices , System of linear equations, Limits and Continuity, Basic concepts of Differentiation, Basic concepts of Integration

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2		2							2	2	2	2
CO2	3	3	2		2							2	2	2	2
CO3	3	3	2		2							2	2	2	2
CO4	3	3	2		2							2	2	2	2
CO5	3	3	2		2							2	2	2	2
CO6	3	3	2		2							2	2	2	2

UNIT I MATRICES 9+3

Consistency of linear system of equations– Rouche’s theorem–Linear transformations–Vectors–Linear dependence – Eigenvalues and Eigenvectors of a real matrix–Properties of Eigenvalues and Eigenvectors (excluding proof)– Applications of Matrices in CSE and IT.

UNIT II DIAGONALIZATION OF A REAL SYMMETRIC MATRICES 8+3

Cayley - Hamilton theorem (excluding proof) – Orthogonal matrix – Diagonalization of matrices– Reduction of Quadratic form to Canonical form by orthogonal transformation – Applications of Diagonalization of a real symmetric matrices in CSE and IT.

UNIT III DIFFERENTIAL CALCULUS AND ITS GEOMETRICAL APPLICATIONS 9+3

Derivatives – Curvature –Radius of curvature in Cartesian and Parametric forms – Simple problems – Centre of curvature – Circle of curvature – Involutives and Evolutives of Parabola – Applications of Differential Calculus in CSE and IT.

UNIT IV INTEGRAL CALCULUS AND MULTIPLE INTEGRALS 9+4

Definite and Indefinite integrals – Substitution rule – Integration by parts – Double integrals – Area


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Information Technology
Sri Shakthi Inst. of Engg. & Tech.
Coimbatore - 641 014

enclosed by plane curves – Triple integrals in Cartesian coordinates – Applications of Integrals in CSE and IT.

UNIT V ORDINARY DIFFERENTIAL EQUATIONS

9+3

Higher order linear differential equations with constant coefficients – Cauchy's linear equations – Simultaneous first order linear equations with constant coefficients – Applications of Ordinary Differential Equations in CSE and IT

Total: 60 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Calculate the rank of a matrix, Eigenvalues and Eigenvectors and solutions of system of linear equations.
- CO2:** Use the applicability of Cayley-Hamilton theorem to find the inverse of a matrix and diagonalization of matrices which are frequently used in representing data in Computer and Scientific applications.
- CO3:** Gain knowledge to find the radius of curvature and torsion of a curve which is used for analyzing the output data.
- CO4:** Gain knowledge to determine definite integrals exactly and apply to regions under and between curves..
- CO5:** Gain knowledge to solve differential equations arising in Computer science and engineering and able to interpret the underlying physical process.
- CO6:** Knowledge of Calculus is essential for coding in applications and the design of algorithms.

TEXT BOOKS:

- T1:** Grewal. B. S., "Higher Engineering Mathematics", 44th Edition, Khanna Publishers, New Delhi, 2017.
- T2:** James Stewart., "Calculus: Early Transcendentals", Cengage Learning, 7th Edition, New Delhi, 2015. [For Unit IV-Sections 5.2,5.4(excluding net change Theorem), 5.5 and 7.1]

REFERENCE BOOKS:

- R1:** Kreyszig E., "Advanced Engineering Mathematics", 10th Edition, John Wiley and sons, 2011.
- R2:** Peter V. O. Neil., "Advanced Engineering Mathematics", 7th Edition Cengage learning, India pvt., Ltd, New Delhi. 2011.
- R3:** Veerarajan T., "Engineering Mathematics", Tata McGraw Hill Publishing Company, New Delhi (2008)
- R4:** Weir. M. D and Joel Hass., " Thomas Calculus", 14th Edition, Pearson India, 2017

COURSE OBJECTIVES

The course aims to provide the students

- To make the students understand the principles of electrochemical reactions, corrosion.
- To gain the knowledge on electrochemical processing and the methods for prevention and protection of corrosion.
- To understand the principles and fabrication of batteries and fuel cells.
- To gain knowledge on the principles of polymer chemistry and its engineering application.
- To know the properties and applications of important Nanomaterials.
- To acquire the knowledge about polymer, Nano materials, fuels cell and its application.

PREREQUISITES :Nil

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3													
CO2	3	3													
CO3	3	3													
CO4	3	3													
CO5	3	3													
CO6	3	3													

UNIT I ELECTROCHEMISTRY & CORROSION 9

Electrochemical cells–Reversible and irreversible cells–EMF–Electrochemical series–Significance – Single electrode potential – Nernst equation –Chemical corrosion: oxidation corrosion - Pilling–Bedworth rule–Electrochemical corrosion–Types(Galvanic corrosion,Differential aeration corrosion)– Factors influencing corrosion.

UNIT II ELECTROCHEMICAL PROCESSES & METAL FINISHING 9

Corrosion control–Modifying metal-Cathodic protection(Sacrificial anode, Impressed current method) – Corrosion inhibitors; Protective coatings – Electroplating (Cu and Ni only), Electroless plating of Ni&Cu–Anodizing& Chromating–applications; Electro polishing, Electro chemical machining.

UNIT III BATTERIES & FUEL CELLS 8

Batteries - Types – characteristics - fabrication and working of batteries (alkaline battery, lead – acid battery, Ni-Cd battery and lithium ion batteries) - super capacitors; Fuel cells - principle, working and applications of hydrogen - oxygen, solid oxide, direct methanol and proton exchange membrane fuel cells.

UNIT IV POLYMERS 10
Polymers-Functionality-Degree of polymerization; Polymerization: Types – Glass transition temperature; Plastics – Thermoplastics (Teflon and PMMA) thermosets (Bakelite and Urea formal dehyderesin) – Preparation and applications of polymers (Nylon 66 and Epoxy resins); Fabrication: Compression moulding – Injection moulding – Blow moulding.

UNIT V NANOMATERIALS 9
Nanomaterials – Types (Nanoparticles, Nanoclusters, Nanowires, Nanorods and Nanotubes) – Properties – Synthesis & Applications; Role of bottom up and top down approaches in nanotechnology – sol gel process, CVD and Laser ablation – Nano dynamics - Carbon Nanotubes & Graphene - Applications;

Total: 45 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Understand the cells, potentials, types of corrosion and factors influencing it
- CO2:** Know the corrosion control techniques and metal finishing techniques.
- CO3:** Learn about various types of batteries, fuel cells and its applications.
- CO4:** Gain knowledge on the properties of polymers and manufacturing methods.
- CO5:** Understand the importance of nanomaterials and concepts.
- CO6:** Application of polymer, Nano materials, fuels cell and batteries.

TEXT BOOKS:

- T1:** P. C. Jain and Monica Jain, “Engineering Chemistry”, Dhanpat Rai Publications Pvt. Ltd, New Delhi, 16th Edition, 2017
- T2:** S. S. Dara and S.S. Umare, “Textbook of Engineering Chemistry”, S. Chand & Company Ltd, New Delhi, 2017

REFERENCE BOOKS:

- R1:** Prasanta Rath, “Engineering Chemistry”, Cengage Learning India Pvt. Ltd, 2013.
- R2:** O.G. Palanna, “Engineering Chemistry”, Tata McGraw-Hill Education Pvt. Ltd, New Delhi, 2017.
- R3:** Sunita Rattan, “A Textbook of Engineering Chemistry”, S.K. Kataria & Sons, New Delhi, 2013
- R4:** S. Vairam, P. Kalyani and Suba Ramesh, “Engineering Chemistry”, Wiley India Pvt. Ltd, New Delhi, 2nd Edition 2014.

COURSE OBJECTIVES

The course aims to provide the students

- To gain working knowledge of computers and their components, number system conversion and complements.
- To understand and implement a simple application using various utility tools.
- To understand the various command line interfaces.
- To develop different layouts as per need of applications.
- To develop the dynamic web pages.

PREREQUISITES :Nil

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3									2	3	2	
CO2	3	3	3		3							2	3	2	
CO3	3		3		3							2	3		2
CO4	3		3		3					2		2	3		2
CO5	3	2	3		2	2						2	3	2	2
CO6	3	3	3		3					2	2	2	3	2	2

UNIT I INTRODUCTION TO COMPUTING 10

Computer- History, Generation, classification of Computers- Computer Components: Input/Output units – computer memory- Application of Computers. Number Systems: Binay, Decimal, Octal, Hexadecimal- Conversions-Binary arithmetic: Addition, Subtraction, and Multiplication.

UNIT II UTILITY TOOLS 9

Introduction – Types of softwares, Word processor, Spreadsheets, Presentations Tools, Image Editing Tools- Command Line Interface (CLI).

UNIT III HTML 9

Overview of HTML, Basic Structure of HTML, Elements of HTML, List, Links, Forms, iFrame, Tables, HTML5, Multimedia, Web Page Design using HTML5.

UNIT IV CSS 8

Overview of Cascading Style Sheet, Ways to apply CSS to HTML, CSS for Colors, background Image,Text, Forms, Tables, Borders, Lists, CSS for Website Layout, printing, and Validations.

Overview of JavaScript – Introduction to Variables and Data Types- Operators- Statements -Loops- Functions- Events, Dialogue boxes, Page printing.

Total: 45 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Understand the working principle of computer system and different number conversion techniques.
- CO2:** Create a simple application with different software tools.
- CO3:** Design the modern web pages using the HTML.
- CO4:** Apply CSS features with different layouts as per need of applications.
- CO5:** Apply the JavaScript concept to develop the dynamic web pages.
- CO6:** To familiar web based applications through Javascript.

TEXT BOOKS:

- T1:** Rajaraman - "Fundamentals of computers" 6th edition, Prentice Hall of India, 2015.
- T2:** Jon Duckett, "Beginning HTML, XHTML, CSS and Javascript", Wiley Publishing, Inc 2001.

REFERENCE BOOKS:

- R1:** Jeffrey C. Jackson, "Web Technologies--A Computer Science Perspective", Pearson Education, 2006

COURSE OBJECTIVES

The course aims to provide the students

- To understand the various general steps in problem solving.
- To analyze the efficiency of the algorithms.
- To learn to solve problems using C.
- To understand the concept of arrays and strings.
- To learn C functions and storage classes.

PREREQUISITES :Nil

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2		3		1								3	3	
CO2	3													2	
CO3		2	3											2	
CO4	3		3		3								3	2	2
CO5	3	2		2					2		2	2	1	2	2
CO6	3	2	3	2					2		2	2	2	3	3

UNIT I INTRODUCTION TO COMPUTER PROBLEM SOLVING**9**

Computers - Introduction, CPU - ALU, Memory – RAM/ROM, Input/Output, hard disk, storage. The problem-solving Aspect, Top-Down Design, Implementation of Algorithms, Program Verification, Introduction, Information and data, Data encoding, number systems. Logic: Boolean logic.

UNIT II PROBLEM SOLVING TECHNIQUES AND ALGORITHMIC THINKING**9**

Problem definition, logical reasoning, problem decomposition, abstraction. Flowchart: Name binding, Selection, Repetition, Modularization. Data Organization: List and Arrays. Simple algorithms, Factoring and recursion techniques

UNIT III C PROGRAMMING FUNDAMENTALS**9**

Introduction to C Language - Background, C Programs, Identifiers, Data Types, Variables, Constants, Input / Output Statements Arithmetic, Operators and Expressions: Evaluating Expressions, Precedence and Associativity of Operators, Type Conversions. If, If-Else, Switch-Statement and Examples. Loop Control Statements: For, While, Do While and Examples. Continue, Break and Goto statements.

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1							2	2	2	3		2			2
CO2								1	2	3		2			2
CO3						2		2	3	3		2			2
CO4							3	2	1	3		3			3
CO5						3	3	3	3	3		3			3

LAB COMPONENTS

1. Organs of Speech.
2. Pronunciation – Vowels
3. Pronunciation – Diphthongs
4. Pronunciation - Consonants
5. Word Transcription
6. Pronunciation tips
7. Word stress
8. Intonation
9. News/ Video clips
10. Conversation
11. Self-introduction (Video Recording)
12. Ted Talks (comprehension and questions)

COURSE OUTCOMES

- CO1:** Listen and comprehend technical and non-technical spoken experts critically and functionally.
- CO2:** Write different forms of writing effectively and apparently and create advance level of writing in English.
- CO3:** Read different genres of text, analyzing and interpreting it by guessing the meaning from the context and employ it for new ideas, to learn and present.

- CO4:** Speak fluently using the proper vocabulary, modulation, articulation and pronunciation.
- CO5:** Familiarize the soft skills needed for the employability and gaining functional understanding of the language.

Total: 15 Hours


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COURSE OBJECTIVES

The course aims to provide the students

- To equip the students to understand the concept of conductivity and pH.
- To acquire the knowledge about the various types of volumetric reaction.
- To know the electrochemical characterization techniques.
- To provide a basic knowledge on different instrumental analysis.
- To gain knowledge about the synthesis of nano materials.
- To equip the students to understand the concept electro deposition and electroplating

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	1					2	1		1			
CO2	2	2	1	1					1			1			
CO3	1	1	1	2	1				2	1		1			
CO4	2	1	2	1					2	1		1			
CO5	2	2	3	2					2	1		1			
CO6	1	1	2			2	2					1			

LAB COMPONENTS

1. Testing the conductivity of various types of water (municipal water, distilled water, salt water, waste water).
2. Construction of voltaic cells & batteries.
3. Determination of strength of HCl using pH meter.
4. Determination of strength of HCl using Conductivity meter.
5. Determination of Dissolved Oxygen content of water sample by Winkler's method.
6. Determination of corrosion rate of steel in acid media by weight loss method.
7. Electro-deposition of Copper for corrosion control.
8. Electroplating of Nickel for corrosion control.
9. Redox reactions – Finding emf of Fe in sample by Potentiometry.

10. Determination of molecular weight by Viscometry.
11. Synthesis of conductive polymers & its electrochemical characterization.
12. Synthesis of silver nano particles & its electrochemical characterization.

TEXT BOOKS

T1: Laboratory Manual, prepared by chemistry Department

REFERENCE BOOKS

R1: Vogel's textbook of quantitative chemical analysis (8th edition, 2014)

COURSE OUTCOMES

- CO1:** Estimate the amount of substance present in the given solution using potentiometer and conductivity meter.
- CO2:** Examine the total hardness and chemical oxygen demand in the given solution by volumetric analysis method.
Apply the use of internal and external indicators and their comparison for redox titrations
- CO3:** and mechanisms of iodometric titrations and use of double indicator method in a single titration.
- CO4:** Learn about instrumental analysis and chemical components.
- CO5:** Gain knowledge of mechanism chemical reaction.
- CO6:** They would learn about electroplating techniques.

Total: 30 Hours

COURSE OBJECTIVES

The course aims to provide the students

- To gain working knowledge of computers and their components, number system conversion and complements.
- To understand and implement a simple application using various utility tools.
- To understand the various command line interfaces.
- To develop different layouts as per need of applications.
- To develop the dynamic web pages.

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3		3					2	2	2	3	3	2
CO2	3	3	3		3					2	2	2	3	3	2
CO3	3	3	3		3					2	2	2	3	3	2
CO4	3	3	3		3					2	2	2	3	3	2
CO5	3	3	3		3					2	2	2	3	3	2
CO6	3	3	3		3					2	2	2	3	3	2

LAB COMPONENTS

1. Document Creation, Search, Generate, Manipulation data using MS Office.
2. Implement a data manipulation using Spreadsheets.
3. Presentation and Visualization – Graphs, Charts, 2D, 3D.
4. Working with image-editing tools.
5. Working with different CLI commands.
6. Design a simple webpage using HTML Tags and Tables.
7. Implement a HTML Form element.
8. Design a simple webpage using iFrames.
9. Apply all the CSS properties to make a HTML pages.
10. Write a simple JavaScript program using conditional statements and looping.

11. Implement JavaScript programs using Functions.
12. Implement a webpage by applying JavaScript events and functions..

TEXT BOOKS

T1: Rajaraman - "Fundamentals of computers" 6th edition, Prentice Hall of India, 2015

T2: Jon Duckett, "Beginning HTML, XHTML, CSS and Javascript", Wiley Publishing, Inc 2001

REFERENCE BOOKS

R1: Jeffrey C. Jackson, "Web Technologies--A Computer Science Perspective", Pearson Education, 2006

COURSE OUTCOMES

- CO1:** Gain working knowledge of computers and their components, number systems.
- CO2:** Design interactive websites using basic HTML tags, different styles, links and with all Basic control elements.
- CO3:** Implement a data manipulation using Spreadsheets.
- CO4:** Design the modern web pages using the HTML.
- CO5:** Apply CSS features with different layouts as per need of applications
- CO6:** Apply the JavaScript concept to develop the dynamic web pages.

Total: 30 Hours

COURSE OBJECTIVES

The course aims to provide the students

- To understand the various general steps in problem solving.
- To analyze the efficiency of the algorithms.
- To learn to solve problems using C.
- To understand the concept of arrays and strings.
- To learn C functions and storage classes.

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2										2		
CO2	3	2	3									2	2		
CO3	3	2	2	2					2	2			2		
CO4	3	3	2	2									2	2	2
CO5	3	2	3	2										2	
CO6	3	2	3	2					2	2		2		2	2

LAB COMPONENTS

1. Design an Algorithm, Flow chart for various problems.
2. Design an algorithm, a flowchart using sequence
3. Algorithm using selection.
4. Algorithm using Boolean logic and number systems.
5. Design an algorithm, a flowchart using Repetition.
6. Construct an algorithm using List
7. Design an algorithm for encoding and decoding.
8. Demonstrate various algorithms using Factoring Techniques.
9. Demonstrate various Searching Techniques.
10. Demonstrate various sorting techniques.
11. Design various algorithms for Recursive problems.
12. Construct an algorithm for Text processing.

COURSE OUTCOMES

- CO1:** Understand the syntax and semantics of the C language.
- CO2:** Recognize how to develop and implement a program in the C language
- CO3:** Understand the concept of a branching and looping.
- CO4:** Develop various forms of data representation and array supported by the C language
- CO5:** Understand string representation and its operations supported by the C language
- CO6:** Implementing function concept with examples

Total: 30 Hours

COURSE OBJECTIVES

The course aims to provide the students

- To enable the students to design and build simple systems on their own
- To help experiment with innovative ideas in design and team work
- To create an engaging and challenging environment in the engineering lab
- To inculcate ethics and sustainability perspectives and enable students to work in a team

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1		2		2	2	2	2	1	1	1	1
CO2	3	3	3	3		2		2	2	2	2	1	2	2	2
CO3	3	3	3	3		2		2	2	2	2	1	2	2	2
CO4	3	3	3	3		2		2	2	2	2	1	2	2	2
CO5	3	3	3	3		2		2	2	2	2	1	2	2	2

CONTENTS

S No	Topics	No of Hours
1	Introduction to Engineering	3
2	Platform based development	12
3	Mechanisms	9
4	Requirements	3
5	Design	
6	Ethics	6
7	Sustainability	
8	Project Management Principles	
9	Guided Project	3
10	Final Project	9

COURSE OUTCOMES

- CO1:** Understand the role of an engineer as a problem solver
- CO2:** Apply multi-disciplinary principles and build systems using engineering design process and tools
- CO3:** Analyze engineering solutions from ethical and sustainability perspectives

CO4: Use basics of engineering project management skills while doing projects

CO5: Communicate, Collaborate and work as a team

Total: 45Hours

GUIDELINES

- 1 Practical based learning carrying credits
- 2 Multi-disciplinary/ Multi-focus group of 3-4 students
- 3 Groups can select to work on specific tasks, or projects related to real world problems
- 4 Each group has a faculty coordinator/Instructor who will guide/evaluate the overall group as well as individual students.
- 5 The students have to display their model at the end of semester
- 6 The progress of the course is evaluated based on class performance and final demonstration of prototype

COURSE OBJECTIVES

The course aims to provide the students

- To introduce the students to principles of field crops production and to introduce the production practices of crops.
- To delineate the role of agricultural and irrigation engineers in relation to various crop production practices.
- To equip the students with necessary theoretical and practical knowhow on basic principles of cropping and acquaint them with the cultivation practice of few important crops of Tamil Nadu.

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3				2							2	2	
CO2	3	3		2		2	2						2	2	
CO3	3	3		2	2	2	1						2	2	
CO4	3	3		1	2	2	2						2	2	
CO5	3	3				2	2						2	2	
CO6	3	3		2		2							2	2	

LAB COMPONENTS

1. To introduce the different crop production practices in wet land, dry land and garden land through hands on experience and demonstrations.
2. Identification of different crops in local region
3. Visit to meteorological observatory
4. Visit to wetlands and irrigate dry lands to learn important cropping systems and Hi Tec nursery
5. Seed selection and seed treatment procedures
6. Seed bed and nursery preparation
7. Sowing / Transplanting
8. Biometric observation for crops

9. Nutrient management studies
10. Water management and irrigation scheduling
11. Weed management studies
12. Integrated Pest Management studies
13. Harvesting
14. Post harvesting.

TEXT BOOKS

- T1:** Rajendra Prasad, Text Book of Field Crop Production. Directorate of Information and Publication, Krishi Anusandhan Bhavan, Pusa, New Delhi, 2015
- T2:** Hand Book of Agriculture. 2009 (6th revised edition), Indian Council of Agricultural Research (ICAR), New Delhi
- T3:** Balasubramanian P and Palaniappan SP. 2001. Principles and practices of Agronomy. Agrobios Publishers, Ludhiana

REFERENCE BOOKS

- R1:** Ramasamy S and Siddeswaran K 2018. Agriculture and crop production. Sri Shakthi Institute of Engineering and Technology, Coimbatore
- R2:** Crop Production Guide, Tamil Nadu Agricultural University Publication, Coimbatore. 2005

COURSE OUTCOMES

- CO1:** Knowledge on crop selection, production and management..
- CO2:** Able to understand the importance of crop water management
- CO3:** Understand the cultivation practices for some of the important crops in Tamil Nadu
- CO4:** Good knowledge in the field preparation of crops including systems of tillage
- CO5:** Sound understanding of the production practices of vegetable crops
- CO6:** Students will gain good knowledge in the production of agricultural and horticultural crops

Total: 30 Hours


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COURSE OBJECTIVES

The course aims to provide the students

- To enhance listening skill of the learners and practicing it for a better professional as well as moral skills
- To read different text without barriers using reading strategies

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1									3	3	2	2	1		
CO2									3	3	2	2	1		
CO3									3	3	2	1	1		
CO4									3		2	1	1		
CO5									3	3	2	3	1		
CO6									3	3	2	2	1		

UNIT I**அலகு - 1****5**

சங்ககாலம்- மூன்றுசங்கங்கள்- முதற்சங்கம் (கடல்கொண்டதென்மதுரை)- இடைச்சங்கம் (கபாடபுரம்)-கடைச்சங்கம்(மதுரை)-சங்க இலக்கியங்கள்- பதினெண்மேற்க்கணக்கு நூல்கள்: எட்டுத்தொகைநூல்கள் (ஐங்குறுநூறு, குறுந்தொகை,கலித்தொகை, நற்றிணை, அகநானூறு, புறநானூறு, பதிற்றுப்பத்து, பரிபாடல்)- பத்துப்பாட்டு நூல்கள் (சிறுபாணாற்றுப்படை, பெரும்பாணாற்றுப்படை, திருமுருகாற்றுப்படை, பொருநராற்றுப்படை, மலைபடுகடாம், குறிஞ்சிப்பாட்டு, முல்லைப்பாட்டு, பட்டினப்பாலை, நெடுநல்வாடை, மதுரைக்காஞ்சி.)- சங்கம்மருவியகாலம்- பதினெண்கீழ்க்கணக்கு நூல்கள் (திருக்குறள், நாலடியார், நான்மணிக்கடிகை, இன்னாநாற்பது, இனியவைநாற்பது, திரிகடுகம், ஆசாரக்கோவை, பழமொழி, சிறுபஞ்சமூலம், முதுமொழிக்காஞ்சி, ஏலாதி, கார்நாற்பது, களவழிநாற்பது, ஐந்திணைஐம்பது, திணைமொழிஐம்பது, ஐந்திணைஎழுபது, திணைமாலை நூற்றைம்பது, கைந்நிலை)- காப்பியங்கள்- ஐம்பெருங்காப்பியங்கள்- (சிலப்பதிகாரம், மணிமேகலை, சீவகசிந்தாமணி, வளையாபதி, குண்டலகேசி)- ஐஞ்சிறுகாப்பியங்கள் (நாககுமாரகாவியம், உதயணகுமாரகாவியம், யசோதரகாவியம், சூளாமணி, நீலகேசி)- இலக்கணம் - எழுத்து, சொல், பொருள், யாப்பு, அணி -

தமிழ் எழுத்துக்கள்- உயிரெழுத்துக்கள், மெய்யெழுத்துக்கள், உயிர்மெய் எழுத்துக்கள், ஆய்தஎழுத்து- வகைகள்- குறில், நெடில், வல்லினம், மெல்லினம், இடையினம், குற்றியலுகரம், குற்றியலிகரம்.

UNIT II

அலகு - 2

5

மயங்கொலிப்பிழைகள் - ர, ற-ஒலிவேறுபாடுகள்-ல, ள, ழஒலிவேறுபாடுகள்-ந, ன, ண-ஒலி வேறுபாடுகள்- சொல் இலக்கணம்- திணை, பால், எண், இடம், காலம் -பேச்சுவழக்கு- எழுத்துவழக்கு- இழிவழக்குச்சொற்கள்- வழுவுச்சொற்கள் - இணைச்சொற்கள்- தொகைச்சொற்கள்- நிறுத்தற்குறியீடுகள்- உவமைத்தொடர்கள்- மரபுத்தொடர்கள்- வாக்கியத்தில் அமைத்தல்-மரபுப்பிழை திருத்தம் -ஐந்திணை- பலபொருள்ஒருசொல்- ஒருசொல்பலபொருள்.

UNIT III

அலகு - 3

5

அணி இலக்கணம் - இயல்புநவீர்சி அணி, உயர்வுநவீர்சி அணி, உவமை அணி- எடுத்துக்காட்டுஉவமை அணி, உருவக அணி, ஏகதேச உருவக அணி, சொற்பொருள் பின்வருநிலைஅணி, தற்குறிப்பேற்ற அணி, வேற்றுமை அணி, வஞ்சப்புக்கழ்ச்சி அணி, மடக்கணி. பொருந்திய சரியான சொல்லைத் தேர்ந்தெடுத்தல் செய்யுள் பொருளுணர்திறன்.

UNIT IV

அலகு - 4

5

திருக்குறள்- 50 குறள்கள்- ஆத்திச்சூடி- கவிதைகள்- பாரதியார் (மனதில் உறுதி வேண்டும்)- பாரதிதாசன் (கனியிடை ஏறியசுளையும்)- வைரமுத்து (ஆதலால்மனிதா...) பெய்யெனப் பெய்யும் மழை கவிதைத்தொகுப்பு-காசி ஆனந்தன் (மாடியிலிருந்து...)-நறுக்குகள் கவிதைத் தொகுப்பு- பழமொழிகள்- விடுகதைகள்

UNIT V

அலகு - 5

5

சிறுகதைகள் - ஜெயமோகன், ஜெயகாந்தன், கி.ராஜநாராயணன், பிரபஞ்சன் நீதிக்கதைகள், மொழிபெயர்ப்பு- மூன்றில் ஒருபங்காகச் சுருக்குதல் வினாவிற்கேற்ற விடைகள்- கடிதங்கள்-தலைவர்கள் மற்றும் அறிஞர்கள் பற்றிய கட்டுரைகள்

UNIT VI

அலகு - 6

5

படைப்பாற்றல்பயிற்சி - பேச்சுப்பயிற்சி (கதைசொல்லுதல், விவாதித்தல், கவியரங்கம், பட்டிமன்றம்)-எழுத்துப்பயிற்சி (கவிதை, கட்டுரை, சிறுகதை, கடிதங்கள்)

Total: 30 Hours


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COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Learn the language literature concepts
- CO2:** Speak fluently using the proper vocabulary.
- CO3:** Familiarize the functional understanding of the language grammar
- CO4:** Understand the concepts of new era tamil literature works
- CO5:** To develop the reading skills of tamil novels and stories
- CO6:** To enhance the features of story telling, conversation and creative skills of writing in students

U19LAML101

MALAYALAM
(Common to all Programs)

L T P C
2 0 0 2

COURSE OBJECTIVES

The course aims to provide the students

- To Write analytically in a variety of formats, including essays, research papers, reflective writing, and critical reviews of secondary sources.
- To develop an interest in the Mother tongue through the study of literature and other contemporary forms of culture.
- To be proficient in speaking and listening and assist students in the development of intellectual flexibility, creativity, and cultural literacy so that they may engage in life-long learning
- To enhance reading and writing skills for a better understanding of the main contextual ideas
- To use their mother tongue in the formal setup to express their views and ideas using the appropriate vocabulary and phrases.

PREREQUISITES :Nil

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1							3	1	2	3		2			2
CO2								2		3		2			2
CO3							3		3	3		2			3
CO4							1		2	3		3			3
CO5								1	3	3		3			3

UNIT I GRAMMAR AND LANGUAGE DEVELOPMENT 6

Writing- letters, swaraksharanga, vyanjanaksharanga, Error-free Malayalam: 1. Language; 2. Clarity of expression; 3. Punctuation..

UNIT II LETTER WRITING 6

Letter writing: Formal (applications, letter to the editor of a Newspaper, commercial correspondence, complaints) and informal letters.

UNIT III READING COMPREHENSION 6

Reading section: Comprehension of unseen prose passages and Short stories

UNIT IV EXTENDED SPEAKING 6

Expansion of ideas: Proverbs, poems, and philosophical statements.


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UNIT V INTRODUCTION TO MALAYALAM LITERATURE

6

Critical appreciation of literary works (Books and Films). Literary & Cultural figures of Kerala and their literary contributions.

Total: 45 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Students should be familiar with literary and cultural texts within a significant number of historical, geographical, and cultural contexts.
- CO2:** Students should be able to apply critical and theoretical approaches to the reading and analysis of literary and cultural texts in multiple genres.
- CO3:** Students should be able to ethically gather, understand, evaluate, and synthesize information from a variety of written and electronic sources from different genres.
- CO4:** Students should be able to write analytically in a variety of formats, including essays, research papers, reflective writing, and critical reviews of secondary sources.
- CO5:** Students should be able to understand the process of communicating and interpreting human experiences through literary representation using historical contexts and disciplinary methodologies

TEXT BOOKS:

TEXT BOOKS:

- T1:** John D Kunnathu, Lissy J Kunnathu, Learn Basic Malayalam In Six Weeks: With Daily Worksheets & Answer Key; CreateSpace Independent Publishing Platform (June 22, 2015)
- T2:** Vidvan C. L. Meenakshi Amma. Learn Malayalam, manuals_contributions; manuals; additional_collections, 1975
- T3:** Learn Basic Malayalam in Six Weeks: With Daily Worksheets & Answer Key, by John D. Kunnathu (Author), Lissy J. Kunnathu (Author), Kindle Edition
- T4:** A Grammar of the Malayalam Language by Rev H.Gundert, Basel Mission Press, 2002
- T5:** Malayalam Grammar Book Paperback, Kindle Edition, 2018

REFERENCE BOOKS:

- R1:** Malayalam: A University Course and Reference Grammar. - Fourth Edition, The Center for Asian Studies at The University of Texas at Austin, 2018
- R2:** An Intensive Course in Malayalam (An Old and Rare Book) by B.Shyamala Kumari, Central Institute of Indian Languages, Mysore, 1999

WEB RESOURCES:

- W1:** <https://e-resources.saraswathihouse.com>
- W2:** <https://www.alllanguageresources.com/malayalam/>
- W3:** Learning Malayalam: A Complete Self-Study Guide - <https://www.alllanguageresources.com> › Malayalam

U19LAEN101

FOUNDATION ENGLISH
(Common to all Programs)

L T P C
2 0 0 2

COURSE OBJECTIVES

The course aims to provide the students

- Educate students in both the artistry and utility of the English language through the study of literature and other contemporary forms of culture.
- Provide students with the critical faculties necessary in an academic environment, on the job, and in an increasingly complex, interdependent world.
- Graduate students who are capable of performing research, analysis, and developing content from different genres.
- Assist students in the development of intellectual flexibility, creativity, and cultural literacy so that they may engage in life-long learning.
- Write analytically in a variety of formats, including essays, research papers, reflective writing, and critical reviews of secondary sources.

PREREQUISITES :Nil

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1							3	1	2	3		2			2
CO2								2		3		2			2
CO3							3		3	3		2			3
CO4							1		2	3		3			3
CO5								1	3	3		3			3

UNIT I INTRODUCTION TO ENGLISH LITERATURE 6

Introduction to the English Language – Introduction to Indian writing in English - Palanquin Bearers by Sarojini Naidu – To me, fair friend, you never can be old, Sonnet 104 by Shakespeare

UNIT II APPRECIATION OF POEMS 6

Ureca Urn by John Keats – Gitanjali by Rabindranath Tagore

UNIT III FOCUS ON SHORT STORIES 6

Short Stories: A Christmas Carol by Charles Dickens - The Open Window by Saki - The Interpreter of Maladies by Jhumpa Lahiri – Success Stories of inspirational leaders: Martin Luther King, Malala Yousafzai & Saalumara Thimmakka, also known as Aalada Marada Thimakka, an Indian environmentalist.

UNIT IV	FOCUS ON NOVEL	6
Novel: The Man-Eater of Malgudi by R.K.Narayan		
UNIT V	FOCUS ON DRAMA	6
<i>A Doll's House</i> by Norwegian playwright Henrik Ibsen		

Total: 45 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Students should be familiar with literary and cultural texts within a significant number of historical, geographical, and cultural contexts.
- CO2:** Students should be able to apply critical and theoretical approaches to the reading and analysis of literary and cultural texts in multiple genres.
- CO3:** Students should be able to ethically gather, understand, evaluate, and synthesize information from a variety of written and electronic sources from different genres.
- CO4:** Students should be able to write analytically in a variety of formats, including essays, research papers, reflective writing, and critical reviews of secondary sources.
- CO5:** Students should be able to understand the process of communicating and interpreting human experiences through literary representation using historical contexts and disciplinary methodologies.

TEXT BOOKS:

- T1:** Palanquin Bearers Paperback by Sarojini Naidu (Author), Indu Harikumar (Illustrator)
- T2:** Sonnet 104: To Me, Fair Friend, You Never Can Be Old Emma Abbate & Ashley Riches From the Album Mario Castelnuovo-Tedesco: Shakespeare Sonnets
- T3:** Ode On A Grecian Urn And Other Poems (English, Paperback, Keats John), Publisher: Kessinger Publishing Co, Genre: Poetry, ISBN: 9781419137730
- T4:** Gitanjali by Rabindranath Tagore, Kindle edition
- T5:** The Man-eater of Malgudi by R.K. Narayan (Author), Repro Books
- T6:** A Doll's House by Henrik Ibsen, Maple Press, Genre: Fiction, ISBN: 9789350330685

REFERENCE BOOKS:

- R1:** 1.The Open Window and Other Short Stories, Kindle Edition
- R2:** 2.Charles Dickens' Christmas Stories: A Classic Collection, 2019, Kindle Edition

WEB RESOURCES:

- R1:** 1.<https://www.deccanchronicle.com/lifestyle/books-and-art/220418/saalumarada-thimmakka-the-green-legend-now-on-stage.html>
- R2:** 2.<https://malala.org/malalas-story>
- R2:** <https://www.nobelprize.org/prizes/peace/1964/king/biographical/>


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Idioms: guessing meaning based on the context - Question Tags - Reported speech - Technical Proposal
– Report Writing (Project / Survey)

Total: 30 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Communicate with one or many listeners using appropriate communicative strategies.
- CO2:** Speak clearly, confidently, and comprehensively using appropriate communicative strategies.
- CO3:** Read different genres of texts adopting various reading strategies.
- CO4:** Understand the form and function of the basic official correspondences and perform a range of official support through formal and informal writings.
- CO5:** Comprehend and apply language learning strategies to read, comprehend, organize and retain written information.

TEXT BOOKS:

- T1:** Richards, C. Jack. Interchange Students Book-2 New Delhi: CUP, 2015.
- T2:** Means, L. Thomas and Elaine Langlois. English and Communication for Colleges. Cengage Learning, USA: 2007.

REFERENCE BOOKS:

- R1:** Redston, Chris & Gillies Cunningham. Face2Face (Upper-intermediate Student Book). Cambridge University Press, New Delhi: 2005
- R2:** Daise, Debra & Charl Norloff. Q: Skills for Success Reading and Writing (2nd Edition). Oxford University Press. 2019
- R3:** Sudharshana N P and Savitha C. English for Technical Communication. Cambridge University Press. 2018

WEB RESOURCES:

- W1:** <https://learnenglish.britishcouncil.org/grammar>
- W2:** [https://www.kau.edu.sa/Files/0013287/Subjects/academic-writing-handbook-international-students-3rd-ed%20\(2\).pdf](https://www.kau.edu.sa/Files/0013287/Subjects/academic-writing-handbook-international-students-3rd-ed%20(2).pdf)
- W3:** https://owl.purdue.edu/owl/general_writing/academic_writing/essay_writing/descriptive_essays.html

COURSE OBJECTIVES

Engineering Mathematics is an essential tool for describing and analyzing engineering process and systems. It enables precise representation and communication of knowledge. The objective of the course is to expose students to understand the basics and importance of Vector Calculus, Complex Differentiation, Complex Integration, Sets & Relations and Functions which are being widely used in Information sciences.

PREREQUISITES :

Basic concepts of vectors and Trigonometric functions

Basic concepts of Differentiation,

Basic concepts of Integration,

Basic concepts of Relations and Functions.

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2		2							2	2	2	2
CO2	3	3	2		2							2	2	2	1
CO3	3	3	2		2							2	2	2	2
CO4	3	3	2		2							2	2	2	1
CO5	3	3	2		2							2	2	2	2
CO6	3	3	2		2							2	2	2	2

UNIT I VECTOR CALCULUS 9

Gradient – Directional derivative – Divergence and Curl – Irrotational and Solenoidal vector fields – Vector Integration – Line Integrals – Applications of Vector calculus in CSE and IT.

UNIT II COMPLEX DIFFERENTIATION 9

Limit and derivative of a complex function – Analytic functions – Cauchy-Riemann equations – Harmonic functions – Orthogonal properties of analytic functions (excluding proof) – Construction of analytic functions by Milne - Thomson's Method – Conformal mappings: $w = z + c$, cz , $1/z$ and Bilinear transformation – Applications of complex differentiation in CSE and IT.

UNIT III COMPLEX INTEGRATION 9

Complex integration – Statements of Cauchy's theorem and Cauchy's integral formula – Laurent's series – Singular points – Residues – Calculation of Residues – Cauchy's Residue theorem (excluding proof) – Applications of complex integration in CSE and IT.

COURSE OBJECTIVES

The course aims to provide the students

- To understand the difference between classical and quantum free electron theory, and able to know the concept of holes
- To enrich the understanding of charge carriers in semiconducting materials and devices
- To understand the basic concepts of diodes and photo conducting devices.
- To understand the basic concepts of electromagnetic waves
- To understand the interaction of electromagnetic waves with matter
- To get knowledge of the working principle of laser and fibre optics

PREREQUISITES :As a prerequisite for this course on Engineering Physics knowledge of physics like Mechanics, Optics, Waves and basic mathematics is essentially required

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3													
CO2	3	3													
CO3	3	3													
CO4	3	3													
CO5	3	3													
CO6	3	3													

UNIT I FREE ELECTRON AND BAND THEORY OF SOLIDS**9**

Electronic Materials: Classical free electron theory of metals (Drude Lorentz Theory)-Electrical and Thermal conductivity – Widemann Franz Law-Fermi energy and Fermi - Dirac distribution function – Density of states-Thermionic Emission. Band Theory of Solids-Electronic periodic potential- Bloch Theorem- Kronig Penny Model-Origin of Energy Bands - Bloch Theorem-Concepts of Effective mass-Brillouin Zones –Concept of Holes- Classification of solids into conductor, semiconductor- Insulator.

UNIT II SEMICONDUCTOR FUNDAMENTALS**9**

Energy band in solids – types of semiconductors – majority and minority carriers – Mobile charge carriers and immobile ions – drift current in intrinsic semiconductor – PN junction – Depletion layer – barrier voltage – Effect of temperature – forward biased and reverse biased pn junction – Zener breakdown – Avalanche breakdown – H parameters in CE and CB configuration..

UNIT III PHYSICS OF SEMICONDUCTOR DEVICES & PHOTOCONDUCTING MATERIALS 9

Open circuit P-N Junction diode - Energy diagram of PN Diode-Working of Diode - VI Characteristics of Diode - PN Diode as Rectifier- Diode equation – Tunnel Diode- Schottky diode - Metal Oxide Transistor. Classification of optical materials and their properties - Luminescence, Fluorescence and Phosphorescence - LED – LCD - Photo conducting materials - Photo detectors - Photonic crystals and applications - Elementary ideas of Non-linear optical materials and their applications.

UNIT IV ELECTROMAGNETIC WAVES & INTERACTION WITH MATTER 9

Electromagnetic waves in vacuum – Energy and momentum of EMW – EMW in matter – Propagation in linear media – Reflection and transmission at Normal incidence – Reflection and Transmission at Oblique incidence – Implications: Laws of incidence and reflectance, Snell’s law, Brewster law – Fresnel’s equations – wave guides- rectangular waveguide..

UNIT V APPLIED OPTICS 9

Properties of laser radiation and their significance-wavelength, power, monochromaticity, coherence. Einstein Theory of stimulated emission-Types of lasers-working media and their radiation characteristics-

Power, wavelength and operational modes of Nd-YAG, excimer, diode lasers. Optical fiber – principle and propagation of light in optical fibers – Numerical aperture and acceptance angle – types of optical fibers – applications – fiber optic communication system – medical endoscopy.

Total: 45 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Illustrate the free electron theory of metals and to classify the conducting materials
- CO2:** Understand the fundamental concept of semiconducting physics and their applications.
- CO3:** Describe the basic operating principles of diodes and photo conducting devices.
- CO4:** Describe the idea behind electromagnetic theory
- CO5:** Describe the propagation and interaction of electromagnetic waves in different mediums
- CO6:** Demonstrate the basics of LASER devices and optical fibres, as well as their significance in engineering and communication applications

TEXT BOOKS:

- T1:** S.J.Gupta, Sanjeev Gupta, Modern Engineering Physics, Dhanpatrai Publication, New Delhi, 2015.
- T2:** S.O. Kasap, Principle of Electronic Materials and Device, McGraw Hill Publications, 3RD Edition,2017
- T3:** V. Rajendran, Engineering Physics, Mc Graw Hill Education, tenth print, 2017

REFERENCE BOOKS:

- R1:** Garcia, N. & Damask, A. —Physics for Computer Science Students||. Springer-Verlag, 2012.


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- R2:** David Halliday, Robert Resnick and Jearl Walker, Fundamentals of Physics, John Wiley&Sons, New Delhi , 9th Edition , 2001.
- R3:** Smith, F. Graham / King, Terry A. / Wilkins, Dan, Optics and Photonics, John Wiley&Sons, New Delhi , 2nd Edition , 2007
- R4:** Shatendra Sharma, Jyostna Sharma, Engineering Physics, Pearson, Uttar Pradesh, 2019

COURSE OBJECTIVES

The course aims to provide the students

- Write modular programs consisting of structure, functions and pointer concepts.
- Use structure variables for data storage and manipulation.
- Develop application using strings.
- Gain knowledge about memory management in C.
- To learn the files and perform file manipulations

PREREQUISITES :Nil

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	1	1									1		
CO2	2	1	1	1	2								2	3	1
CO3	3	2	2	1	3								1	2	
CO4	3	2	2	1	3								2	2	
CO5	2	1	1	1	2								2	3	
CO6	2	1	1	1	2								1	2	

UNIT I INTRODUCTION :C PROGRAMMING 9

Structure of C program, Comments, Data types, Variables, Tokens: Keyword, Identifier, Constants, Operators, Expression and evaluation, Input and Output statements, Decision making statements, Iterative statements, Storage Classes: auto, register, static and extern, Preprocessor Directives.

UNIT II ARRAYS AND STRINGS 9

Introduction to arrays: Declaration, Initialization. One dimensional array Multidimensional arrays, Searching: Linear and Binary Search, Sorting: Bubble sort, Selection Sort. Introduction to string, Built In string functions, String manipulation with and without built in functions, Array of strings, Pattern matching application using strings.

UNIT III FUNCTIONS AND POINTERS 9

Introduction to functions, Function prototype, Function definition, Function call, User defined functions and Standard functions (math function), Parameter passing: Call by value, Call by reference, Recursive functions, Passing arrays to functions, Command line arguments. Pointer in C, Importance of pointer, Types of pointer, Pointer expression and arithmetic, Pointer and array, String as pointer, Pointer to function, Dynamic Memory Allocation.

UNIT IV USER DEFINED DATATYPES 9

Structure: Declaration, Accessing structure elements, Array of structure, Nested structure, Pointers to

structure, Structure to function, typedef vs #define. Union: Declaration, Accessing union elements, Difference between structure and union, Enum and its uses.

UNIT V FILE HANDLING

9

Introduction to file, File Operations: Create, Open: File modes, Read, Write, Move, Close, File Processing: Sequential access and Random access.

Total: 45 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Explain the syntax for C programming.
- CO2:** Associate the programs in 'C' for real world situation.
- CO3:** Apply the concepts of Arrays, Strings in 'C' language for user defined problems.
- CO4:** Apply the concept of functions and pointers.
- CO5:** Associate the programs with structure using 'C' language.
- CO6:** Discuss to read and write data from/to files in 'C' Programs.

TEXT BOOKS:

- T1:** Programming in C, Ashok N.Kamthane,2ndEdition,Pearson Education India,2011.
- T2:** Behrouz A. Forouzan and Richard F. Filberg, "Computer Science A Structures Programming Approach using C", Third Edition, Cengage Learning, 2006

REFERENCE BOOKS:

- R1:** A first book of ANSI C by GrayJ.Brosin 3rd edition Cengage delmer Learning India P.Ltd.
- R2:** Pradip Dey,Manas Ghosh,"Programming in C",second edition,Oxford University Press,2011.
- R3:** SeyedHRoosta,"Foundationsofprogramminglanguagesdesign&implementation",Cengage Learning,2009

COURSE OBJECTIVES

The course aims to provide the students

- To learn the basics of electronics, various semiconductor materials and to describe the operation of PN junction diode.
- To understand the basic concept and key principles of BJT and FET.
- To understand the basic concept and key principles of switching theory and logic gates.
- To learn the basics of various Instruments, transducers and working of electronic circuits used in electronic test and measuring instruments.
- To understand the basic concept and key principles of communication systems

PREREQUISITES :Nil

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3										3	3	1
CO2	3	2	3										3	3	1
CO3	3	2	3										3	3	1
CO4	3	2	3										3	3	1
CO5	3	2	3										3	3	1
CO6	3	2	3										3	3	1

UNIT I ELECTRONIC SYSTEMS**9**

Introduction to electronics, Semiconductors, Conductors, Insulators, Types of semiconductors, Diodes, PN junction diode, forward and reverse bias characteristics, Switching Characteristics, Breakdown in PN Junction Diodes.

UNIT II TRANSISTOR AND APPLICATIONS**9**

Introduction to transistors, BJT Characteristics, biasing and applications, Switching characteristics, FET and MOSFET characteristics and applications.

UNIT III SWITCHING THEORY AND LOGIC GATES**9**

Number system, Conversion, Compliments, Addition and Subtraction, BCD numbers, Boolean algebra, Canonical form, Logic gates.

UNIT IV TRANSDUCERS AND MEASURING DEVICES**9**

Transducers-Types: Active, passive, sensors, Measurement, Function Generators, Laboratory measuring instruments, Ammeter, Voltmeter, digital multi-meters, Cathode ray oscilloscopes (CRO's).

UNIT V COMMUNICATION SYSTEMS**9**

Introduction, Elements of Communication Systems, Frequency Spectrum, Modulation: Need for modulation, Amplitude Modulation, AM Detection (Demodulation), Frequency and Phase Modulation. Comparison of AM and FM

Total: 45 Hours**COURSE OUTCOMES**

At the end of the course students should be able to

- CO1:** Explain the V-I characteristic of diode.
- CO2:** Describe the equivalence circuits of transistors
- CO3:** Compile the different building blocks in digital electronics using logic gates and implement simple logic function using basic universal gates.
- CO4:** Understand the basic principles of different types of Transducers.
- CO5:** To operate various measuring instruments.
- CO6:** Understand the functioning of a communication system, and different modulation techniques.

TEXT BOOKS:

- T1:** V.K.Mehta, Rohit Mehta,|| Principles of Electronics|| S Chand,7th Revised edition edition,2014.
- T2:** D.P. Kothari, I. J. Nagrath, —Basic Electronics||, McGraw Hill Education (India) Private Limited, 2014

REFERENCE BOOKS:

- R1:** David A. Bell, —Electronic Devices and Circuits||, Oxford University Press, 5th Edition, 2008.
- R2:** Santiram Kal —Basic Electronics|| Devices, circuits and its fundamentals,PHI,2006.

COURSE OBJECTIVES

The course aims to provide the students

- Data representation and organization of a computer system
- To write assembly language programs and download the machine code that will provide solutions real-world control problems.
- Knowledge about pipe lining, I/O and memory organization

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1										1			2
CO2	2	1	1									1			2
CO3	3	1	2										3	2	
CO4	2	1	1									1			2
CO5	3	2	3										3	3	1
CO6	3	2											3		

UNIT I BASIC STRUCTURE OF COMPUTERS 9

Functional units - Basic operational concepts - Performance – Uniprocessors to multiprocessors – Instructions: Language of the Computer – Operations, Operands – Instruction representation – Logical operations – decision making – MIPS Addressing.

UNIT II ARITHMETIC OPERATIONS 9

Addition and subtraction of signed numbers – Multiplication of positive numbers - Signed operand multiplication- fast multiplication – Integer division – Floating point numbers and operations.

UNIT III PROCESSOR AND PARALLELISM 9

Fundamental concepts – Execution of a complete instruction – Data path and control consideration for Instruction sets - Pipelining: Basic concepts – Data hazards – Instruction hazards – Control hazards.

UNIT IV MEMORY SYSTEM 9

Basic Concepts - Memory Representation – Hierarchy - Memory Units: Semiconductor RAMs – ROM Secondary Storage Devices: Magnetic Tape- Magnetic Disk and types-Optical Disk and types - USB: Pen drive -External Hard Disk- Cache Memory, Operations and performance considerations - Virtual Memory.

UNIT V I/O ORGANIZATION 9

Accessing I/O devices – Interrupts – Direct Memory Access – Buses – Interface circuits – Standard I/O Interfaces (PCI, SCSI, USB) – Case study: ARM interrupt structure and Multi core processor and its memory

Total: 45 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Understand the basic structure of computer and addressing mode used in the processor
- CO2:** Design arithmetic and logic unit
- CO3:** Understand control unit and parallelism
- CO4:** Understand various memory systems
- CO5:** Understand different ways of communication with I/O devices
- CO6:** Understand interrupts and DMA data transfer strategy.

TEXT BOOKS:

- T1:** Carl Hamacher, Zvonko Vranesic and SafwatZaky, "Computer Organization", McGraw-Hill, 5th Edition 2011. (UNIT I, II, III, IV, V).
- T2:** David A. Patterson and John L. Hennessey, "Computer organization and design", Morgan Kauffman / Elsevier, 4th edition, 2012. (UNIT- I, III, V)

REFERENCE BOOKS:

- R1:** William Stallings, "Computer Organization and Architecture designing for Performance", Pearson Education 8th Edition, 2001
- R2:** David A. Patterson and John L. Hennessy, "Computer Organization and Design: The Hardware/ Software Interface", Morgan Kaufmann, 4th Edition, 2008, Publishers, 2012.
- R3:** John P. Hayes, "Computer Architecture and Organization", McGraw Hill, 3rd 59 Edition, 2002
- R4:** M. Morris R. Mano "Computer System Architecture" 3rd Edition 2007

Course Articulation Matrix : 3- High, 2- Medium, 3- Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3										3	3	1
CO2	3	2	3										3	3	1
CO3	3	2	3										3	3	1
CO4	3	2	3										3	3	1
CO5	3	2	3										3	3	1
CO6	3	2	3										3	3	1

LAB COMPONENTS

1. Familiarization with Laboratory Instruments (Oscilloscope, Function Generator, Digital Multimeter, DC Power Supply).
2. Measurement of Voltage Amplitude & Frequency.
3. To make a circuit on a wire-o-board & find different currents & voltages.
4. V - I Characteristics of Diodes.
5. Characteristics of BJT in Common Emitter Configuration.
6. Truth Table verification of Logic Gates.
7. Soldering and de-soldering practice.
8. Volt-Ampere Characteristics of Zener Diode.
9. Volt-Ampere Characteristics of Light Emitting Diode.
10. Half-Wave rectifier with and without filter.
11. Drain and transfer characteristics of FET.
12. To make a circuit on Blinking Lights.

COURSE OUTCOMES

- CO1:** Explain the V-I characteristic of diode.
- CO2:** Describe the equivalence circuits of transistors.
- CO3:** Compile the different building blocks in digital electronics using logic gates and implement simple logic function using basic universal gates.
- CO4:** Understand the basic principles of different types of Transducers.
- CO5:** To operate various measuring instruments.
- CO6:** Understand the functioning of a communication system, and different modulation techniques

Total: 15 Hours

COURSE OBJECTIVES

The course aims to provide the students

- To learn the proper use of various kinds of physics laboratory equipment.
- To learn how data can be collected, presented and interpreted in a clear and concise manner.
- To learn problem solving skills related to physics principles and interpretation of experimental data.
- To determine error in experimental measurements and techniques used to minimize such error.
- To make the student as an active participant in each part of all lab exercises.
- To make the students to apply the physics concepts to engineering applications

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3													
CO2	3	3													
CO3	3	3													
CO4	3	3													
CO5	3	3													
CO6	3	3													

LAB COMPONENTS

1. Determination of rigidity modulus of the material of a wire-Torsional Pendulum
2. Determination of Viscosity of a liquid – Poiseuille’s method.
3. Uniform Bending - Determination of Young’s Modulus.
4. Determination of thickness of a thin wire –Air Wedge
5. Determination of wavelength of mercury spectrum – spectrometer grating
6. Basic operation of Logic Gates
7. Laser (i) Determination of Wavelength and (ii) Determination of Particles size analysis
8. V-I characterization of PNP and NPN transistors
9. V-I characterization of Solar Cells

10. Energy band gap using p-n junction
11. Determination of thermal conductivity of a bad conductor by Lee's disc method
12. Determination of Velocity of Ultrasonic waves in a given liquid using Ultrasonic Interferometer.

TEXT BOOKS

- T1:** H. Sathayaseelam, Laboratory Manual in Applied Physics, Second edition, -New age International Publication, 2015

COURSE OUTCOMES

- CO1:** Understand the functioning of various physics laboratory equipment.
- CO2:** Use graphical models to analyse laboratory data.
- CO3:** Use mathematical models as a medium for quantitative reasoning and describing physical Reality.
- CO4:** Access, process and analyse scientific information.
- CO5:** Solve problems individually and collaboratively.
- CO6:** Understand how to apply the physics concepts for the engineering applications

Total: 30 Hours

COURSE OBJECTIVES

The course aims to provide the students

- Write modular programs consisting of structure, functions and pointer concepts.
- Use structure variables for data storage and manipulation.
- Develop application using strings.
- Gain knowledge about memory management in C.
- To learn the files and perform file manipulations

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	1	1									1		
CO2	2	1	1	1	2								2	3	1
CO3	3	2	2	1	3								1	2	
CO4	3	2	2	1	3								2	2	
CO5	2	1	1	1	2								2	3	
CO6	2	1	1	1	2								1	2	

LAB COMPONENTS

1. Solve some mathematical and scientific problems using functions.
2. Solve problems using arrays.
3. Create a program using recursive functions.
4. Demonstrate various Predefined String functions.
5. Manipulate string using user defined functions.
6. Solve problems using pointers.
7. Develop a C program using Enum datatype.
8. Design a C program using typedef.
9. Create programs using structures and unions.

10. Develop a C program using Dynamic Memory Allocation.
11. File handling in sequential access.
12. File handling in random access

COURSE OUTCOMES

- CO1:** Explain the syntax for C programming
- CO2:** Associate the programs in 'C' for real world situation
- CO3:** Apply the concepts of Arrays, Strings in 'C' language for user defined problems
- CO4:** Apply the concept of functions and pointers
- CO5:** Associate the programs with structure using 'C' language
- CO6:** Discuss to read and write data from/to files in 'C' Programs

Total: 30 Hours

COURSE OBJECTIVES

The course aims to provide the students

- To enable the students to design and build simple systems on their own
- To help experiment with innovative ideas in design and team work
- To create an engaging and challenging environment in the engineering lab
- To inculcate ethics and sustainability perspectives and enable students to work in a team

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1		2		2	2	2	2	1	1	1	1
CO2	3	3	3	3		2		2	2	2	2	1	2	2	2
CO3	3	3	3	3		2		2	2	2	2	1	2	2	2
CO4	3	3	3	3		2		2	2	2	2	1	2	2	2
CO5	3	3	3	3		2		2	2	2	2	1	2	2	2

CONTENTS

S No	Topics	No of Hours
1	Introduction to Engineering	3
2	Platform based development	12
3	Mechanisms	9
4	Requirements	3
5	Design	
6	Ethics	6
7	Sustainability	
8	Project Management Principles	
9	Guided Project	3
10	Final Project	9

COURSE OUTCOMES

- CO1:** Understand the role of an engineer as a problem solver
- CO2:** Apply multi-disciplinary principles and build systems using engineering design process and tools
- CO3:** Analyze engineering solutions from ethical and sustainability perspectives

CO4: Use basics of engineering project management skills while doing projects

CO5: Communicate, Collaborate and work as a team

Total: 45Hours

GUIDELINES

- 1** Practical based learning carrying credits
- 2** Multi-disciplinary/ Multi-focus group of 3-4 students
- 3** Groups can select to work on specific tasks, or projects related to real world problems
- 4** Each group has a faculty coordinator/Instructor who will guide/evaluate the overall group as well as individual students.
- 5** The students have to display their model at the end of semester
- 6** The progress of the course is evaluated based on class performance and final demonstration of prototype

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1						1	2	1	1	3		2		2	
CO2						2	2	2	2	3		2		2	
CO3						3	3	1	2	3		3		2	
CO4						1	1		1	3		1		3	
CO5						3	3	3	3	3		3		3	

LAB COMPONENTS

1. Telephone conversation
2. One-Minute Talk (Prepared)
3. Describing a holiday/festival / special events
4. BBC Hard Talk / NDTV Big Fight
5. Impromptu Speech
6. Story writing
7. Storytelling
8. Open-ended stories
9. Pecha Kucha
10. Book Review
11. Blog writing
12. TED Talk Presentation

COURSE OUTCOMES

- CO1:** Communicate with one or many listeners using appropriate communicative strategies.
- CO2:** Speak clearly, confidently, and comprehensively using appropriate communicative strategies.
- CO3:** Read different genres of texts adopting various reading strategies.
- CO4:** Understand the form and function of the basic official correspondences and perform a range of official support through formal and informal writings.
- CO5:** Comprehend and apply language learning strategies to read, comprehend, organize and retain written information.

Total: 15 Hours

Division algorithm–Base-brepresentations–Numberpatterns–Primeandcompositenumbers– GCD – Euclidean algorithm – Fundamental theorem of arithmetic – LCM - Chinese remainder theorem– Problems- Applications of Number Theory in Information sciences.

Total: 60 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- Apply the logical structure of proofs with connectives to produce logically valid arguments
- CO1:** and construct direct and indirect proofs and proofs by induction for appropriateness of each type in a particular setting
- CO2:** Formulate and solve problems involve predicates.
- CO3:** Apply counting techniques and recursion theory including recursive and recursively enumerable sets of natural numbers in the problems of logic
- CO4:** Solve problems using vector space concepts
- CO5:** Apply number theory concepts for solving problems occur in Information sciences
- CO6:** Gain the knowledge of combinatorics, set theory, logic, relations, graph theory, and analysis of algorithms

TEXT BOOKS:

- T1:** Tremblay J P and Manohar R, —Discrete Mathematical Structures with Applications to Computer Science||, Tata Mc Graw Hill, NewDelhi,2017.
- T2:** Kenneth H Rosen, “Discrete Mathematics and its Applications”, Tata McGraw Hill, New Delhi, 7th Edition, 2016
- T3:** Friedberg, A.H., Insel ,A.J. and Spence, L., —Linear Algebra||, PrenticeHallofIndia,NewDelhi,2004
- T4:** Koshy, T., “Elementary Number Theory with Applications”, Elsevier Publications, New Delhi, 2002

REFERENCE BOOKS:

- R1:** Bernard Kolman, Robert C Busby and Sharon Cutler Ross, “Discrete Mathematical Structures”, Prentice Hall, New Delhi, 6th Edition ,2007.
- R2:** Ralph P Grimaldi, “Discrete and Combinatorial Mathematics-An Applied Introduction”, Addison Wesley, USA, 5th Edition,2016
- R3:** Richard Johnsonbaugh, “Discrete Mathematics”, Pearson Education, New Delhi,8th Edition ,2018
- R4:** Kolman, B. Hill, D.R., —Introductory Linear Algebra||, Pearson Education, New Delhi, First Reprint, 2009.
- R5:** Strang, G., —Linear Algebra and its applications||, Thomson (Brooks/Cole), New Delhi, 3rd Edition, 2017.
- R6:** Sundarapandian,V.—NumericalLinearAlgebra||,PrenticeHallofIndia,NewDelhi,2015.

COURSE OBJECTIVES

The course aims to provide the students

- Introduction to database management systems,
- How to organize, maintain and retrieve - efficiently, and effectively - information from a DBMS

PREREQUISITES :Nil

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3											2	3		
CO2	3	2	3									2	3	3	2
CO3	3	2	3									3	3	2	3
CO4	3	2	3									2	2	2	1
CO5	3	2	3									2	2	2	1
CO6	3	2	2		3							2	3		

UNIT I INTRODUCTION 9

File Systems Organization – Sequential, Pointer, Indexed, Direct – Purpose of Database System-view of data, Database System Terminologies-Database characteristics- Data models – Types of data models – Components of DBMS-database users and administrators- Applications of Database system- Introduction to Relational Database- relational model, keys, relational algebra.

UNIT II SQL and PL SQL 9

SQL fundamentals- Introduction- Data types- SQL statements- DDL, DML, DCL, TCL- aggregate functions, string functions- operators- nested query- sub query- joins- views- sequence and synonyms. PL SQL fundamentals- Introduction-data types- variables- constants- literals-operators- conditions loops- cursor- procedure- function- trigger- exception handling.

UNIT III DATABASE DESIGN 9

Entity-Relationship model – E-R Diagrams – Enhanced-ER Model – ER-to-Relational Mapping – Functional Dependencies – Non-loss Decomposition – First, Second, Third Normal Forms, Dependency Preservation – Boyce/Codd Normal Form – Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Forml.

UNIT IV TRANSACTION MANAGEMENT 9

Transaction Concepts – ACID Properties- Transaction states– Schedules – Serializability – Concurrency

Control – Need for Concurrency – Locking Protocols – Two Phase Locking – Time-stamp based locking – Deadlock – Transaction Recovery - Save Points – Isolation Levels – SQL Facilities for Concurrency and Recovery.

UNIT V STORAGE AND QUERYING

9

RAID- organization of records- Hashing- static and dynamic hashing- query processing- measure of query cost- selection operation- sorting- join operation- query optimization using heuristics and cost estimation.

Total: 45 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** To describe data models and schemas in DBMS and to understand the features of database management systems and Relational database.
- CO2:** To use SQL and PL SQL- the standard language of relational databases
- CO3:** To design a database
- CO4:** To implement the concept of Transaction processing
- CO5:** To implement the concepts of Query processing
- CO6:** Implement and test the project developed for an application

TEXT BOOKS:

- T1:** Data base System Concepts, A. Silberschatz, Henry. F. Korth, S. Sudarshan, McGraw Hill Education (India) Private Limited, 6th edition.
- T2:** Data base Management Systems, Raghu Ramakrishnan, Johannes Gehrke, McGraw Hill Education (India) Private Limited, 3rd Edition

REFERENCE BOOKS:

- R1:** Database Systems, 6th edition, R Elmasri, ShamkantB.Navathe, Pearson Education.
- R2:** Database System Concepts, Peter Rob & Carlos Coronel, Cengage Learning.
- R3:** Introduction to Database Management, M. L. Gillenson and others, Wiley Student Edition
- R4:** Database Development and Management, Lee Chao, Auerbach publications, Taylor & Francis Group

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Apply Sorting, Searching Hashing Techniques for Problem Solving
- CO2:** Apply Binary Trees for various applications
- CO3:** Use M- Way Search trees, Heaps and Trie for solving problems
- CO4:** Implement Graph and perform various operations on graph
- CO5:** Use the different algorithms on graphs to solve problems.

TEXT BOOKS:

- T1:** Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education, 1997.
- T2:** ReemaThareja, "Data Structures Using C", Second Edition, Oxford University Press, 2011
- T3:** Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein, "Introduction to Algorithms", Second Edition, Mcgraw Hill, 2002

REFERENCE BOOKS:

- R1:** Aho, Hopcroft and Ullman, "Data Structures and Algorithms", Pearson Education, 1983.
- R2:** Stephen G. Kochan, "Programming in C", 3rd edition, Pearson Education, 2004.
- R3:** Ellis Horowitz, SartajSahni, Susan Anderson-Freed, "Fundamentals of Data Structures in C", Second Edition, University Press, 2008

U19ECTL309T**DIGITAL PRINCIPLES AND SYSTEM DESIGN**

L	T	P	C
3	0	2	4

COURSE OBJECTIVES

The course aims to provide the students

- To introduce number systems and codes, basic hypotheses of Boolean algebra and relationship between Boolean expressions.
- To design and analyze combinational circuits and sequential circuits.
- To introduce the concept of memories and programmable logic devices.

PREREQUISITES : U19ECTL101T

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	2	2				1	1	1	3	2	
CO2	3	2	2	2	2	2				1	1	1	3	2	
CO3	3	2	2	2	2	2				1	1	1	3	2	
CO4	3	2	2	2	2	2				1	1	1	3	2	
CO5	3	2	2	2	2	2				1	1	1	3	2	
CO6	3	2	2	2	2	2				1	1	1	3	2	

UNIT I BOOLEAN ALGEBRA AND LOGIC GATES 9

Number Systems – Arithmetic Operations – Binary Codes- Boolean Algebra– Theorems and Properties of Boolean Algebra – Boolean Functions – Canonical and Standard Forms – Simplification of Boolean Functions using Karnaugh Map-Quine McCluskey method – NAND and NOR Implementations.

UNIT II COMBINATIONAL LOGIC 9

Combinational Circuits – Analysis and Design Procedures – Binary Adder-Subtractor – Decimal Adder – Binary Multiplier – Magnitude Comparator – Decoders – Encoders – Multiplexers – Introduction to HDL – HDL Models of Combinational circuits.

UNIT III SYNCHRONOUS SEQUENTIAL CIRCUITS 9

Latches, Flip flops –SR, JK, T, D, Master/Slave FF –operation and excitation tables, Triggering of FF, Analysis and design of clocked sequential circuits –Design of Counters-Ripple Counters, Ring Counters, Shift registers.

UNIT IV ASYNCHRONOUS SEQUENTIAL CIRCUITS 9

Analysis and design of clocked Asynchronous sequential circuits, cycles and races, Hazards, Design of Hazard free circuits.


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UNIT V DEVICES AND ITS APPLICATIONS

9

Classification of memories – RAM-ROM - PROM – EPROM – EAPROM –Programmable Logic Devices – Programmable Logic Array (PLA) - Programmable Array Logic (PAL) - Implementation of combinational logic circuits using ROM, PLA, PAL.

Total: 45 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Apply and Implement the Boolean functions using K map and logic gates.
- CO2:** Analyze and Design the combinational logic circuits.
- CO3:** Analyze and design the sequential circuits.
- CO4:** Discuss the operation of various memory devices and their applications.
- CO5:** Discuss the operation of various memory devices and their applications.
- CO6:** Describe the operation of programmable logic devices and implement combinational logic using PLDs.

TEXT BOOKS:

- T1:** M. Morris Mano, Michael D. Ciletti, 'Digital Design', 5th Edition, Pearson Education, New Delhi, 2012.

REFERENCE BOOKS:

- R1:** Ronald J Tocci, Neal S Widmer, Gregory L Moss Digital Systems: Principles and Applications, 10th edition, Person, 2009.
- R2:** Thomas L. Floyd, Digital Fundamentals, Prentice Hall, 11th Edition, 2015.
- R3:** A. Anand Kumar, Fundamentals of Digital Electronics, 2nd Edition PHI Learning Private Limited, 2013
- R4:** D. Donald Givone, Digital principles and design, Tata McGraw Hill, 2008

COURSE OBJECTIVES

The course aims to provide the students

- To understand Object Oriented Programming concepts and basic characteristics of Java
- To know the principles of creating basic Java classes and methods
- To know the principles of inheritance and interfaces and polymorphism
- To define exceptions and use I/O streams
- To develop a java application with threads and collections

PREREQUISITES :Nil

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3														3
CO2	3														3
CO3	3	2	3											2	3
CO4	3	3	3	2										2	3
CO5	3	3	3	3										2	3
CO6	3														3

UNIT I INTRODUCTION TO OOP AND JAVA FUNDAMENTALS 9

Object Oriented Programming Abstraction – objects and classes Encapsulation Inheritance Polymorphism OOP in Java – Characteristics of Java – The Java Environment Java Source File Structure – Compilation. Fundamental Programming Structures in Java.

UNIT II JAVA LANGUAGE BASICS 9

Defining classes in Java – constructors and methods – defining real world entities using classes Access specifiers static members Comments, Data Types, Variables, Operators, Control Flow, Arrays, Packages – Java API documentation, Java Doc comments.

UNIT III INHERITANCE AND INTERFACES 9

Inheritance – Super classes sub classes –Protected members – constructors in sub classes The Object class – abstract classes and methods final methods and classes – Interfaces – defining an interface, implementing interface, differences between classes and interfaces and extending interfaces – polymorphism with inheritance – Strings.

UNIT IV EXCEPTION HANDLING AND I/O

9

Exceptions exception hierarchy throwing and catching exceptions – builtin exceptions, creating own exceptions, Stack Trace Elements. Input / Output Basics – Streams – Byte streams and Character streams – Reading and Writing Console – Reading and Writing Files.

UNIT V MULTITHREADING AND COLLECTIONS

9

Differences between multithreading and multitasking, thread life cycle, creating threads, Synchronizing threads, Interthread communication, daemon threads, inner classes, Array List Basics of collections frameworks and Generics – Generic classes, Generic methods.

Total: 45 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Explain the basic concepts of object oriented programming language and their representation
- CO2:** Illustrate dynamic memory allocation functions, access specifiers and the friend functions
- CO3:** Demonstrate the use of constructors, destructors and also the behaviour of inheritance and its implementation
- CO4:** Implement polymorphism and overloading of operators.
- CO5:** Apply the I/O operations to handle backup system using files and to develop general purpose templates
- CO6:** Handle raised exception while implementing various object oriented concepts

TEXT BOOKS:

- T1:** Herbert Schildt, - Java The complete reference, 8th Edition, McGraw Hill Education, 2011.
- T2:** Cay S. Horstmann, Gary Cornell, - Core Java Volume –I Fundamentals, 9th Edition, Prentice Hall, 2013

REFERENCE BOOKS:

- R1:** Paul Deitel, Harvey Deitel, “Java SE 8 for programmers”, 3rd Edition, Pearson, 2015.
- R2:** Steven Holzner, “Java 2 Black book”, Dreamtech press, 2011.
- R3:** Timothy Budd, “Understanding Object-oriented programming with Java”, Updated Edition, Pearson Education, 2000


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COURSE OBJECTIVES

The course aims to provide the students

- To make the students understand how server works and learn to use PHP as the scripting language
- To help the students understand the MySQL database management and integrate with the web application
- To inculcate the various design patterns available in designing the web application
- To make the students use Advanced Javascript and jQuery for client-side scripting
- To help the students to understand XML and Web Services, create and use them in web applications

PREREQUISITES :U19ITTLL101T

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3				2							2	2		1
CO2	3	2	2									2	3	2	2
CO3	3		1									2	2	2	1
CO4	3	1	1		3							2	2	2	1
CO5	3	1	1		3							2	2	1	3
CO6	3	2	3									2	2	2	3

UNIT I THE JAVASCRIPT LANGUAGE 9

Introduction to Javascript – Developer Console – Javascript Fundamentals – Code Quality – Javascript Objects – Data Types - Advanced Working with functions – Object Properties Configuration..

UNIT II OOPS IN JAVASCRIPT 9

Prototypes, Inheritance – Classes – Error Handling – Promises – Async/ await – Generators, advanced Iteration – Modules.

UNIT III BROWSER: DOCUMENT, EVENTS, INTERFACES 9

Document – Introduction to Events – UI Events – Forms, Controls – Document and Resource Loading –Mutation Observer – Event Loop: microtasks and macrotasks.

UNIT IV ADVANCED JAVASCRIPT 9

Frames and Windows - Binary Data, Files – Network Requests – Storing Data in the Browser – CSS and JS Animation – Web Components: Shadow DOM and Events.

UNIT V REGULAR EXPRESSIONS IN JAVASCRIPT

9

Patterns and Flags – Character Class – Unicode – Anchors – Word Boundary – Escaping special characters – Sets and Ranges – Quantifiers – Capturing Groups..

Total: 45 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Explain separation of concerns and identify three layers of web
- CO2:** Use operators, variables, arrays and control structures, functions and objects in JavaScript
- CO3:** Use constructors and classes concepts in real time application
- CO4:** Demonstrate handling web page events
- CO5:** Design web pages with JS animations.
- CO6:** Apply regular expressions in Javascript Code.

TEXT BOOKS:

- T1:** Eric Freeman, Elisabeth Robson, "Head First Javascript Programming", O'Reilly Media, Inc. March 2014.
- T2:** Ivelindemirov, "Learn Javascript with Interactive Exercises Visually", The beautiful Way to learn a programming language, Nai Inc, 1st Edition

REFERENCE BOOKS:

- R1:** Jeremy McPeak and Paul Wilton, "Beginning Javascript", Wrox, Fifth Edition
- R2:** Kyle Simpson, "You Don't Know JS", O'Reilly Media, 1st Edition.

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3											2	3		
CO2	3	2	3									2	3	3	2
CO3	3	2	3									3	3	2	3
CO4	3	2	3									2	2	2	1
CO5	3	2	3									2	2	2	1
CO6	3	2	2		3							2	3		

LAB COMPONENTS

1. SQL Commands (DDL, DML, DCL, TCL)
2. Database query- simple queries, nested queries, sub queries
3. Join Operations
4. Views, sequence and synonyms
5. Study of PL/SQL and simple programs using constructs
6. Database programming: implicit and explicit cursor
7. Procedure and function
8. Triggers
9. Exception handling
10. Database design using ER model and normalization for applications
11. Case study using real time database applications

COURSE OUTCOMES

- CO1:** To describe data models and schemas in DBMS and to understand the features of database management systems and Relational database
- CO2:** To use SQL and PL SQL- the standard language of relational databases.
- CO3:** To design a database.
- CO4:** To implement the concept of Transaction processing.
- CO5:** To implement the concepts of Query processing.
- CO6:** Implement and test the project developed for an application

Total: 30 Hours

COURSE OBJECTIVES

The course aims to provide the students

- To write and execute programs to solve problems using data structures such as arrays, linked lists, stacks, queues.
- To write and execute programs in to solve problems using data structures such as trees, graphs, hash tables and search trees.
- To write and execute write programs to implement various sorting and searching methods

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3											2	1		
CO2	3	2	1	1								2	1		
CO3	3	2	1	1								2	1		
CO4	3	2	1	1								2	1		

LAB COMPONENTS

1. Array Implementation of List ADT
2. Operations on list ADT using singly ,doubly, circularly linked list
3. Operations on stack and queue
4. Applications of linear data structures.
5. Operations of Binary Trees
6. Expression tree
7. Binary Search Trees–Operations and Applications
8. AVL Trees–Operations and Application
9. Graph representation and Traversal algorithms
10. Minimum Spanning Trees
11. Shortest Path Algorithm
12. Hashing and Collision Resolution Techniques.
13. Sorting & Searching algorithms–implementation

COURSE OUTCOMES

- CO1:** Identify the appropriate data structure for given problem.
- CO2:** Design programs for solving problems using different data structures.
- CO3:** Solve problems using trees, graphs and hash tables addressing various issues.
- CO4:** Graduates will have ability to effectively use compilers includes library functions, debuggers and trouble shooting

Total: 30 Hours

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3		2								2	1	1
CO2	3	3	3		2								2	1	1
CO3	3	3	3		2								2	1	1
CO4	3	3	3		2								2	1	1
CO5	3	3	3		2								2	1	1
CO6	3	3	3		2								2	1	1

LAB COMPONENTS

1. Study of Logic Gates.
2. Verification of Boolean Theorems using Digital Logic Gates.
3. Design and implementation of code converters using logic gates BCD to excess-3 code and Binary to gray code.
4. Implementation of half adder and full adder, half subtractor and full subtractor.
5. Design and implementation of 4-bit binary Adder/ Subtractor and BCD adder using IC 7483.
6. Design and implementation of Multiplexer and De-multiplexer using logic gates.
7. Construction and verification of 4-bit ripple counter and Mod-1 Ripple counters.
8. Design and Implementation of Shift Registers.
9. Design and implementation of 3-bit synchronous up/down counter.
10. Simulation of Combinational and sequential Circuits using Hardware Description Language (VHDL / Verilog HDL Software Required).

COURSE OUTCOMES

- CO1:** Apply and Implement the Boolean functions using K map and logic gates
- CO2:** Analyse and Design the combinational logic circuits
- CO3:** Design and verify any sequential circuit
- CO4:** Discuss the operation of various memory devices and their applications
- CO5:** Describe the operation of programmable logic devices and implement combinational logic using PLDs
- CO6:** Simulate the design using HTML

Total: 30 Hours

COURSE OBJECTIVES

The course aims to provide the students

- To build software development skills using java programming for real-world applications.
- To understand and apply the concepts of classes, interfaces.
- To help the students understand the concept of threads and integrate with the web application
- To develop applications using exception handling and packages.
- To make the students use Advanced Java concepts generic programming

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3				2										
CO2	3				2										
CO3	3				2										
CO4	3	2	2		2								2	2	
CO5	3	2			2										
CO6	3	2	2		2								2	2	

LAB COMPONENTS

1. Analyze a real-world scenario (bank, college, department, etc.,) and an object-oriented class hierarchy has to be created.
2. Analyze and understand the importance of inheritance in object-oriented programming with practical examples.
3. Implement class hierarchy with interface to understand the need for a contract.
4. Dynamic polymorphism has to be implemented and understood with a real-world scenario.
5. Multithreading with the help of Java programs should be experimented to understand the capabilities of Java in various special occasions.
6. The synchronization has to be implemented among multiple threads for a useful real time activity such as producer consumer.
7. The unexpected scenarios of a program have to be handled with exception handling mechanism of java.

8. The steps to package java classes and interfaces and the benefits has to be practically implemented and understood.
9. The hierarchy of java classes for input and output from java programs has to be implemented.
10. The collections framework has to be experimented for effective ways of storing java objects and how they could be improved with Generics.

COURSE OUTCOMES

- CO1:** Implement object oriented concepts such as objects, class abstraction and message passing.
- CO2:** Implement the friend function and function overloading.
- CO3:** Implement Operator overloading, Inheritance and method overriding.
- CO4:** Implement virtual function to achieve Run time polymorphism.
- CO5:** Implement the various functions on String.
- CO6:** Apply I/O operation to handle file system.

Total: 30 Hours

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1						1			2	1	1
CO2	3	3	2	1						1			2	1	1
CO3	3	3	2	1						1			2	1	1
CO4	3	3	2	1						1			2	1	1
CO5	3	3	2	1						1			2	1	1
CO6	3	3	2	1						1			2	1	1

LAB COMPONENTS

1. Perform Form Validation using Javascript.
2. Build a Javascript Login Authentication.
3. Build a Javascript To-Do List. (If possible, add local storage)
4. Build a Javascript Quiz
5. Check if a given string is a valid ISBN – 10 number.
6. Build a Matching card Game
7. Build an Image and File Upload.
8. Build a secret message Passing
9. Build a Budget Application Project
10. Build a Calculator project.

COURSE OUTCOMES

- CO1:** Explain separation of concerns and identify three layers of web
- CO2:** Use operators, variables, arrays and control structures, functions and objects in JavaScript.
- CO3:** Use constructors and classes concepts in real time application.
- CO4:** Demonstrate handling web page events.
- CO5:** Design web pages with JS animations.
- CO6:** Apply regular expressions in Javascript Code.

Total: 30 Hours

COURSE OBJECTIVES

The course aims to provide the students

- To enable the students to design and build simple systems on their own
- To help experiment with innovative ideas in design and team work
- To create an engaging and challenging environment in the engineering lab
- To inculcate ethics and sustainability perspectives and enable students to work in a team

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1		2		2	2	2	2	1	1	1	1
CO2	3	3	3	3		2		2	2	2	2	1	2	2	2
CO3	3	3	3	3		2		2	2	2	2	1	2	2	2
CO4	3	3	3	3		2		2	2	2	2	1	2	2	2
CO5	3	3	3	3		2		2	2	2	2	1	2	2	2

CONTENTS

S No	Topics	No of Hours
1	Introduction to Engineering	3
2	Platform based development	12
3	Mechanisms	9
4	Requirements	3
5	Design	
6	Ethics	6
7	Sustainability	
8	Project Management Principles	
9	Guided Project	3
10	Final Project	9

COURSE OUTCOMES

- CO1:** Understand the role of an engineer as a problem solver
- CO2:** Apply multi-disciplinary principles and build systems using engineering design process and tools
- CO3:** Analyze engineering solutions from ethical and sustainability perspectives

CO4: Use basics of engineering project management skills while doing projects

CO5: Communicate, Collaborate and work as a team

Total: 45Hours

GUIDELINES

- 1** Practical based learning carrying credits
- 2** Multi-disciplinary/ Multi-focus group of 3-4 students
- 3** Groups can select to work on specific tasks, or projects related to real world problems
- 4** Each group has a faculty coordinator/Instructor who will guide/evaluate the overall group as well as individual students.
- 5** The students have to display their model at the end of semester
- 6** The progress of the course is evaluated based on class performance and final demonstration of prototype

COURSE OBJECTIVES

The course aims to provide the students

- To develop active listening skills in various contexts.
- To develop the students' ability to use English accurately, appropriately, and fluently in different social and professional situations.
- To enable students to gain a strong foundation by expanding their logical, numerical, and reasoning skills.
- To ensure students develop the ability to comprehend, work with, and apply general mathematical techniques and models to different situations.

PREREQUISITES :Nil

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1										3		2			1
CO2							2		2	3		2			2
CO3	3	2				2			1			2	2	3	
CO4	2	2						2				2			3

UNIT I**4**

Applied Language Skills: Pronunciation - Homophones/ Homonyms / Homographs - Listening to Business conversations and answering MCQs.

Quants: Number Series - Sequence - Alphabet Series - Odd man out

UNIT II**4**

Applied Language Skills: Telephone Etiquette - Understanding the tone - Listening to a Telephone conversation and filling out the forms.

Quants: Seating Arrangements - Linear, Circular, Square, Rectangular Arrangement

UNIT III**4**

Applied Language Skills: Idioms & Phrases - Phrasal Verbs - Listening to Self-introductions/conversations - Understanding the structure of the speech.

Quants: Family Tree- Statement Problems on Blood Relations - Direction Problems – Left Right Movement – Clockwise – Anti-clockwise.

UNIT IV**4**

Applied Language Skills: Listening to describing the products - Interpretation of Charts- Usage of discourse markers.

Quants: Logical Deduction - Introduction to Sets-Venn Diagrams – Logic-based questions using Venn diagram - Rules for solving syllogism questions-Statement and conclusion.

UNIT V**4**

Applied Language Skills: Strategies for presentation - Practice- Decision Making – Problem-Solving - Taking up a Listening Test.

Quants: Clocks and Calendar - Minute Spaces - Hour Hand and Minute Hand - Odd Days - Leap Year – Ordinary Year - Counting of Odd Days.

Total: 20 Hours**COURSE OUTCOMES**

At the end of the course students should be able to

- CO1:** Listen and comprehend technical and non-technical spoken experts critically and functionally.
- CO2:** Able to use English accurately, appropriately, and fluently in different social and professional situations
- CO3:** Able to gain a strong foundation by expanding their logical, numerical, and reasoning skills.
- CO4:** Ability to comprehend, work with, and apply general mathematical techniques and models to different situations.

TEXT BOOKS:

- T1:** GMAT – All the Verbal: 978-1-5062-4904-9, 2019, Manhattan Prep, Newyork
- T2:** Redston, Chris & Gillies Cunningham. Face2Face (Pre-intermediate Student’s Book). Cambridge University Press, New Delhi: 2005
- T3:** Aggarwal, R.S. “Quantitative Aptitude”, Revised Edition 2016, Reprint 2018, S.Chand& Co Ltd., New Delhi.
- T4:** Pearson Publication, “A Complete Manual for the CAT”, 2018

REFERENCE BOOKS:

- R1:** Carter, R., & McCarthy, M. (2006). Cambridge grammar of English: A comprehensive guide: spoken and written English grammar and usage. Cambridge University Press.
- R2:** Comfort, Jeremy, et al. Speaking Effectively: Developing Speaking Skills for Business English. Cambridge University Press, Cambridge: Reprint 2011
- R3:** Dhaval Bathia, Vedic Mathematics, JAICO Publishing House, 29th Edition, Mumbai, 2014


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WEB RESOURCES:

W1: <https://learnenglish.britishcouncil.org/skills/listening>

W2: <https://ieltsposka.pl/wp-content/uploads/2020/05/Listening-paper-assets.pdf>

W3: <https://www.cambridgeenglish.org/learning-english/activities-for-learners/?skill=listening>

W4: <https://testbook.com/aptitude-practice>

W5: <https://www.indiabix.com/aptitude/questions-and-answers/>

SEMESTER IV

U19MATH429

PROBABILITY, STATISTICS AND QUEUEING THEORY

L T P C
3 1 0 4

COURSE OBJECTIVES

Engineering Mathematics is an essential tool for describing and analyzing engineering process and systems. The objective of the course is to expose students to understand the basics and importance of Random variables, Two-dimensional discrete random variables, Testing of hypothesis, Design of experiments, and Queueing theory are being widely used in Information sciences.

PREREQUISITES :Differentiation and Integration

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2		2							2	2	2	2
CO2	2	3	3		2							2	2	2	2
CO3	2	3	3		2							2	2	3	2
CO4	2	3	2		2							2	2	2	2
CO5	2	3	2		2							2	2	2	2
CO6	2	2	2		2							2	2	2	2

UNIT I PROBABILITY AND RANDOM VARIABLES 12

Random variable – Discrete and continuous random variables–Moment generating functions– Binomial, Poisson, Exponential and Normal distributions - Applications of Probability and random variables.

UNIT II DISCRETE TWO-DIMENSIONAL RANDOM VARIABLES 12

Two dimensional discrete random variables - Joint distributions – Marginal and conditional distributions –Correlation and Linear regression – Applications of discrete two-dimensional random variables in Information sciences

UNIT III TESTING OF HYPOTHESIS 12

Sampling distributions–Type I and Type II errors-One sample and two sample tests for means and proportion so large samples(z-test)-One sample and two sample tests for means of small samples(t-test)-F test for two sample standard deviations-Chi-square distribution Tests for independence of attributes and goodness of fit in Information sciences

UNIT IV DESIGN OF EXPERIMENTS 12

Analysis of variance – One way and two way classifications - Completely randomized design – Randomized block design –Latin square design-Applications of design of experiments in Information


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sciences.

UNIT V QUEUING THEORY

12

Markov process (Definition only)-Representation of Queuing models-(a/b/c: d/e)forms – (M/M/I:∞/FIFO)–(M/M/I:N/FIFO)–(M/M/C:∞/FIFO)–(M/M/C:N/FIFO)(Problems only)-Applications of Queuing models in Information sciences.

Total: 45 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Apply the techniques of discrete and continuous probability distributions in real life problems
- CO2:** Apply the concepts of two dimensional discrete random variables such as mean, variance, covariance, correlation and regression in data analyzing
- CO3:** Perform parameter testing techniques to single and multi-sample tests by means, proportions and variances in order to decision making
- CO4:** Understand the concepts of analysis of variance technique and the strategy to apply the same in experimental design
- CO5:** Understand the situation that generates queuing problems, various elements of queuing system and the performance measures of different queuing models
- CO6:** Provide the mathematical foundations needed to design, analyze, and evaluate computational systems.

TEXT BOOKS:

- T1:** Johnson R.A, “Miller & Freund's Probability and Statistics for Engineers”, Pearson Education, Delhi, 8th Edition 2015
- T2:** Trivedi K. S, “Probability and Statistics with Reliability, Queuing and Computer Science Applications”, John Wiley and Sons, Second Edition, 2016.

REFERENCE BOOKS:

- R1:** Allen A.O, “Probability Statistics and Queuing Theory”, Academic Press, New Delhi, 2nd Ed 2014.
- R2:** Gupta S.C and Kapur J.N, “Fundamentals of Mathematical Statistics”, Sultan Chand, New Delhi, 11th Edition, 2019
- R3:** Gross. D and Harris. C.M, “Fundamentals of Queueing Theory”, Wiley Student Edition, 4th Ed, 2008.
- R4:** Robertazzi, “Computer Networks and Systems: Queueing Theory and performance evaluation”, Springer, 3rd Edition, 2006
- R5:** Taha H. A, “Operations Research: An Introduction”, 8th Edition, Prentice Hall of India Ltd, New Delhi, 2008

COURSE OBJECTIVES

The course aims to provide the students

- Study the basic concepts and functions of operating systems.
- Understand the structure and functions of OS.
- Learn about Processes, Threads and Scheduling algorithms.
- Understand the principles of concurrency and Deadlocks.
- Learn various memory management schemes.
- Study I/O management and File systems.
- Learn the basics of the Linux system and perform administrative tasks on Linux Servers.

PREREQUISITES :Computational Thinking and Problem Solving

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	1										2	2	
CO2	2	1	1										2	2	
CO3	2	1	1										2	2	
CO4	2	1	1										2	2	
CO5	3	2	2										2	3	
CO6	3	2	2										2	2	

UNIT I OPERATING SYSTEMS OVERVIEW**9**

Computer System Overview-Basic Elements, Instruction Execution, Interrupts, Memory Hierarchy, Cache Memory, Direct Memory Access, Multiprocessor and Multicore Organization. Operating system overview-objectives and functions, Evolution of Operating System - Computer System Organization- Operating System Structure and Operations- System Calls, System Programs, OS Generation and System Boot.

UNIT II PROCESS MANAGEMENT**9**

Processes-Process Concept, Process Scheduling, Operations on Processes, Inter-process Communication; Threads- Overview, Multicore Programming, Multithreading Models; Windows 7 – Thread and SMP Management. Process Synchronization – Critical Section Problem, Mutex Locks, Semaphores, Monitors; CPU Scheduling and Deadlocks.

UNIT III STORAGE MANAGEMENT**9**

Main Memory-Contiguous Memory Allocation, Segmentation, Paging, 32-bit and 64-bit architecture Examples; Virtual Memory- Demand Paging, Page Replacement, Allocation, Thrashing; Allocating Kernel Memory, OS Examples.

UNIT IV I/O SYSTEMS 9

Mass Storage Structure- Overview, Disk Scheduling and Management; File System Storage-File Concepts, Directory and Disk Structure, Sharing and Protection; File System Implementation- File System Structure, Directory Structure, Allocation Methods, Free Space Management, I/O Systems.

UNIT V CASE STUDY 9

Linux System -Design Principles, Kernel Modules, Process Management, Scheduling, Memory Management, Input-Output Management, File System, Inter-process Communication; Mobile OS – iOS and Android – Architecture and SDK Framework, Media Layer, Services Layer, Core OS Layer, File System.

Total: 45 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Explain the overall view of the computer system and operating system.
- CO2:** Identify various scheduling algorithm and deadlock prevention and avoidance algorithm
- CO3:** Compare and contrast various memory management schemes and file system functionalities
- CO4:** Discuss the performance of the various page replacement algorithms and interpret the file system implementation, sharing and protection mechanisms.
- CO5:** Demonstrate administrative tasks on Linux servers and to be familiar with the basics of Mobile OS.
- CO6:** Make use of various algorithms to solve computing problems.

TEXT BOOKS:

- T1:** Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Concepts”, 9th Edition, John Wiley and Sons Inc., 2012.

REFERENCE BOOKS:

- R1:** William Stallings, “Operating Systems – Internals and Design Principles”, 7th Edition, Prentice Hall, 2011
- R2:** Andrew S. Tanenbaum, “Modern Operating Systems”, Second Edition, Addison Wesley, 2001
- R3:** Charles Crowley, “Operating Systems: A Design-Oriented Approach”, Tata McGraw Hill Education”, 1996.
- R4:** D M Dhamdhare, “Operating Systems: A Concept-Based Approach”, Second Edition, Tata McGraw-Hill Education, 2007
- R5:** Daniel P Bovet and Marco Cesati,—Understanding the Linux kernel||, 3rd edition, O’Reilly 2005
- R6:** Neil Smyth, —iPhone iOS 4 Development Essentials – Xcode, Fourth Edition, Payload media, 2011

U19ECTL412T**EMBEDDED SYSTEMS**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

The course aims to provide the students

- To understand the significance of input-output device interface
- To know the different Sensors & its real time applications
- To work on motors and actuators in agriculture engineering
- To Get comprehensive knowledge on the communication technologies and Protocols
- To work on different project making using Arduino microcontroller

PREREQUISITES :U19ECTL309T

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	3			2	3						2	2	1
CO2	2	2	3			2	3						2	2	1
CO3	2	2	3			2	3						2	2	1
CO4	2	2	3			2	3						2	2	1
CO5	2	2	3			2	3						2	2	1
CO6	2	2	3			2	3						2	2	1

UNIT I INTRODUCTION TO ARDUINO 9

Introduction to ARDUINO- ARDUINO IDE- Introduction to ESP8266- Concepts of C language - Embedded C Programming-LED's- Switches- Seven Segment Display- Relay - LCD- Buzzer.

UNIT II SENSOR INTERFACING 9

Introduction to ADC and Sensors: ADC – Temperature- Humidity – Moisture- Gas Sensor-pH- Load Cell- Peltier sensor- Ultrasonic- Water Level Sensor- RGB Sensor- Proximity- IR- Motion- Pressure Sensor.

UNIT III MOTORS & ACTUATORS 9

Photodiode- Solar Panel- DC Motor- Stepper Motor- Servo Motor- BLDC Motor- Joystick- Robotic arm- Solenoids- Piezoelectric- Hydraulics.

UNIT IV COMMUNICATION PROTOCOLS 9

Communication Protocols- UART – SPI- I2C.

UNIT V ARDUINO BASED APPLICATION AND DEVELOPMENT 9

Communication Technology: GPS – GSM – RFID – NRF - Bluetooth – ZigBee – Wi-Fi.

Total: 45 Hours


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COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Identify and understand function of different blocks of AVR microcontroller.
- CO2:** Develop programs for multiple sensors interfacing to develop product prototype.
- CO3:** Develop programs to read ADC output from Photodiodes/Phototransistors for different wavelength.
- CO4:** Develop program for different Sensors which involves communication protocols.
- CO5:** Implementing different real time projects using Arduino Boards.
- CO6:** Gain knowledge to use Arduino Boards for making any kind of simple automated electronic projects.

COURSE OBJECTIVES

The course aims to provide the students

- To understand and apply the algorithm analysis techniques
- To understand the basic concepts of brute force and divide-and-conquer strategy
- To critically analyze the efficiency of alternate algorithmic solutions for the same problem
- To apply iteration improvement in feasible solution with an improved value of the objective function
- To understand different algorithm design techniques

PREREQUISITES :

- Fundamentals of Programming and problem solving using C
- Advanced Data structure and Algorithms

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	1										3		
CO2	2	3	1										3		
CO3	2	3	1										1		
CO4	2	3	1										1		
CO5	2	2											1		
CO6	2	3	1										3		

UNIT I INTRODUCTION**7**

Algorithm- Space and Time Complexity- Analysis Framework- Fundamentals of Algorithmic Problem Solving – Important Problem Types – Asymptotic Notations – Mathematical analysis for Recursive and Non-recursive algorithms.

UNIT II BRUTE FORCE AND DIVIDE-AND-CONQUER**10**

Brute Force: String Matching-Closest-Pair and Convex-Hull Problems-Exhaustive Search - Traveling Salesman Problem - Knapsack Problem - Assignment problem.

Divide and conquer methodology: Strassen's matrix multiplication-Master Theorem-Binary search – Merge sort – Quick Sort –Heap Sort.

UNIT III DYNAMIC PROGRAMMING**9**

Dynamic Programming: Principle of optimality- Floyd' algorithm -Warshall's algorithm–Multistage Graph- Optimal Binary Search Trees – Knapsack Problem.

UNIT IV ITERATIVE IMPROVEMENT AND GREEDY TECHNIQUE 9

Iterative improvement: The Simplex Method-The Maximum-Flow Problem – Maximum Matching in Bipartite Graphs- The Stable marriage Problem. Greedy Technique: Coin Change Problem-Prim’s Algorithm- Kruskal’s Algorithm-Dijkstra’s Algorithm-Huffman Trees.

UNIT V BACKTRACKING AND BRANCH-AND-BOUND 10

Backtracking: N-Queens’s problem – Hamiltonian Circuit Problem – Subset Sum Problem
Branch and Bound: Assignment problem – Knapsack Problem – Travelling Salesman Problem-NP Complete and NP Hard Problems: Basic Concepts-Non-Deterministic Algorithms - P, NP, NP – Complete and NP-Hard Classes.

Total: 45 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Analyze time and space complexities of algorithms.
- CO2:** Design algorithms for various computing problems(brute force, divide and conquer)
- CO3:** Analyze the different algorithm design techniques for a given problem.
- CO4:** Understand the application of Iterative algorithm
- CO5:** Modify existing algorithms to improve efficiency.
- CO6:** Adopt the recent algorithm design technique to solve the given problem.

TEXT BOOKS:

- T1:** S.Sridhar, “Design and Analysis of Algorithms”, Oxford University Press, 2015
- T2:** Computer Algorithms/C++, Ellis Horowitz, Satraj Sahni and Rajasekaran, 2nd Edition, 2014, Universities Press

REFERENCE BOOKS:

- R1:** Rajesh K Shukla, Analysis and Design of AlgorithmsA Beginner’s Approach”, Wiley publisher ,2015
- R2:** Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein, 3rd Edition, PHI.
- R3:** Steven S. Skiena, “The Algorithm Design Manual”, Second Edition, Springer, 2008.

Elements Exception Handling in JSP Creating Custom Tag in JSP – JSP Pagination – JSP Actions Accessing Database. Interactive Web Applications – Cookies and Session Management – Managing Client State Sessions.

UNIT V ANNOTATIONS AND DESIGN PATTERNS

8

Java Annotations – Design Patterns Creational – Structural and Behavioural Design Patterns Singleton – Factory Method Pattern Adapter Pattern – Proxy Iterator, MVC.

Total: 45 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Use the type hierarchy in Collections Framework of Java and write code which uses iterators, Comparators
- CO2:** Use Regular Expression for Pattern Matching
- CO3:** Build Java Console Based Projects with MySQL integration.
- CO4:** Create a dynamic web application, using Servlets and JSP.
- CO5:** Apply annotations and different design patterns in the application development

TEXT BOOKS:

- T1:** Philip Wadler, Maurice Naftalin, “Java Generics and Collections”, O’Reilly Media, Inc. 2006
- T2:** Marty Hall and Larry Brown, “Core Servlets and JavaServer Pages”, Second Edition.
- T3:** Martin Kalin, “Java Web Services: Up and Running”, 2nd Edition, O’Reilly Media; 2 edition 2013
- T4:** Stephen Stelting, Olav Maassen, “Applied java Patterns”, the Sun Microsystems Press, 2002.

REFERENCE BOOKS:

- R1:** Herbert Schildt, “Java The complete Reference”, Ninth Edition, Mcgraw Hill, 2016
- R2:** Bryan Basham, Kathy Sierra and Bert Bates, “Head First Servlets and JSP”, 2nd Edition, O’Reilly, 2008.
- R3:** Kathy Sierra, Bert Bates, “Head First Java”, 2nd Edition.
- R4:** Eric freeman & Elisabeth robson with kathy sierra and bert Bates, “Head First Design Patterns”, O’Reilly, Second Release 2014
- R5:** Alur Deepak, Malks Dan and Crupi John, Core J2EE Patterns: Best Practices and Design Strategies, Prentice Hall India (2001).

COURSE OBJECTIVES

The course aims to provide the students

- To learn the NoSQL and use of MongoDB in NoSQL along with configuring mongo server
- To learn to write Query for MongoDB
- To learn indexing and its usage
- To learn aggregation framework and MapReduce techniques in MongoDB
- To learn replica management on MongoDB, configure sharding on MongoDB

PREREQUISITES :Database Management Systems

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	2	2	2								2	3	
CO2	1	3	1	2	1								3	2	
CO3	2	2	2	2	2								3	2	
CO4	2	2	2	2	2								2	3	1
CO5	2	3	3	2	3									1	3
CO6	2	1	3	2	3									3	

UNIT I INTRODUCTION, BASIC DATA TYPES, CREATING, UPDATING, AND DELETING DOCUMENTS 9

Introduction to NoSQL and MongoDB, Installation of MongoDB and GUI of MongoDB. Basic Data Types: Documents, Collections, Dynamic Schemas, Mongo Shell, Mongo Server and Client, Data Types, Embedded Documents, Creating Configuration file for Mongo. Creating, Updating, and Deleting Documents: Inserting and Saving Documents, Batch Insert, Insert Validation, Removing Documents, Updating Documents, Document Replacement, Using Modifiers, Upserts, Updating Multiple Documents, Returning Updated Documents.

UNIT II QUERY 9

Introduction to find, Query Criteria, Query Conditionals, Conditional Semantics, Type-Specific Queries, Regular Expressions, Querying Arrays, Querying on Embedded Documents, Cursors, Limits, Skips, Advanced Query Options, Getting Consistent Results Immortal Cursors.

UNIT III INDEX, SPECIAL INDEX AND COLLECTION TYPES 9

Introduction to Indexing, Introduction to Compound Indexes, Using Compound Indexes, Indexing Objects and Arrays, Index Cardinality, Using explain() and hint(), The Query Optimizer, Index Administration, Changing Indexes, Capped Collections, Geospatial Indexing Storing Files with GridFS, Getting Started with GridFS: mongofiles, Working with GridFS from the MongoDB Drivers.

UNIT IV AGGREGATION, REPLICATION 10

The Aggregation Framework, Pipeline Operations, \$match, \$project, \$group, \$unwind, \$sort, \$limit, \$skip, Using Pipelines, MongoDB and MapReduce, Aggregation Command. Introduction to Replication, Configuring a Replica Set, Networking, Elections, Member Configuration Options, Creating Election Arbiters, Priority, Heartbeats.

UNIT V

SHARDING

8

Introduction to Sharding, Config Servers, The mongos Processes, Adding a Shard from a Replica Set, Shard Keys, Hashed Shard Keys for GridFS, Shard Key.

Total: 45 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Understand the NoSQL and use of MongoDB in NoSQL
- CO2:** To add new document, modify and remove existing documents from collections.
- CO3:** Write Query for MongoDB.
- CO4:** Apply indexing concepts.
- CO5:** Apply aggregation framework and MapReduce techniques in MongoDB.
- CO6:** Use replica management on MongoDB, configure Sharding on MongoDB

TEXT BOOKS:

- T1:** MongoDB: The Definitive Guide, 2nd Edition, by Kristina Chodorow, Released May 2013, O'Reilly Media, Inc.
- T2:** MongoDB in Action by Kyle Banker

REFERENCE BOOKS:

- R1:** MongoDB: Applied Design Patterns 1st Edition, by Rick Copeland, O'Reilly Media, Inc.
- R2:** MongoDB: The Definitive Guide: Powerful and Scalable Data Storage 3rd Edition by Shannon Bradsh, Eoin Brazil, Kristina Chodorow.

COURSE OBJECTIVES

The course aims to provide the students

- To enable the students to design and build simple systems on their own
- To help experiment with innovative ideas in design and team work
- To create an engaging and challenging environment in the engineering lab
- To inculcate ethics and sustainability perspectives and enable students to work in a team

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1		2		2	2	2	2	1	1	1	1
CO2	3	3	3	3		2		2	2	2	2	1	2	2	2
CO3	3	3	3	3		2		2	2	2	2	1	2	2	2
CO4	3	3	3	3		2		2	2	2	2	1	2	2	2
CO5	3	3	3	3		2		2	2	2	2	1	2	2	2

CONTENTS

S No	Topics	No of Hours
1	Introduction to Engineering	3
2	Platform based development	12
3	Mechanisms	9
4	Requirements	3
5	Design	
6	Ethics	6
7	Sustainability	
8	Project Management Principles	
9	Guided Project	3
10	Final Project	9

COURSE OUTCOMES

- CO1:** Understand the role of an engineer as a problem solver
- CO2:** Apply multi-disciplinary principles and build systems using engineering design process and tools
- CO3:** Analyze engineering solutions from ethical and sustainability perspectives

CO4: Use basics of engineering project management skills while doing projects

CO5: Communicate, Collaborate and work as a team

Total: 45Hours

GUIDELINES

- 1** Practical based learning carrying credits
- 2** Multi-disciplinary/ Multi-focus group of 3-4 students
- 3** Groups can select to work on specific tasks, or projects related to real world problems
- 4** Each group has a faculty coordinator/Instructor who will guide/evaluate the overall group as well as individual students.
- 5** The students have to display their model at the end of semester
- 6** The progress of the course is evaluated based on class performance and final demonstration of prototype

COURSE OBJECTIVES

The course aims to provide the students

- To Develop the students' ability to participate in the conversation.
- Develop an ability to use a number of key functional exponents with confidence and accuracy.
- To enable students to learn to interpret given information correctly, determine which mathematical model best describes the data, and apply the model correctly.
- To improve students' analytical and data interpretation skills.

PREREQUISITES :Nil

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		3	3				2	1		3	3		2		2
CO2		3	3				2	1		3	2		2		2
CO3		3	2				2	1		3	3		2		2
CO4		3	2				3	1		3	3		2		3

UNIT I**4**

Applied Language Skills: Self Introduction - Attending Interviews - Greeting - Starting a conversation- Social Conversation Skills

Quants: Analogy Pattern Recognition - Relating two objects - Problems on Number Analogy - Pattern completion.

UNIT II**4**

Applied Language Skills: Asking and Giving Information - Apologising and Excusing - Giving Instructions - Roleplays

Quants: Coding and Decoding Pattern Recognition - Coding and decoding by letter shifting- Coding Letters of a Word-Coding and decoding in fictitious language

UNIT III**4**

Applied Language Skills: Agreeing and disagreeing - Inviting, accepting and declining invitations - Negotiating Skills - Persuasive Skills - Debate

Quants: Analytical Reasoning - Problems related to shapes – To find the missing numbers - Shape Construction - Cubes & Dices.

UNIT IV**4**

Applied Language Skills: Expressing likes and dislikes - Complimenting - Mock Interviews - GD

Quants: Cognitive Problems & Puzzles - Find the next Image- Mirror Image- Water Image - Logical Puzzle

UNIT V

4

Applied Language Skills: Taking up certificate speaking test.

Quants: Vedic Mathematics and Sudoku- Addition- Subtraction- System of Multiplication- Squaring numbers- Cube roots – Square roots – Logic-based Sudoku

Total: 20 Hours

COURSE OUTCOMES

At the end of the course students should be able to

CO1: Able to participate in formal/informal conversations

CO2: Speak in different contexts confidently and accurately

CO3: Ability to interpret the given information correctly, determine which mathematical model best describes the data, and apply the model correctly.

CO4: To improve analytical and data interpretation skills.

TEXT BOOKS:

T1: Chris Anderson, TED Talks: The official TED guide to public speaking: Tips and tricks for giving unforgettable speeches and presentations The Newyork Times Paperback, 2018

T2: GMAT – All the Verbal: 978-1-5062-4904-9, 2019, Manhattan Prep, Newyork

T3: Aggarwal, R.S. “Quantitative Aptitude”, Revised Edition 2016, Reprint 2018, S.Chand& Co Ltd., New Delhi.

T4: Analytical Reasoning by M.K Pandey

REFERENCE BOOKS:

R1: Interact English Lab Manual for Undergraduate Students. Orient Black Swan: Hyderabad, 2016

R2: Raman, Meenakshi and Sangeetha Sharma. Professional Communication. Oxford University Press: Oxford, 2014.

R3: Arun Sharma “How to Prepare for Quantitative Aptitude for the CAT”, McGraw Hill Education; Eighth edition 2018

R3: Arun Sharma “How to Prepare for Logical Reasoning for the CAT”, McGraw Hill Education; Eighth edition 2018.

WEB RESOURCES:

W1: <https://www.ted.com/talks>

W2: <https://www.toastmasters.org/>

W3: <https://www.edudose.com/reasoning/>

W4: <https://testbook.com/aptitude-practice/>

COURSE OBJECTIVES

The course aims to provide the students

- To learn the NoSQL and use of MongoDB in NoSQL along with configuring mongo server
- To learn to write Query for MongoDB
- To learn indexing and its usage
- To learn aggregation framework and MapReduce techniques in MongoDB
- To learn replica management on MongoDB, configure sharding on MongoDB

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	2	2	2								2	3	
CO2	1	3	1	2	1								3	2	
CO3	2	2	2	2	2								3	2	
CO4	2	2	2	2	2								2	3	1
CO5	2	3	3	2	3									1	3
CO6	2	1	3	2	3									3	

LAB COMPONENTS

1. Install MongoDB Community Edition on Windows
2. Implement aggregation and indexing with suitable examples using MongoDB.
3. Implementing Map reduces operation with suitable examples using MongoDB...
4. Design and implement any 5 queries using MongoDB.
5. Implement any one Concurrency Control Protocol using MongoDB and .net/Java
6. Implement Replication and Sharding.
7. Design and Implement any Database Application using PHP/ python/Java and MongoDB as a back end.
8. Implement Database navigation operations (add, delete, edit etc.) using ODBC/JDBC.

COURSE OUTCOMES

- CO1:** Understand the NoSQL and use of MongoDB in NoSQL
- CO2:** To add new document, modify and remove existing documents from collections.
- CO3:** Write Query for MongoDB
- CO4:** Apply indexing concepts
- CO5:** Apply aggregation framework and MapReduce techniques in MongoDB
- CO6:** Use replica management on MongoDB, configure Sharding on MongoDB

U19ITTL405L

ADVANCED JAVA PROGRAMMING LABORATORY

Total: 30 Hours

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COURSE OBJECTIVES

The course aims to provide the students

- To provide deeper understanding of the collections framework.
- To understand Regular Expressions and how to use it in java applications.
- To equip the students with the advanced feature of contemporary java that will enable them to handle complex programs relating to managing data.
- To provide the ability to design console based, GUI based and web based applications.
- To provide a sound foundation to the students on the concepts, precepts and practices, in a field that is of immense concern to the industry and business.

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		3			3								2	3	
CO2		3			3								3	3	
CO3		3	3								2		3	3	2
CO4		3	3		3						2		3	3	2
CO5			3		3								3	3	2

LAB COMPONENTS

1. Write a Java program for implementing Regular Expressions
2. Write a Java program to display objects using Iterators, Enumerations, advanced For Loop.
3. Write a Java program using all classes of collections framework
4. Write a Java program to sort objects using Comparator and Comparable.
5. Create Web Application Using Servlets
6. Write a Java program to integrate login, signup and dashboard forms using servlets.
7. Write a Java program to connect Servlet and JSP with MySQL using JDBC API and perform CRUD Operation.
8. Demonstrate different design patterns.


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COURSE OUTCOMES

- CO1:** Use the type hierarchy in Collections Framework of Java and write code which uses iterators, Comparators.
- CO2:** Use Regular Expression for Pattern Matching
- CO3:** Build Java Console Based Projects with MySQL integration.
- CO4:** Create a dynamic web application, using Servlets and JSP..
- CO5:** Apply annotations and different design patterns in the application development

Total: 30 Hours

9. Implement all page replacement algorithms: a) FIFO b) LRU c) LFU
10. Implement Shared memory and IPC

11. Implement Paging Technique of memory management.
12. Implement Threading & Synchronization Applications

COURSE OUTCOMES

- CO1:** Design various Scheduling algorithms.
- CO2:** Apply the principles of concurrency.
- CO3:** Design deadlock, prevention and avoidance algorithms.
- CO4:** Compare and contrast various memory management schemes.
- CO5:** Design and Implement a prototype file systems.
- CO6:** Perform administrative tasks on Linux Servers.

Total: 30 Hours

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	2		3					1			2	2	1
CO2	3	1	2		3					1			2	2	1
CO3	3	1	2		3					1			2	2	1
CO4	3	1	2		3					1			2	2	1
CO5	3	1	2		3					1			2	2	1
CO6	3	1	2		3					1			2	2	1

LAB COMPONENTS

1. Sindhu is working as a software engineer in TCS, she is growing some flowering and fruits plant at her roof garden. Due to her busy schedule, she is unable to water them regularly. Sindhu wants someone to help her in developing an automatic system which can water all her plants once the moisture level decreases. Kindly develop a project which can help sindhu.
2. Karthick wants to do smart farming at his native place in salem, due to unavailability of labours, he is not able to properly water his farming land. Since Salem having highest temperature compared to other regions in tamilnadu. Kindly suggest an automatic system which can water his farm checking the temperature, soil moisture and humidity. Kindly develop a project which can help karthick ease his farming.
3. Arthi is a house wife who grows flowering plants and some vegetables in her balcony. Arthi wants her plants to take enough sunlight on Morning & Evening. She need to design a system which automatically detect temperature level and analysis the required sunlight for the plants. Kindly develop a project which can help arthi grow her plants.
4. Abi is a village girl who collects neem seeds and makes an income out of it. She collects more than a sack of Neem seeds nearby her village daily and takes three to five days to dry it, so that she can sell it and make income out of it. She wants to dry the seeds at the temperature level of 35 C for duration of 3 minutes which can ease her drying process. Help her to design a system which can help Abi to make money on daily basis.
5. Kumar is owning a pre-owned car showroom at Chennai. He owns a farm land 15km away from his house. He commutes daily morning to his farm land to start the motor for irrigation purpose. He wants to turn ON /OFF motor from his house using some wireless method. Kindly help kumar to develop system that will help him ease of travel daily to switch on the motor.

6. Mani is real estate owner at erode. Due to water pollution nearby his area people are resistant to buy land from him which he has for sale. He needs to find out pH level of his land so that it will be easy for him to convenience his buyers. Kindly help Mani to develop a project on the same.
7. Muthu is a Farmer in Sathyamangalam & his son is studying Engineering in some nearby college. Due to the ongoing famine Government supplies water only one hour on different timing of the day. As farming is important he sits in the farm expecting for the water supply so that he can switch on the motor, which spoils most of his other chores. As a son/daughter of muthu how will you help your father solve his issue?
8. Ramu is small time milk maid who supplies milk to nearby villages. Due to the pandemic diseases he is finding it difficult to supply milk within his streets. Kindly develop a Multi-Purpose Wireless Robot using Bluetooth Module which can make him delivery his milk to his nearby villages.
9. Electricity bill for Sriram was very high because of the Automatic water level controller. So, he decided to install solar panel to rectify this issue. As an Engineer how you will support Sriram.
10. Ram daily ON the street light in the Evening & OFF it in the morning, since it's difficult task for him, he decided to ON & OFF it Automatically without manual involvement. How you will help him as an Embedded Engineer?

- CO1:** Identify and understand function of different blocks of AVR microcontroller.
- CO2:** Develop programs for multiple sensors interfacing to develop product prototype.
- CO3:** Develop programs to read ADC output from Photodiodes/Phototransistors for different wavelength
- CO4:** Develop program for different Sensors which involves communication protocols
- CO5:** Implementing different real time projects using Arduino Boards
- CO6:** Gain knowledge to use Arduino Boards for making any kind of simple automated electronic projects.

Total: 30 Hours

COURSE OBJECTIVES

The course aims to provide the students

- To provide the students learn the importance of designing an algorithm in an effective way by considering space and time complexity
- To learn divide and conquer strategy based algorithms
- To learn greedy method based algorithms
- To learn the dynamic programming design techniques
- To develop Recursive backtracking algorithms

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	1	1							1	3	1	
CO2	2	1	1	1	1							1	1	1	
CO3	2	2	2	1	1							1	3	1	
CO4	2	2	2	1	1							1	3	1	

LAB COMPONENTS

1. Sort a given set of n integer elements using Quick Sort method and compute its time complexity. Run the program for varied values of $n > 5$ and record the time taken to sort. Plot a graph of the time taken versus non graph sheet. The elements can be read from a file or can be generated using the random number generator. Demonstrate using Java how the divide and- conquer method works along with its time complexity analysis: worst case, average case and best case.
2. Sort a given set of n integer elements using Merge Sort method and compute its time complexity. Run the program for varied values of $n > 5$, and record the time taken to sort. Plot a graph of the time taken versus non graph sheet. The elements can be read from a file or can be generated using the random number generator. Demonstrate using Java how the divide and conquer method works along with its time complexity analysis: worst case, average case and best case.
3. Implement in Java, the /1 Knapsack problem using (a) Dynamic Programming method (b) Greedy method.

4. From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm. Write the program in Java.
5. Find Minimum Cost Spanning Tree of a given connected undirected graph using Kruskal's Algorithm. Use Union-Find algorithms in your program.
6. Find Minimum Cost Spanning Tree of a given connected undirected graph using Prim's algorithm.
7. Write Java programs to Implement All-Pairs Shortest Paths problem using Floyd's algorithm.
8. Implement Travelling Sales Person problem using Dynamic Programming.
9. Design and implement in Java to find a subset of a given set $S = \{S_1, S_2, \dots, S_n\}$ of n positive integers whose SUM is equal to a given positive integer d . For example, if $S = \{1, 2, 5, 6, 8\}$ and $d = 9$, there are two solutions $\{1, 2, 6\}$ and $\{1, 8\}$. Display a suitable message, if the given problem instance doesn't have a solution.
10. Design and implement in Java to find all Hamiltonian Cycles in a connected undirected Graph G of n vertices using backtracking principle.

COURSE OUTCOMES

- CO1:** Design algorithms using divide and conquer and greedy methods
- CO2:** Analyze the performance of merge sort and quick sort algorithms using divide and conquer technique
- CO3:** Design algorithms using dynamic programming and back tracking methods
- CO4:** Design algorithms using BRANCH AND BOUND

Total: 30 Hours

SEMESTER V

U19ITTL506T

COMPUTER NETWORKS

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COURSE OBJECTIVES

The course aims to provide the students

- To understand the concepts of data communications
- To be familiar with the Transmission media and Tools.
- To study the functions of OSI layers
- To learn about IEEE standards in computer networking
- To get familiarized with different protocols and network components

PREREQUISITES :Nil

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	2										2	2	1
CO2	3	1	2										2	2	1
CO3	3	1	2										2	2	1
CO4	3	1	2										2	2	1
CO5	3	1	2										2	2	1
CO6	3	1	2										2	2	1

UNIT I DATA COMMUNICATIONS 9

Data communication Components – Data representation and Data flow – Networks – Types of Connections – Topologies – Protocols and Standards – OSI model – Transmission Media – LAN –Wired LANs, Wireless LANs, Connecting LANs, Virtual LANs.

UNIT II DATA LINK LAYER 9

Error Detection and Error Correction – Introduction–Block coding–Hamming Distance – CRC–Flow Control and Error control – Stop and Wait – Go back N ARQ – Selective Repeat ARQ – Sliding Window – Piggybacking – Random Access – CSMA/CD, CDMA/CA.

UNIT III NETWORK LAYER 9

Switching–Logical addressing – IPV4 – IPV6–Address mapping–ARP, RARP, BOOTP and DHCP–Delivery, Forwarding and Unicast Routing protocols.

UNIT IV TRANSPORT LAYER 9

Process to Process Delivery – User Datagram Protocol – Transmission Control Protocol – SCTP –


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Congestion Control with Examples.

UNIT V APPLICATION LAYER

9

Domain Name Space – DDNS – TELNET – EMAIL – File transfer WWW – HTTP – SNMP – Cryptography – Basic concepts.

Total: 45 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Understand fundamental underlying principles of computer networking
- CO2:** Understand details and functionality of layered network architecture
- CO3:** Apply mathematical foundations to solve computational problems in computer networking
- CO4:** Analyse performance of various communication protocols
- CO5:** Compare Routing Algorithms
- CO6:** Practice packet /file transmission between nodes.

TEXT BOOKS:

- T1:** Larry Peterson, Peter S. Davie, “Computer Networks”, Elsevier, Fifth Edition, 2012
- T2:** William Stallings, “Data and Computer Communication”, Eighth Edition, Pearson Education, 2007
- T3:** James F. Kurose, Keith W. Ross, “Computer Networking: A Top–Down Approach Featuring the Internet”, Pearson Education, 2005

REFERENCE BOOKS:

- R1:** Computer Networks – A System Approach, Larry L. Peterson & Bruce S. Davie, 2nd Edition.
- R2:** .B. A. Forouzan – “Data Communications and Networking (3rd Ed.)” – TMH.
- R3:** A. S. Tanenbaum – “Computer Networks (4th Ed.)” – Pearson Education/PHI

COURSE OBJECTIVES

The course aims to provide the students

- To learn the various phases of compiler.
- To learn the various parsing techniques.
- To understand intermediate code generation and runtime environment.
- To learn to implement frontend of the compiler.
- To learn to implement code generator.

PREREQUISITES :Nil

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2		1	1								3	1	1
CO2	3	3	1	3	2										1
CO3	3	3	1	3	2								3	2	1
CO4	3	3	2	3	2	1	1						3	2	1
CO5	1	3	3	2	3	2	1	1	2			1	1		3
CO6	1											1	1		

UNIT I INTRODUCTION TO COMPILERS 9

Structure of a compiler – Lexical Analysis – Role of Lexical Analyzer – Input Buffering – Specification of Tokens – Recognition of Tokens – Lex – Finite Automata – Regular Expressions to Automata – Minimizing DFA.

UNIT II SYNTAX ANALYSIS 12

Role of Parser – Grammars – Error Handling – Context free grammars – Writing a grammar – Top Down Parsing General Strategies Recursive Descent Parser Predictive Parser LL (1) Parser Shift Reduce Parser LR Parse rLR (0) Item Construction of SLR Parsing Table Introduction to LALR Parser Error Handling and Recovery in Syntax Analyzer YACC.

UNIT III INTERMEDIATE CODE GENERATION 8

Syntax Directed Definitions, Evaluation Orders for Syntax Directed Definitions, Intermediate Languages: Syntax Tree, Three Address Code, Types and Declarations, Translation of Expressions, Type Checking

UNIT IV RUNTIME ENVIRONMENT AND CODE GENERATION 8

Storage Organization, Stack Allocation Space, Access to Nonlocal Data on the Stack, Heap Management Issues in Code Generation Design of a simple Code Generator.

UNIT V CODE OPTIMIZATION**8**

Principal Sources of Optimization – Peephole optimization DAG Optimization of Basic Blocks Global Data Flow Analysis Efficient Data Flow Algorithm.

Total: 45 Hours**COURSE OUTCOMES**

At the end of the course students should be able to

- CO1:** Understand the different phases of compiler and design a lexical analyzer for a sample language.
- CO2:** Apply different parsing algorithms to develop the parsers for a given grammar.
- CO3:** Understand syntax directed translation.
- CO4:** Understand runtime environment and a simple code generator.
- CO5:** Learn to implement code optimization techniques.
- CO6:** Design and implement a scanner and a parser using LEX and YACC tools. Implement storage allocation strategies.

TEXT BOOKS:

- T1:** Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, Compilers: Principles, Techniques and Tools, Second Edition, Pearson Education, 2009.

REFERENCE BOOKS:

- R1:** Randy Allen, Ken Kennedy, Optimizing Compilers for Modern Architectures: A Dependence based Approach, Morgan Kaufmann Publishers, 2002.
- R2:** Steven S. Muchnick, Advanced Compiler Design and Implementation, Morgan Kaufmann Publishers Elsevier Science, India, Indian Reprint 2003.
- R3:** Keith D Cooper and Linda Torczon, Engineering a Compiler, Morgan Kaufmann Publishers Elsevier Science, 2004.
- R4:** V. Raghavan, Principles of Compiler Design, Tata McGraw Hill Education Publishers, 2010.
- R5:** Allen I. Holub, Compiler Design in C, PrenticeHall Software Series, 1993.

COURSE OBJECTIVES

The course aims to provide the students

- Understand the software life cycle models
- Understand the importance of the requirement analysis in software development process.
- Learn the concept of modeling
- Learn the importance of testing
- Design and develop correct and robust software products

PREREQUISITES :Nil

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1									2				3
CO2	1	1	3							1	2				3
CO3	1	2								1	2				3
CO4	1		3	2			1			1					3
CO5	1			2											3

UNIT I OVERVIEW OF SOFTWARE ENGINEERING 9

Nature of Software, Software Engineering, Software process, project, product, Process Models, Classical Perspective models - Waterfall model - Incremental models - Evolutionary models - Specialized models - Unified Process Models.

UNIT II REQUIREMENTS 9

Requirements Engineering process Requirement Elicitation - Developing Use Cases - Building the analysis model – Negotiation - Validation - Building the Analysis Model. Requirement Analysis – Approaches - Data modelling concepts - OO Analysis - Scenario Based modelling - Flow Oriented modelling - Class based modelling - Behavioural Modelling.

UNIT III DESIGN – MODELING WITH UML 9

Modeling Concepts and Diagrams - Use Case Diagrams - Class Diagrams - Interaction Diagrams - State chart Diagrams – Activity Diagrams - Package Diagrams - Component Diagrams – Deployment Diagrams - Diagram Organization- Diagram Extensions. Design Process- Design concepts: Abstraction, Architecture, patterns, Separation of Concerns, Modularity, Information Hiding, Functional Independence, Refinement, Aspects, Refactoring, Object Oriented Design Concepts, Design Classes- Design Model: Data, Architectural, Interface, Component, Deployment Level Design Elements.

UNIT IV IMPLEMENTATION AND TESTING**9**

Structured coding Techniques-Coding Styles-Standards and Guidelines- Documentation Guidelines- Modern Programming Language Features: Type checking -User defined data types-Data Abstraction-Exception Handling- Concurrency Mechanism.

Testing Strategies: Strategic Approach to Software Testing, Testing Fundamentals - Blackbox and White-box Testing - Test Plan, Test Design, Test Execution, Reviews, Inspection Auditing - Product Metrics. Case Study: SWEBOK.

UNIT V MAINTENANCE AND QUALITY ASSURANCE**9**

MAINTENANCE: Software Maintenance-Software Supportability- Reengineering- Business Process Reengineering- Software Reengineering- Reverse Engineering- Restructuring- Forward Engineering- Economics of Reengineering.

QUALITY ASSURANCE: Product Process Metrics, Quality Standards Models ISO, TQM, Six-Sigma.

Total: 45 Hours**COURSE OUTCOMES**

At the end of the course students should be able to

CO1: Develop the software projects using Software life cycle models

CO2: Identify the requirements for the software projects.

CO3: Design the prototype of the software projects.

CO4: Test the software products that are implemented using the software development process from requirement analysis to verification and validation.

CO5: Apply benchmarking standards in process and in product.

TEXT BOOKS:

T1: Pressman R S, Bruce R. Maxim, "Software engineering - A Practitioner's Approach", Eighth Edition, Tata McGraw-Hill, 2014

REFERENCE BOOKS:

R1: Sommerville I, "Software Engineering", Sixth Edition, Addison Wesley, 2003.

R2: Fairley R, "Software Engineering Concepts", Seventh Edition, Tata McGraw-Hill, 1999.

R3: G J Myers, Corey S, Tom B and Todd M T, "The Art of Software Testing", Third Edition, Wiley, 2011

R4: Pankaj J, "An Integrated Approach to Software Engineering", Third Edition, Narosa Publishing House, 2005.

COURSE OBJECTIVES

The course aims to provide the students

- To provide a strong foundation on fundamental concepts in Computational Intelligence.
- To enable Problem-solving through various searching techniques.
- To apply these techniques in applications which involve perception, reasoning and learning.
- To apply Computational Intelligence techniques for information retrieval
- To apply Computational Intelligence techniques primarily for machine learning.

PREREQUISITES :Nil

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3			3		2							2		
CO2	3			3		2							2		
CO3	3	3	3	3		2							2	2	1
CO4	3	3	3	3		2							2	2	1
CO5	3	3	3	3		2							2	2	1
CO6	3	3	3	3		2							2	2	1

UNIT I INTRODUCTION 9

Introduction to Artificial Intelligence-Search-Heuristic Search-A* algorithm-Game Playing- Alpha-Beta Pruning-Expert Systems-Inference-Rules-Forward Chaining and Backward Chaining- Genetic Algorithms.

UNIT II KNOWLEDGE REPRESENTATION AND REASONING 9

Proposition Logic - First Order Predicate Logic – 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 - Prolog Programming.

UNIT III UNCERTAINTY 9

Non monotonic reasoning-Fuzzy Logic-Fuzzy rules-fuzzy inference-Temporal Logic-Temporal Reasoning-Neural Networks-Neuro-fuzzy Inference.

UNIT IV LEARNING 9

Probability basics - Bayes Rule and its Applications - Bayesian Networks – Exact and Approximate Inference in Bayesian Networks - Hidden Markov Models - Forms of Learning - Supervised Learning - Learning Decision Trees – Regression and Classification with Linear Models - Artificial Neural Networks – Nonparametric Models - Support Vector Machines - Statistical Learning - Learning with Complete

Data - Learning with Hidden Variables- The EM Algorithm – Reinforcement Learning.

UNIT V APPLICATION LAYER

9

Natural language processing-Morphological Analysis-Syntax analysis-Semantic Analysis-All applications – Language Models - Information Retrieval – Information Extraction - Machine Translation – Machine Learning - Symbol-Based – Machine Learning: Connectionist – Machine Learning.

Total: 45 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Provide a basic exposition to the goals and methods of Computational Intelligence
- CO2:** Study of the design of intelligent computational techniques
- CO3:** Apply the Intelligent techniques for problem solving
Improve problem solving skills using the acquired knowledge in the areas of, reasoning,
- CO4:** natural language understanding, computer vision, automatic programming and machine learning
- CO5:** Improve problem solving skills using the acquired knowledge in the areas of, reasoning, natural language understanding
- CO6:** Acquired knowledge in the area of computer vision, automatic programming and machine learning.

TEXT BOOKS:

- T1:** Stuart Russell, Peter Norvig, —Artificial Intelligence: A Modern Approach||, Third Edition, Pearson Education / Prentice Hall of India, 2001
- T2:** Elaine Rich and Kevin Knight,—Artificial Intelligence||,Third Edition,Tata McGraw-Hill,2001

REFERENCE BOOKS:

- R1:** Patrick H. Winston. "Artificial Intelligence", Third edition, Pearson Edition, 2006.
- R2:** Dan W.Patterson, —Introduction to Artificial Intelligence and Expert Systems||, PHI, 2006.
- R3:** Nils J. Nilsson, —Artificial Intelligence: A new Synthesis||, Harcourt Asia Pvt. Ltd., 2000


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COURSE OBJECTIVES

The course aims to provide the students

- Understand the fundamentals of Web.
- Learn to build web page with NodeJS and Express JS.
- Learn to integrate a Relational Database with a Web Application.
- Learn to develop web pages using Bootstrap.
- Learn to design a web application with NoSQL Database

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3					3	3	3		3	3	2	3
CO2	3	3	3		3			3	3	3		3	3		3
CO3	3	3	3					3	3	3		3	3	2	3
CO4	3	3	3					3	3	3		3	3		3
CO5	3	3	3		3			3	3	3		3	3	2	3
CO6	3	2	2		3								2	2	2

UNIT I INTRODUCTION 9

The Internet- Basic Internet Protocols - Web Fundamentals - Web Clients - Web Servers. - Overview of Full stack – MVC Architecture – Front-end and Backend technologies - Middleware – Handling request and response - MEAN – MERN – Django.

UNIT II DESIGNING A STATIC WEB PAGE 9

HTML – Structure of HTML - HTML tags - CSS – Styling – JavaScript -Introduction - Overview of NPM **Node.js** – Introduction - Modules - HTTP Module –Installation and configuration – File structure - **Express.js** - Request - Response - Get - Post – Routing

UNIT III RELATIONAL DATABASE 9

DOM Manipulation - DOM Events - Call back function – Promises - Database Integration using MySQL - Working with Database Schemas - Implementing MVC in Express - Retrieve the data from Database - Template Engines - HTML Injection - EJS – Handle bars.

UNIT IV BOOTSTRAP 9

Bootstrap - Introduction to Bootstrap- Bootstrap Basics - Grid system - Basic Components - Page Header - Button Groups – Dropdown -Nav&Navbars - **Responsive Web Design** - Viewport - Grid View - Media Queries – Validation - Understanding Client-side validation – JavaScript in Validation.

UNIT V NOSQL DATABASE 9

NoSQL – Serialization - Modelling NoSQL data - Document Databases (MongoDB) – MongoDB - MongoDB Environment - Database - Collection - Read Operations - Write Operations –Working with

NoSQL and MongoDB - Working with Mongoose – Creating a Cluster in MongoDB Atlas- Defining a Schema (Model in Node JS) – MongoDB Integration with NodeJS..

Total: 45 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Differentiate between Frontend and Backend Technologies.
- CO2:** Build a web page using NodeJS and Express JS
- CO3:** Work on JavaScript Events, Database schemas and Integrate a Relational Database with the web application
- CO4:** Develop a responsive web page using Bootstrap
- CO5:** Connect the web application with NoSQL Database
- CO6:** Implement CRUD operations in collection.

WEB RESOURCES:

- W1:** <https://nodejs.org/api/>
- W2:** <https://expressjs.com/en/5x/api.html>
- W3:** <https://docs.atlas.mongodb.com/api/>

REFERENCE BOOKS:

- R1:** John Duckett, “HTML and CSS design and build websites”, John Wiley & Sons, Inc.
- R2:** Shay Howe, “Learn to Code HTML & CSS Develop & Style Websites”, New Riders, Pearson Education, 2014.
- R3:** Brad Dayley , Brendan Dayley, Caleb Dayley, “Node.js, MongoDB and Angular Web Development“, Second Edition, Pearson, 2017

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3					3	3	3		3	3	2	3
CO2	3	3	3		3			3	3	3		3	3		3
CO3	3	3	3					3	3	3		3	3	2	3
CO4	3	3	3					3	3	3		3	3		3
CO5	3	3	3		3			3	3	3		3	3	2	3
CO6	3	2	2		3								2	2	2


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LAB COMPONENTS

1. Develop a static page (HTML and CSS) for an online Book store. The website should consist the following pages. Home page, Registration and user Login, User profile page, Books Catalogue, Shopping cart, Payment by credit card, order confirmation
2. Develop a HTML page that includes JavaScript functions to check whether the,
 - a. Position in the string has right-most vowel
 - b. Number of characters in the string does not exceeds 12
3. DOM Manipulation and JS Events
4. Implement CRUD operations using MySQL in a web application
5. Design a web page to store information about a student in an engineering college affiliated to Anna University. The information must include USN, Name, and Name of the College, Branch, Year of Joining, and email id. Make up sample data for 3 students.
6. Create an administrative interface for an online voting application that lets add, change and delete votes with JS Validation.

LAB COMPONENTS

1. Online Auction Management web application using Express, Node JS.
2. Movie – Ticket Booking
3. Secure messaging application
4. E-learning Site
5. E-Signature (Online Petition Signing app)
6. E-Blood Bank site

COURSE OUTCOMES

- CO1:** Differentiate between Frontend and Backend Technologies.
- CO2:** Build a web page using NodeJS and Express JS.
- CO3:** Work on JavaScript Events, Database schemas and Integrate a Relational Database with the web application.
- CO4:** Develop a responsive web page using Bootstrap.
- CO5:** Connect the web application with NoSQL Database.
- CO6:** Implement CRUD operations in collection.

Total: 15 Hours

COURSE OBJECTIVES

The course aims to provide the students

- To understand the concepts of data communications
- To be familiar with the Transmission media and Tools.
- To study the functions of OSI layers
- To learn about IEEE standards in computer networking
- To get familiarized with different protocols and network components

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	2										2	2	1
CO2	3	1	2										2	2	1
CO3	3	1	2										2	2	1
CO4	3	1	2										2	2	1
CO5	3	1	2										2	2	1
CO6	3	1	2										2	2	1

LAB COMPONENTS

1. Socket Program for Echo/Ping/Talk commands.
2. Create a socket (TCP) between two computers and enable file transfer between them.
3. Create a socket (UDP) between two computers and enable file transfer between them.
4. Implement Remote Command Execution. (Two M/Cs may be used)
5. Simulating ARP /RARP protocols.
6. Create a socket for HTTP for web page upload and download.
7. TCP module implementation. (TCP services)
8. File Transfer in client-server architecture using following methods.
 - (a) RS232C
 - (b) TCP/IP
9. Implement RMI (Remote Method Invocation)
10. Perform a case study about the different routing algorithms to select the network path with its optimum and economical during data transfer.
 - i. Shortest path routing
 - ii. Flooding
 - iii. Distance vector
11. Implement client in C and server in Java and initiate communication between them.

COURSE OUTCOMES

- CO1:** Understand fundamental underlying principles of computer networking
- CO2:** Understand details and functionality of layered network architecture.
- CO3:** Apply mathematical foundations to solve computational problems in computer networking
- CO4:** Analyse performance of various communication protocols.
- CO5:** Compare Routing Algorithms
- CO6:** Practice packet /file transmission between nodes.

Total: 30 Hours

COURSE OBJECTIVES

The course aims to provide the students

- To learn the various parsing techniques.
- To understand intermediate code generation and runtime environment.
- To learn to implement frontend of the compiler.
- To learn to implement code generator.
- To implement the logic using LEX and YACC Tools

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2				2									3	2
CO2	2				2									3	2
CO3	2	2												2	
CO4	2	2												3	3

LAB COMPONENTS

Develop a lexical analyser to recognize a few patterns in C. (Ex. identifiers, constants, comments, operators etc.). Create a symbol table, while recognizing identifiers.

2. Implement a Lexical Analyzer using Lex Tool
3. Implement an Arithmetic Calculator using LEX and YACC
4. Generate three address code for a simple program using LEX and YACC.
5. Implement simple code optimization techniques (Constant folding, Strength reduction and Algebraic transformation)
6. Implement backend of the compiler for which the three address code is given as input and the 8086 assembly language code is produced as output.

7. Write a LEX Program and YACC program to count the number of words, vowels and consonants in a string
8. Write a LEX Program and YACC program to recognize and count the number of identifiers in a given input file.
9. Write a LEX Program and YACC program to recognize a string ending with 'aba'.
10. Write a LEX Program and YACC program to calculate average of given numbers
11. Write a LEX Program and YACC program to recognize a whether the given sentence is simple or compound.

COURSE OUTCOMES

- CO1:** Students will able to implement the techniques of Lexical Analysis and Syntax Analysis.
- CO2:** Students will able to apply the knowledge of Lex & Yacc tools to develop programs..
- CO3:** Students will be able to generate intermediate code
- CO4:** Students will be able to implement Optimization techniques and generate machine level code.

Total: 30 Hours

COURSE OBJECTIVES

The course aims to provide the students

- Understand the software life cycle models
- Understand the importance of the requirement analysis in software development process.
- Learn the concept of modeling
- Learn the importance of testing
- Design and develop correct and robust software products

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2									2		1	1	3
CO2	2	2	3							2	2				3
CO3	2	3								3	2				3
CO4	1		3	2			2			2					3
CO5	2		1	2											3

LAB COMPONENTS

1. Case Study on Waterfall model Vs Agile Methodology.
2. Exploration of Agile tools
3. Creation of User Story for Concern Project
4. Sprint Planning-Sprint 1,Sprint 2
5. Scrum Meeting
6. Bug fixing and Backlog Refinement.
7. Demo Call

COURSE OUTCOMES

- CO1:** Understand the software life cycle models.
- CO2:** Understand the importance of the requirement analysis in software development process.
- CO3:** Learn the concept of modeling.
- CO4:** Learn the importance of testing.
- CO5:** Design and develop correct and robust software products.

Total: 30 Hours

COURSE OBJECTIVES

The course aims to provide the students

- To enable the students to design and build simple systems on their own
- To help experiment with innovative ideas in design and team work
- To create an engaging and challenging environment in the engineering lab
- To inculcate ethics and sustainability perspectives and enable students to work in a team

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1		2		2	2	2	2	1	1	1	1
CO2	3	3	3	3		2		2	2	2	2	1	2	2	2
CO3	3	3	3	3		2		2	2	2	2	1	2	2	2
CO4	3	3	3	3		2		2	2	2	2	1	2	2	2
CO5	3	3	3	3		2		2	2	2	2	1	2	2	2

CONTENTS

S No	Topics	No of Hours
1	Introduction to Engineering	3
2	Platform based development	12
3	Mechanisms	9
4	Requirements	3
5	Design	
6	Ethics	6
7	Sustainability	
8	Project Management Principles	
9	Guided Project	3
10	Final Project	9

COURSE OUTCOMES

- CO1:** Understand the role of an engineer as a problem solver
- CO2:** Apply multi-disciplinary principles and build systems using engineering design process and tools
- CO3:** Analyze engineering solutions from ethical and sustainability perspectives
- CO4:** Use basics of engineering project management skills while doing projects
- CO5:** Communicate, Collaborate and work as a team

Total: 45Hours

GUIDELINES

- 1** Practical based learning carrying credits
- 2** Multi-disciplinary/ Multi-focus group of 3-4 students
- 3** Groups can select to work on specific tasks, or projects related to real world problems
- 4** Each group has a faculty coordinator/Instructor who will guide/evaluate the overall group as well as individual students.
- 5** The students have to display their model at the end of semester
- 6** The progress of the course is evaluated based on class performance and final demonstration of prototype

COURSE OBJECTIVES

The course aims to provide the students

- To develop making inferences and predictions based on comprehension of a text
- To distinguish main idea(s) from supporting detail
- To enhance problem-solving skills, to improve basic mathematical skills.
- To help the students who are preparing for any type of competitive examination.
- To draw conclusions and/or make decisions based on analysis and critique of quantitative information using proportional reasoning.

PREREQUISITES :Nil

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		3	3				2	1		3	3		2		2
CO2		3	3				2	1		3	2		2		2
CO3		3	2				2	1		3	3		2		2
CO4		3	2				3	1		3	3		2		3

UNIT I**4**

Applied Language Skills: Reading for main ideas - Making Inferences- Identifying the theme - Writing different types of paragraphs – Para jumbles.

Quants: Number System – Lcm & HCF – Simplification – Surds & Indices – Cyclicity- Equations - Classification on Numbers -Power cycles and remainders - Concept of highest common factor – the concept of least common multiple - Divisibility Rule - Number of zeros in an expression - Problems on Surds and Indices - Concept of Unit digit - Simultaneous equations- Quadratic equations – In equation.

UNIT II**4**

Applied Language Skills: Email etiquette - Email writing - Dangling modifiers - Writing different types of essays.

Quants: Fundamentals of Algebra - Averages - Variables - Algebraic expressions - Substitution & evaluating expressions - Writing algebraic expressions - Percentages – the concept of percentage values through additions - fraction to the percentage conversion table.

UNIT III**4**

Applied Language Skills: Resume and cover letter writing - Visumes - Practice- Preparation of Resumes for placements.

Quants: Ratios and Proportion- comparison of ratios - proportions - relation among the quantities more than two – variation. - Partnership - Mixtures and Allegations - Problem on Ages - Definition - Allegation rule - mean value (cost price) of the mixture - Problems with ages and Problems related to ratios.

UNIT IV**4**

Applied Language Skills: Technical Reports - Structure of the report - Critical Reasoning- Employee motivation, Satisfaction and commitment - Work Ethics

Quants: Problem on Ages - Profit & Loss - Discount - Simple Interest & Compound Interest - Data Interpretation.

UNIT V**4**

Applied Language Skills: Organisational Communication - Leadership skills- Stress management - Self Appraisal - Taking up a Reading test

Quants: Time, Speed & Distance - Problems on Trains - Boats & Streams - Data Sufficiency.

Total: 20 Hours**COURSE OUTCOMES**

At the end of the course students should be able to

CO1: Able to infer and predict content based on comprehension of a text

CO2: Understand and distinguish main idea(s) from supporting detail

CO3: Able to make decisions based on analysis and critique of quantitative information using proportional reasoning

CO4: Ability to enhance the problem-solving skills

TEXT BOOKS:

T1: A Modern Approach to Verbal & Non-Verbal Reasoning by R.S. Aggarwal

T2: The Slight Edge, Jeff Olsen, Momentum Media, 2013

T3: Aggarwal, R.S. "Quantitative Aptitude", Revised Edition 2016, Reprint 2018, S.Chand& Co Ltd., New Delhi

T4: Arihant Publications," Quantitative Aptitude Quantum CAT ", Sarvesh Kumar Verma

REFERENCE BOOKS:

R1: Revised Edition of 'English for Engineers and Technologists' Volume 1 published by Orient Black Swan Limited 2019

R2: Raman, Meenakshi, and Sangeetha Sharma. Professional Communication. Oxford University Press: Oxford, 2014.

R3: Arun Sharma "How to Prepare for Quantitative Aptitude for the CAT ", McGraw Hill Education; Eighth edition 2018

SEMESTER VI

U19ITTL607T

MACHINE LEARNING TECHNIQUES

L T P C
3 0 0 3

COURSE OBJECTIVES

The course aims to provide the students

- To understand the need for machine learning for various problem solving
- To study the various supervised, semi-supervised and unsupervised learning algorithms in machine learning
- To learn the new approaches in machine learning
- To design appropriate machine learning algorithms for problem solving

PREREQUISITES :Nil

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2		2							3	3	1
CO2	3	3	3	2		2							3	3	1
CO3	3	3	3	2		2							3	3	1
CO4	3	3	3	2		2							3	3	1
CO5	3	3	3	2		2							3	3	1
CO6	3	3	3	2		2							3	3	1

UNIT I INTRODUCTION

9

Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search.

UNIT II NEURAL NETWORKS AND GENETIC ALGORITHMS

9

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

UNIT III BAYESIAN AND COMPUTATIONAL LEARNING

9

Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model.


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UNIT IV INSTANT BASED LEARNING**9**

K- Nearest Neighbour Learning – Locally weighted Regression – Radial Bases Functions – Case Based Learning.

UNIT V ADVANCED LEARNING**9**

Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Induction on Inverted Deduction – Inverting Resolution – Analytical Learning – Perfect Domain Theories – Explanation Base Learning – FOCL Algorithm – Reinforcement Learning – Task – Q-Learning – Temporal Difference Learning.

Total: 45 Hours**COURSE OUTCOMES**

At the end of the course students should be able to

- CO1:** Differentiate between supervised, unsupervised, semi-supervised machine learning approaches.
- CO2:** Apply specific supervised or unsupervised machine learning algorithm for a particular problem.
- CO3:** Analyse and suggest the appropriate machine learning approach for the various types of problem.
- CO4:** Design and make modifications to existing machine learning algorithms to suit an individual application.
- CO5:** Provide useful case studies on the advanced machine learning algorithms.
- CO6:** Provide useful case studies on the advanced machine learning algorithms.

TEXT BOOKS:

T1: Tom M. Mitchell, —Machine Learning||, McGraw-Hill Education (India) Private Limited, 2013.

REFERENCE BOOKS:

- R1:** EthemAlpaydin, —Introduction to Machine Learning (Adaptive Computation and Machine Learning) The MIT Press 2004.
- R2:** Stephen Marsland, —Machine Learning: An Algorithmic Perspective||, CRC Press, 2009.


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COURSE OBJECTIVES

The course aims to provide the students

- To understand the fundamentals of object modeling
- To design with the UML dynamic and implementation diagrams.
- To understand and differentiate Unified Process from other approaches.
- To improve the software design with design patterns.
- To test the software against its requirements specification

PREREQUISITES :Nil

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		1			3					2	2				3
CO2	3	2	2		3					2	2				3
CO3			2	2	3					2	2				3
CO4			2	2	3					2	2				3
CO5			2	2	3					2	2				3
CO6			1	1						1	1				2

UNIT I OVERVIEW OF OBJECT ORIENTED SYSTEMS DEVELOPMENT 9

Introduction to Object Oriented Systems Object Basics Object Oriented Systems Development Life Cycle, Rumbaugh Technique Booch Methodology Jacobson Methodology The Unified Approach.

UNIT II OBJECT ORIENTED MODELING LANGUAGE 9

UML Diagrams Use Case Diagram Class Diagram Sequence Diagram – Collaboration Diagram Activity Diagram State Machine Diagram Component Diagram Deployment Diagram Object Diagram Package Diagram.

UNIT III OBJECT ORIENTED ANALYSIS 9

UseCase Model Object Analysis and Classification – Noun phrase approach Use Case Driven approach Object relationships, attributes and methods.

UNIT IV OBJECT ORIENTED DESIGN 9

Designing classes Designing Access Layer Classes Designing Interface objects GRASP: Designing objects with responsibilities GoF design patterns: factory method, Bridge, Adapter, Strategy, Observer – Mapping design to code.

UNIT V TESTING

9

Object Oriented Methodologies – Software Quality Assurance – Impact of object orientation on Testing – Develop Test Cases and Test Plans.

Total: 45 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Express software design with UML diagrams.
- CO2:** Design software applications using OO concepts.
- CO3:** Identify various scenarios based on software requirements.
- CO4:** Transform UML based software design into pattern based design using design patterns.
- CO5:** Understand the various testing methodologies for OO software.
- CO6:** Compare and contrast various testing techniques.

TEXT BOOKS:

- T1:** Grady Booch, “Object Oriented Analysis and Design with Applications”, Third Edition, Pearson Education, 2009.
- T2:** Craig Larman, “Applying UML and Patterns: An Introduction to ObjectOriented Analysis and Design and Iterative Development”, Third Edition, Pearson Education, 2005.

REFERENCE BOOKS:

- R1:** Grady Booch, James Rumbaugh, Ivar Jacobson, “The Unified Modeling Language User Guide”, Second Edition, Pearson Education, 2017.
- R2:** Simon Bennet, Steve McRobb, Ray Farmer, “Object oriented Systems Analysis and Design using UML”, Second Edition, Tata McGrawHill, 2008.

COURSE OBJECTIVES

The course aims to provide the students

- To understand the basic concepts of mobile computing.
- To be familiar with the network layer protocols and Ad-Hoc networks.
- To Design Android application user interfaces with various layouts and UI Components.
- To Develop Android applications with data management and services.
- To Develop Android applications with content providers and location services.

PREREQUISITES :Nil

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3										2	2	1
CO2	3	2	3										2	2	1
CO3	3	2	3										2	2	1
CO4	3	2	3										2	2	1
CO5	3	2	3										2	2	1
CO6	3	2	3										2	2	1

UNIT I INTRODUCTION 9

Introduction to Mobile Computing – Applications of Mobile Computing- Generations of Mobile Communication Technologies- Multiplexing – Spread spectrum -MAC Protocols – SDMA- TDMA- FDMA- CDMA.

UNIT II MOBILE TELECOMMUNICATION SYSTEM 9

Introduction to Cellular Systems – GSM – Services & Architecture – Protocols – Connection Establishment – Frequency Allocation – Routing – Mobility Management – Security – GPRS- UMTS – Architecture – Handover – Security.

UNIT III MOBILE AD-HOC NETWORKS 9

Ad-Hoc Basic Concepts – Characteristics – Applications – Design Issues – Routing – Essential of Traditional Routing Protocols –Popular Routing Protocols – Vehicular Ad Hoc networks (VANET) – MANET Vs VANET – Security.

UNIT IV ANDROID OS 9

Introduction – Architecture – Android Service – Android Service API – Layouts– Adapters– Android Started Service – Android Bound Service – Android Service Life Cycle – Android Service Example.

Content Provider Fundamental – Built-in Content Providers – Android Notification – Location based Services – GPS network connectivity services- Internal Storage – External Storage – SQLite – SQLite API.

Total: 45 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Students will be able to Explain the basics of mobile telecommunication systems.
- CO2:** Students will be able to Design android applications with basic to advanced user interface components and layouts.
- CO3:** Students will be able to Develop android applications for basic data management.
- CO4:** Develop android applications for location-based applications.
- CO5:** Develop the backend for android applications in the cloud.
- CO6:** Able to expose to Ad-Hoc networks.

TEXT BOOKS:

- T1:** Jochen Schiller, —Mobile Communications||, PHI, Second Edition, 2003.
- T2:** Prasant Kumar Pattnaik, Rajib Mall, —Fundamentals of Mobile Computing||, PHI Learning Pvt.Ltd, New Delhi – 2012.
- T3:** Dawn Griffiths; David Griffiths, "Head First Android Development", 2nd Edition, O'Reilly Publications, 2015.

REFERENCE BOOKS:

- R1:** Dharma PrakashAgarval, Qing and An Zeng, "Introduction to Wireless and Mobile systems",Thomson Asia Pvt Ltd, 2005.
- R2:** UweHansmann, LotharMerk, Martin S. Nicklons and Thomas Stober, —Principles of Mobile Computing||, Springer, 2003.
- R3:** William.C.Y.Lee,—Mobile Cellular Telecommunications-Analog and Digital Systems||, Second Edition,TataMcGraw Hill Edition ,2006.
- R4:** Pradeep Kothari, "Android Application Development (With Kitkat Support), Black Book", First edition, Dreamtech Press, 2014.

COURSE OBJECTIVES

The course aims to provide the students

- To understand the concept of cloud computing.
- To appreciate the evolution of cloud from the existing technologies.
- To have knowledge on the various issues in cloud computing.
- To be familiar with the lead players in the cloud.
- To appreciate the emergence of cloud as the next generation computing paradigm.

PREREQUISITES : U19CSTL304T

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3	2		2							2	3	1
CO2	2	3	3	2		2							2	3	1
CO3	2	3	3	2		2							2	3	1
CO4	2	3	3	2		2							2	3	1
CO5	2	3	3	2		2							2	3	1
CO6	2	3	3	2		2							2	3	1

UNIT I INTRODUCTION**8**

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**10**

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 - IaaS – PaaS – SaaS – Architectural Design Challenges – Cloud Storage – Storage-as-a-Service – Advantages of Cloud Storage – Cloud Storage Providers – S3.

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
Virtual Box -- Google App Engine – Programming Environment for Google App Engine — OpenStack – Federation in the Cloud – Four Levels of Federation – Federated Services and Applications – Future of Federation.

Total: 45 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Articulate the main concepts, key technologies, strengths and limitations of cloud computing.
- CO2:** Develop the ability to understand and use the architecture of compute and storage cloud, service and delivery models.
- CO3:** Explain the core issues of cloud computing such as resource management and security.
- CO4:** Evaluate and choose the appropriate technologies, algorithms and approaches for implementation and use of cloud.
- CO5:** Create and work on recent applications in cloud computing.
- CO6:** Create and work on recent applications in cloud computing.

TEXT BOOKS:

- T1:** Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
- T2:** Rittinghouse, John W., and James F. Ransome, —Cloud Computing: Implementation, Management and Security||, CRC Press, 2017.

REFERENCE BOOKS:

- R1:** Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi, —Mastering Cloud Computing, Tata Mcgraw Hill, 2013.
- R2:** Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing - A Practical Approach, Tata Mcgraw Hill, 2009.
- R3:** George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud: Transactional Systems for EC2 and Beyond (Theory in Practice), O'Reilly, 2009.


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COURSE OBJECTIVES

The course aims to provide the students

- To understand the basics of Information Security
- To know the legal, ethical and professional issues in Information Security
- To know the aspects of risk management
- To become aware of various standards in this area
- To know the technological aspects of Information Security

PREREQUISITES :Nil

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3	2		2							2	3	1
CO2	2	3	3	2		2							2	3	1
CO3	2	3	3	2		2							2	3	1
CO4	2	3	3	2		2							2	3	1
CO5	2	3	3	2		2							2	3	1
CO6	2	3	3	2		2							2	3	1

UNIT I INTRODUCTION 9

History, what is Information Security? - Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC.

UNIT II SECURITY INVESTIGATION 9

Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues - An Overview of Computer Security - Access Control Matrix, Policy-Security policies, Confidentiality policies, Integrity policies and Hybrid policies.

UNIT III SECURITY ANALYSIS 9

Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk - Systems: Access Control Mechanisms, Information Flow and Confinement Problem.

UNIT IV LOGICAL DESIGN 9

Blueprint for Security, Information Security Policy, Standards and Practices, ISO 17799/BS 7799, NIST Models, VISA International Security Model, Design of Security Architecture, Planning for Continuity.

UNIT V PHYSICAL DESIGN

9

Security Technology, IDS, Scanning and Analysis Tools, Cryptography, Access Control Devices, Physical Security, Security and Personnel.

Total: 45 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Able to understand the basics of Information Security.
- CO2:** Gain knowledge to know the aspects of risk management.
- CO3:** To know the technological aspects of Information Security.
- CO4:** Able to identify and explain risk and potential security issues.
- CO5:** Demonstrate responsible computer use as it deals with social, political, legal and ethical issues in today's electronic society.
- CO6:** Demonstrate foundation knowledge of information security/assurance within the organization.

TEXT BOOKS:

- T1:** Tom M. Mitchell, —Machine Learning||, McGraw-Hill Education (India) Private Limited, 2013.

REFERENCE BOOKS:

- R1:** EthemAlpaydin, —Introduction to Machine Learning (Adaptive Computation and Machine Learning)The MIT Press 2004.
- R2:** Stephen Marsland, —Machine Learning: An Algorithmic Perspective||, CRC Press, 2009.

COURSE OBJECTIVES

The course aims to provide the students

- To create architectural, algorithmic and technological foundations for the maintenance of the privacy of individuals
- The confidentiality of organizations, and the protection of sensitive information, despite the requirement that information be released publicly or semi-publicly.

PREREQUISITES :Nil

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3			2							2	3	2
CO2	2	3	3	2		2							2	3	2
CO3	3		3	2		2							2	3	2
CO4	3		3			2	2						2	3	2
CO5	3	3	3	3		2							2	3	2
CO6						2	2						2		3

UNIT I INTRODUCTION**9**

Fundamental Concepts, Definitions, Statistics, Data Privacy Attacks, Data linking and profiling, access control models, role-based access control, privacy policies, their specifications, languages and implementation, privacy policy languages, privacy in different domains- medical, financial, etc.

UNIT II DATA EXPLOSION**9**

Statistics and Lack of barriers in Collection and Distribution of Person-specific information, Mathematical model for characterizing and comparing real-world data sharing practices and policies and for computing privacy and risk measurements, Demographics and Uniqueness.

UNIT III PROTECTION MODELS & SURVEY OF TECHNIQUES**9**

Protection Models- Null-map, k-map, Wrong map

Survey of techniques- Protection models (null-map, k-map, wrong map), Disclosure control, Inferring entity identities, Strength and weaknesses of techniques, entry specific databases.

UNIT IV COMPUTATION SYSTEMS FOR PROTECTING DELIMITED DATA**9**

MinGen, Datafly, Mu-Argus, k-Similar, Protecting textual documents: Scrub..

UNIT V ADVANCED LEARNING**9**

Technology, Policy, Privacy and Freedom- Medical privacy legislation, policies and best practices, Examination of privacy matters specific to the World Wide Web, Protections provided by the Freedom of Information Act or the requirement for search warrants.

Total: 45 Hours**COURSE OUTCOMES**

At the end of the course students should be able to

- CO1:** Understand the concepts of privacy in today's environment..
- CO2:** Obtain the understanding of how automation is changing the concepts and expectations concerning privacy and the increasingly interconnected issue of security.
- CO3:** Obtain the knowledge of the role of private regulatory and self-help efforts.
- CO4:** Have an understanding of how emerging issues are affecting society and business, with a concentration on how information security must shape corporate practices.
- CO5:** Have practical aspects of navigating the complex landscape of privacy requirements.
- CO6:** Better understanding of privacy laws and data protection of an organization.

TEXT BOOKS:

- T1:** B. Raghunathan, The Complete Book of Data Anonymization: From Planning to Implementation, Auerbach Pub, 2013.

REFERENCE BOOKS:

- R1:** L. Sweeney, Computational Disclosure Control: A Primer on Data Privacy Protection, MIT Computer Science, 2002..

U19CSTL512L

OBJECT ORIENTED ANALYSIS AND DESIGN LABORATORY

L T P C
0 0 2 1

COURSE OBJECTIVES

The course aims to provide the students

- To understand the fundamentals of object modelling
- To design with the UML dynamic and implementation diagrams.
- To understand and differentiate Unified Process from other approaches.
- To improve the software design with design patterns.
- To test the software against its requirements specification

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	3								3	3	1
CO2	3	3	3	2	3								3	3	1
CO3	3	3	3	2	3								3	3	1

LAB COMPONENTS

1. Online course registration
2. Student Information System
3. Fee management System
4. Exam registration system
5. Banking System
6. Library Management system
7. Student attendance management system
8. Blood donation management system
9. Student Result management system
10. Railway Management system

COURSE OUTCOMES

- CO1:** Analyze Software Requirements for the given Software Application.
- CO2:** Develop the UML Diagrams to view Software System in Static and Dynamic Aspects.
- CO3:** Creating Class and Object diagram for a given project using the UML notation.

Total: 30 Hours


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COURSE OBJECTIVES

The course aims to provide the students

- To understand the concept of cloud computing.
- To appreciate the evolution of cloud from the existing technologies.
- To have knowledge on the various issues in cloud computing.
- To be familiar with the lead players in the cloud.
- To appreciate the emergence of cloud as the next generation computing paradigm

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3	2	3	2							3	3	1
CO2	2	3	3	2	3	2							3	3	1
CO3	2	3	3	2	3	2							3	3	1
CO4	2	3	3	2	3	2							3	3	1
CO5	2	3	3	2	3	2							3	3	1
CO6	2	3	3	2	3	2							3	3	1

LAB COMPONENTS

1. Install Virtualbox/VMware Workstation with different flavours of linux or windows OS on top of windows.
2. Install a C compiler in the virtual machine created using virtual box and execute Simple Programs.
3. Run simple PHP script in virtual machine loaded with ubuntu.
4. Find a procedure to transfer the files from one virtual machine to another virtual machine.
5. Launch free instances available in AWS and measure the network performances.

COURSE OUTCOMES

- CO1:** Articulate the main concepts, key technologies, strengths and limitations of cloud computing.
- CO2:** Develop the ability to understand and use the architecture of compute and storage cloud, service and delivery models.
- CO3:** Explain the core issues of cloud computing such as resource management and security.
- CO4:** Evaluate and choose the appropriate technologies, algorithms and approaches for implementation and use of cloud.
- CO5:** Create and work on recent applications in cloud computing.
- CO6:** Install and use a generic cloud environment that can be used as a private cloud.

Total: 30 Hours

U19ITPR601

MINI PROJECT

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0 0 2 2

COURSE OBJECTIVES

The course aims to provide the students

- To enable the students to design and build simple systems on their own
- To help experiment with innovative ideas in design and team work
- To create an engaging and challenging environment in the engineering lab
- To inculcate ethics and sustainability perspectives and enable students to work in a team

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1		2	2	2	2	2	2	1	1	1	1
CO2	3	3	3	3	2	2	2	2	2	2	2	1	2	2	2
CO3	3	3	3	3	2	2	2	2	2	2	2	1	2	2	2
CO4	3	3	3	3	2	2	2	2	2	2	2	1	2	2	2
CO5	3	3	3	3	2	2	2	2	2	2	2	1	2	2	2
CO6	3	3	3	3	2	2	2	2	2	2	2	1	2	2	2

CONTENTS

S No	Topics	No of Hours
1	Introduction to Engineering	3
2	Platform based development	12
3	Mechanisms	9
4	Requirements	3
5	Design	
6	Ethics	6
7	Sustainability	
8	Project Management Principles	
9	Guided Project	3
10	Final Project	9


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COURSE OUTCOMES

- CO1:** Identify technically and economically feasible problems of social relevance
- CO2:** plan and build the project team with assigned responsibilities
- CO3:** identify and survey the relevant literature for getting exposed to related solutions
- CO4:** analyse, design and develop adaptable and reusable solutions of minimal complexity by using modern tools
- CO5:** implement and test solutions to trace against the user requirements
- CO6:** deploy and support the solutions for better manageability and provide scope of improvability

Total: 45Hours

GUIDELINES

The students are assigned project work related to product / process development, solution to the technical problems in industry and current research at national and international level. The student is required to submit a report at the end of semester based on the findings. The evaluation is made as per the Regulations of University.


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COURSE OBJECTIVES

The course aims to provide the students

- To develop strategies to improve students' writing skills.
- To learn different types of documents used for business writing.
- To understand the relevance & need of quantitative methods for making business decisions.
- To demonstrate a sound knowledge of the fundamentals of statistics and statistical techniques.
- To apply quantitative methods to solve a variety of decision-making problems

PREREQUISITES :Nil

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		3	3				2	1		3	3		2		2
CO2		3	3				2	1		3	2		2		2
CO3		3	2				2	1		3	3		2		2
CO4		3	2				3	1		3	3		2		3

UNIT I**4**

Applied Language Skills: Active Vocabulary - Writing Personal experiences - Process Description
 Quants: Time & Work - Pipes & Cisterns - using fractions, percentages & negative work.

UNIT II**4**

Applied Language Skills: Writing notices, business letters, and reports (Minutes & Projects).
 Quants: Permutation & Combination - Probability - arrangements - selections - chances.

UNIT III**4**

Applied Language Skills: Feasibility Report, Progressive Report - Evaluation report.
 Quants: Geometry - Mensuration Concepts - Area & Volume - 2D & 3D.

UNIT IV**4**

Applied Language Skills: Book review- Article writing - Writing emails - Letter to the editor.
 Quants: Trigonometry - Basic concepts - Heights & Distance and its applications.

UNIT V**4**

Applied Language Skills: Taking up certificate tests in reading.

Quants: Sequence & Series - Progressions - AP, GP & HP - Data Interpretations - Data Sufficiency.

Total: 20 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Able to participate in formal/informal conversations
- CO2:** Speak in different contexts confidently and accurately
- CO3:** Ability to understand the relevance & need of quantitative methods for making business decisions
- CO4:** Able to solve real-time problems statistically.

TEXT BOOKS:

- T1:** Chris Anderson, TED Talks: The official TED guide to public speaking: Tips and tricks for giving unforgettable speeches and presentations The Newyork Times Paperback, 2018
- T2:** by Kerry Patterson, Joseph Grenny, and Ron Mcmillan, Crucial Conversations Tools for Talking When Stakes Are High, McGraw Education, 2017
- T3:** Quantitative Aptitude for Competitive Examinations - R S Aggarwal
- T4:** A Modern Approach to Verbal & Non-Verbal Reasoning by R.S. Aggarwal

REFERENCE BOOKS:

- R1:** Interact English Lab Manual for Undergraduate Students. Orient Black Swan: Hyderabad, 2016.
- R2:** Raman, Meenakshi, and Sangeetha Sharma. Professional Communication. Oxford University Press: Oxford, 2014.
- R3:** Arun Sharma "How to Prepare for Quantitative Aptitude for the CAT ", McGraw Hill Education; Eighth edition 2018.
- R3:** Pearson Publication, "A Complete Manual for the CAT", 2018

WEB RESOURCES:

- W1:** <https://www.ted.com/talks>
- W2:** <https://www.toastmasters.org/>
- W3:** <https://testbook.com/aptitude-practice/>
- W4:** <http://www.allindiaexams.in/online-test/online-aptitude-test/all>

SEMESTER VII

U19ITPE015

SOFTWARE PROJECT MANAGEMENT

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3 0 0 3

COURSE OBJECTIVES

The course aims to provide the students

- To understand the Software Project Planning and Evaluation techniques.
- To plan and manage projects at each stage of the software development life cycle (SDLC).
- To learn about the activity planning and risk management principles.
- To manage software projects and control software deliverables.
- To develop skills to manage the various phases involved in project management and people management.
- To deliver successful software projects that support organization's strategic goals.

PREREQUISITES :Nil

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2		2	2		2				3		2
CO2	3					2			2				3		2
CO3	3	3	3										3		2
CO4	3	3	3	2		2							3	3	
CO5	3	3	3			2							3		2
CO6						2		2							2

UNIT I PROJECT EVALUATION AND PROJECT PLANNING 9

Importance 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 – Dynamic System Development Method – Extreme Programming– Managing interactive processes – Basics of Software estimation – Effort and Cost estimation techniques – COSMIC Full function points - COCOMO II - a Parametric Productivity Model.

UNIT III ACTIVITY PLANNING AND RISK MANAGEMENT 8

Objectives of Activity planning – Project schedules – Activities – Sequencing and scheduling – Network Planning models – Formulating Network Model – Forward Pass & Backward Pass techniques – Critical


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path (CRM) method – Risk identification – Assessment – Risk Planning – Risk Management – – PERT technique – Monte Carlo simulation – Resource Allocation – Creation of critical paths – Cost schedules.

UNIT IV PROJECT MANAGEMENT AND CONTROL 10

Framework for Management and control – Collection of data – Visualizing progress – Cost monitoring – Earned Value Analysis – Prioritizing Monitoring – Project tracking – Change control – Software Configuration Management – Managing contracts – Contract Management.

UNIT V STAFFING IN SOFTWARE PROJECTS 9

Managing people – Organizational behavior – Best methods of staff selection – Motivation – The Oldham – Hackman job characteristic model – Stress – Health and Safety – Ethical and Professional concerns – Working in teams – Decision making – Organizational structures – Dispersed and Virtual teams – Communications genres – Communication plans – Leadership.

Total: 45 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Understand Project Management principles while developing software.
- CO2:** Gain extensive knowledge about the basic project management concepts, framework and the process models.
- CO3:** Obtain adequate knowledge about software process models and software effort estimation techniques.
- CO4:** Estimate the risks involved in various project activities.
- CO5:** Define the checkpoints, project reporting structure, project progress and tracking mechanisms using project management principles.
- CO6:** Learn staff selection process and the issues related to people management

TEXT BOOKS:

- T1:** Bob Hughes, Mike Cotterell and Rajib Mall: Software Project Management – Fifth Edition, Tata McGraw Hill, New Delhi, 2012

REFERENCE BOOKS:

- R1:** Robert K. Wysocki – Effective Software Project Management – Wiley Publication, 2011
- R2:** Walker Royce – Software Project Management – Addison-Wesley, 1998.
- R3:** Gopalaswamy Ramesh, – Managing Global Software Projects – McGraw Hill Education (India), Fourteenth Reprint 2013.


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COURSE OBJECTIVES

The course aims to provide the students

- To learn the E-Commerce Platform and its concepts
- To Understand the Technology, infrastructure and Business in E-Commerce
- To Understand the Security and Challenges in E-Commerce
- To Build an Own E-Commerce using Open Source Frameworks

PREREQUISITES :U19CSTL101 - Computational Thinking and Problem Solving

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1			3		3	2			2		3		3		3
CO2	3		3		3	2			2		2		3		3
CO3	3		3		3	2			2		2		3		3
CO4		3	3			2								2	2
CO5	3	2	3	2		2	2		2		2		3	3	1
CO6	3	3	3	2		2	2		2		2		3	3	1

UNIT I INTRODUCTION TO E-COMMERCE AND TECHNOLOGY INFRASTRUCTURE 9

Working of Web - HTML Markup for Structure - Creating simple page - Marking up text - Adding Links - Adding Images - Table Markup - Forms - HTML5

UNIT II BUILDING AN E-COMMERCE WEBSITE, MOBILE SITE AND APPS 9

Systematic approach to build an E-Commerce: Planning, System Analysis, System Design, Building the system, Testing the system, Implementation and Maintenance, Optimize Web Performance – Choosing hardware and software – Other E-Commerce Site tools – Developing a Mobile Website and Mobile App

UNIT III E-COMMERCE SECURITY AND PAYMENT SYSTEMS 8

E-Commerce Security Environment – Security threats in E-Commerce – Technology Solutions: Encryption, Securing Channels of Communication, Protecting Networks, Protecting Servers and Clients – Management Policies, Business Procedure and Public Laws - Payment Systems

UNIT IV BUSINESS CONCEPTS IN E-COMMERCE 10

Digital Commerce Marketing and Advertising strategies and tools – Internet Marketing Technologies – Social Marketing – Mobile Marketing – Location based Marketing – Ethical, Social, Political Issues in E-Commerce

UNIT V PROJECT CASE STUDY

9

Case Study : Identify Key components, strategy, B2B, B2C Models of E-commerce Business model of any e-commerce website - Mini Project : Develop E-Commerce project in any one of Platforms like Woo-Commerce, Magento or Opencart

Total: 45 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Design Website using HTML CSS and JS
- CO2:** Design Responsive Sites
- CO3:** Manage, Maintain and Support Web Apps
- CO4:** Understand the basic concepts and technologies used in the field of management information systems
- CO5:** Have the knowledge of the different types of management information systems.
- CO6:** Understand the processes of developing and implementing information systems.

TEXT BOOKS:

- T1:** Kenneth C.Laudon,Carol GuercioTraver—E-Commerce||, Pearson,1 thEdition,2016

REFERENCE BOOKS:

- R1:** <http://docs.opencart.com/>
- R2:** <http://devdocs.magento.com/>
- R3:** <http://doc.prestashop.com/display/PS15/Developer+tutorials>
- R4:** Robbert Ravensbergen, —Building E-CommerceSolutionswithWooCommerce||, PACKT, 2ndEdition

COURSE OBJECTIVES

The course aims to provide the students

- To improve the programming skills of the student
- To let the students know the recent evolution in biological science

PREREQUISITES :Nil

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		1				2							1		
CO2			3		2	3							1		
CO3			2		3	3							2		
CO4		3	2			2							2		
CO5			2		2	3							1		
CO6	1				1								1		1

UNIT I DATABASES 9

Introduction to Bioinformatics-Biological information resources-Genome sequence acquisition and analysis-Retrieval of biological data-Data acquisition, databases, structure and annotation-Data mining and data characteristics.

UNIT II SEQUENCE ALIGNMENT AND DATABASE SEARCHES 9

Database searches and Sequence Alignment-Pair wise and multiple sequence alignment-Methods of local and global alignment-Dynamic programming, Scoring matrix, PAM, searching sequence databases by sequence similarity-BLAST and FASTA.

UNIT III PHYLOGENY ANALYSIS 8

Phylogenetics, Molecular Phylogeny and evolutionary analysis-ClustalW, MSA, Dendrogram-Maximum likelihood, Maximum Parsimony, convergent and parallel evolution, Bootstrapping, Jackknifing-Phylograms.

UNIT IV STRUCTURAL BIOINFORMATICS 10

Structural bioinformatics, analysis for protein structure, Predicting protein structure and function from Sequence-Homology modeling-Microarray Data analysis- proteomic data analysis-Visualization of molecular structures.

UNIT V APPLICATIONS OF BIOINFORMATICS 9

Scope of bioinformatics-Bioinformatics in the Pharmaceutical Industry- Structure-Based Rational Drug Design and discovery-Chemi-informatics in Biology.

Total: 45 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Use bioinformatics tools with programming skills.
- CO2:** Apply computational based solutions for biological perspective
- CO3:** Alignment of nucleotide and protein sequences
- CO4:** Predict gene and protein structure.
- CO5:** Construct, interpret and assess the different molecular phylogenetic tree prediction and gene prediction algorithms
- CO6:** understand the Application of Bioinformatics

TEXT BOOKS:

- T1:** Attwood, T. and P.S. David. 2006. Introduction to Bioinformatics. Pearson Education Ltd., New York.
- T2:** Axevanis, A.D., and Ouellette, B.F.F. (eds) 2006. Bioinformatics A Practical Guide to Analysis of Genes and Proteins. 3rd Edition, John Wiley and Sons, New York

COURSE OBJECTIVES

The course aims to provide the students

- To enable the students to design and build simple systems on their own
- To help experiment with innovative ideas in design and team work
- To create an engaging and challenging environment in the engineering lab
- To inculcate ethics and sustainability perspectives and enable students to work in a team

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1		2	2	2	2	2	2	1	1	1	1
CO2	3	3	3	3	2	2	2	2	2	2	2	1	2	2	2
CO3	3	3	3	3	2	2	2	2	2	2	2	1	2	2	2
CO4	3	3	3	3	2	2	2	2	2	2	2	1	2	2	2
CO5	3	3	3	3	2	2	2	2	2	2	2	1	2	2	2
CO6	3	3	3	3	2	2	2	2	2	2	2	1	2	2	2

CONTENTS

S No	Topics	No of Hours
1	Introduction to Engineering	3
2	Platform based development	12
3	Mechanisms	9
4	Requirements	3
5	Design	
6	Ethics	6
7	Sustainability	
8	Project Management Principles	
9	Guided Project	3
10	Final Project	9

COURSE OUTCOMES

- CO1:** Identify technically and economically feasible problems of social relevance
- CO2:** plan and build the project team with assigned responsibilities
- CO3:** identify and survey the relevant literature for getting exposed to related solutions
- CO4:** analyse, design and develop adaptable and reusable solutions of minimal complexity by using modern tools

CO5: implement and test solutions to trace against the user requirements

CO6: deploy and support the solutions for better manageability and provide scope of improvability

Total: 45Hours

GUIDELINES

The students are assigned project work related to product / process development, solution to the technical problems in industry and current research at national and international level. The student is required to submit a report at the end of semester based on the findings. The evaluation is made as per the Regulations of University.


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SEMESTER VIII

U19CSPE004

SOFTWARE TESTING

L T P C
3 0 0 3

COURSE OBJECTIVES

The course aims to provide the students

- To study fundamental concepts in software testing, including software testing objectives, process, criteria, strategies, and methods
- To discuss various software testing issues and solutions in software unit test: integration, regression, and system testing.
- To learn how to planning a test project, design test cases and data, conduct testing operations, manage software problems and defects, generate a testing report.
- To expose the advanced software testing topics, such as object-oriented software testing methods, and component-based software testing issues, challenges, and solutions.
- To gain software testing experience by applying software testing knowledge and methods to practice- oriented software testing project.

PREREQUISITES :Nil

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3						3				3	3	2
CO2	3												3	3	
CO3	3	2	2						2				3	3	2
CO4	3											2	3		
CO5	3	2	3						3				3		
CO6	3		3						2			2	3		

UNIT I INTRODUCTION 9

Introduction: Software Testing, Importance of testing, Roles and Responsibilities, Testing Principles, Attributes of Good Test, V-Model, Test Case Generation, SDLC Vs STLC, Software Testing Life Cycle-in detail. Types of Testing: Testing Strategies: unit testing, Integration Testing, System Testing, Smoke, Regression Testing, Acceptance Testing. Clean Room Software Engineering. Functional/Non-Functional Testing. Testing Tools, Categorization of testing method: Manual Testing, Automated Testing Vs. Manual Testing.

UNIT II NON FUNCTIONAL TESTING 9

Performance Test, Memory Test, Scalability Test, Compatibility Test, Security Test, Cookies Test, Session Test, Recovery Test, Installation Test, Ad-hoc Test, Risk Based Test, Compliance Test, McCall’s Quality Factors, FURPS.


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UNIT III SOFTWARE TESTING METHODOLOGIES 8

Validation & Verification, White/Glass box Testing, Black Box Testing, Grey box Testing, Statement Coverage Testing, Branch Coverage Testing, Path Coverage Testing, Conditional Coverage Testing, Loop Coverage Testing, Boundary Value Analysis Equivalence class Partition, State Based Testing, Cause Effective Graph, Decision Table, Use case Testing, Exploratory Testing and Testing Metrics, Testing GUI.

UNIT IV TESTING LIFE CYCLE AND TEST CASES DESIGN 10

Requirement Analysis/Design Traceability Matrix, Test Planning, Objectives, Scope of testing, Schedule, Approach Roles & Responsibility, Assumption, Risk & Mitigation, Entry & Exit Criteria, Test Automation, Deliverables. Write Test cases, Review Test cases, Test Cases Template, Type of Test Cases, Difference between Test Scenarios and Test Cases, Test Environment setup, understand the SRS, Hardware and software requirement, Test Data.

UNIT V TEST EXECUTION AND TEST METRICS 9

Execute test cases, Error/defect detecting and reporting, DRE(Defect Removal Efficiency), Object, Types of Bugs, Art of Debugging, Debugging Approaches, Reporting the bugs, Severity and priority, Test Closure Criteria for test closure, Test summary report, Quality Assurance, What is quality control, Difference of QA, QC & Testing.

Total: 45 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** List a range of different software testing techniques and strategies and be able to apply specific (automated) unit testing method to the projects.
- CO2:** Distinguish characteristics of structural testing methods.
- CO3:** Demonstrate the integration testing which aims to uncover interaction and compatibility problems as Early as possible.
- CO4:** Discuss about the functional and system testing methods.
- CO5:** Understand where key testing concepts apply within the context of unified processes
- CO6:** Demonstrate various issues for object oriented testing.

TEXT BOOKS:

- T1:** Roger S.Pressman, Software engineering- A practitioner's Approach McGraw- Hill International Editions.
- T2:** Ian Sommerville, Software engineering, Pearson education Asia.
- T3:** Software Testing Techniques, 2nd edition, Boris Bwizer, 1990 .
- T4:** Software Testing: Principles and Practices by Srinivasan Desikan.


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U19EDOE001**INTELLECTUAL PROPERTY RIGHTS**

L	T	P	C
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COURSE OBJECTIVES

The course aims to provide the students

- To give an idea about IPR, registration and its enforcement

PREREQUISITES :Nil

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1		3	2		2			2			2	2	2	2
CO2	1		3	2		2			2			2	2	2	2
CO3	1		3	2		2			2			2	2	3	3
CO4	1		3	2		2			2			2	1	2	2
CO5	1		3	2		2			2			2	2	2	1
CO6	1		3	2		2			2			2	3	2	1

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 IP

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 8

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 10

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 NANOMATERIALS 9

Infringement of IPRs, Enforcement Measures, Emerging issues – Case Studies.

Total: 45 Hours**COURSE OUTCOMES**

At the end of the course students should be able to


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- CO1:** Ability to manage Intellectual Property portfolio to enhance the value of the firm.
CO2: Ability to learn the registration of IPRs
CO3: Ability to learn the agreements and legislations process
CO4: Ability to understand the digital products and law
CO5: Ability to learn the enforcement of IPRs.
CO6: Ability to patent filing and publishing

TEXT BOOKS:

- T1:** S. V. Satakar, "Intellectual Property Rights and Copy Rights, Ess Ess Publications, New Delhi, 2002.
T2: V. Scople Vinod, Managing Intellectual Property, Prentice Hall of India pvt Ltd, 2012.

REFERENCE BOOKS:

- R1:** Deborah E. Bouchoux, "Intellectual Property: The Law of Trademarks, Copyrights, Patents and Trade Secrets", Cengage Learning, Third Edition, 2012.
R2: Prabuddha Ganguli, "Intellectual Property Rights: Unleashing the Knowledge Economy", McGraw Hill Education, 2011
R3: Edited by Derek Bosworth and Elizabeth Webster, The Management of Intellectual Property. Edward Elgar Publishing Ltd., 2013.

COURSE OBJECTIVES

The course aims to provide the students

- To enable the students to design and build simple systems on their own
- To help experiment with innovative ideas in design and team work
- To create an engaging and challenging environment in the engineering lab
- To inculcate ethics and sustainability perspectives and enable students to work in a team

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1		2	2	2	2	2	2	1	1	1	1
CO2	3	3	3	3	2	2	2	2	2	2	2	1	2	2	2
CO3	3	3	3	3	2	2	2	2	2	2	2	1	2	2	2
CO4	3	3	3	3	2	2	2	2	2	2	2	1	2	2	2
CO5	3	3	3	3	2	2	2	2	2	2	2	1	2	2	2
CO6	3	3	3	3	2	2	2	2	2	2	2	1	2	2	2

CONTENTS

S No	Topics	No of Hours
1	Introduction to Engineering	3
2	Platform based development	12
3	Mechanisms	9
4	Requirements	3
5	Design	
6	Ethics	6
7	Sustainability	
8	Project Management Principles	
9	Guided Project	3
10	Final Project	9

COURSE OUTCOMES

- CO1:** Identify technically and economically feasible problems of social relevance
- CO2:** plan and build the project team with assigned responsibilities
- CO3:** identify and survey the relevant literature for getting exposed to related solutions
- CO4:** analyse, design and develop adaptable and reusable solutions of minimal complexity by using

modern tools

CO5: implement and test solutions to trace against the user requirements

CO6: deploy and support the solutions for better manageability and provide scope of improvability

Total: 45Hours

GUIDELINES

The students are assigned project work related to product / process development, solution to the technical problems in industry and current research at national and international level. The student is required to submit a report at the end of semester based on the findings. The evaluation is made as per the Regulations of University.


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U19ITPE001

CYBER FORENSICS

L T P C
3 0 0 3

COURSE OBJECTIVES

The course aims to provide the students

- To learn computer forensics
- To become familiar with forensics tools
- To learn to analyse and validate forensics data

PREREQUISITES

- NIL

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO3
CO1	3	2											2	2	
CO2	3	3	3	3		2							2	2	
CO3	3	3	3	3		2							2	2	
CO4	3	3				2							2	2	1
CO5	3	3	3	3		2							2	2	1

UNIT I INTRODUCTION TO COMPUTER FORENSICS 9

Introduction to Traditional Computer Crime, Traditional problems associated with Computer Crime. Introduction to Identity Theft & Identity Fraud. Types of CF techniques - Incident and incident response methodology - Forensic duplication and investigation. Preparation for IR: Creating response tool kit and IR team. - Forensics Technology and Systems - Understanding Computer Investigation – Data Acquisition

UNIT II EVIDENCE COLLECTION AND FORENSICS TOOLS 9

Processing Crime and Incident Scenes – Working with Windows and DOS Systems. Current Computer Forensics Tools: Software/ Hardware Tools.

UNIT III ANALYSIS AND VALIDATION 9

Validating Forensics Data – Data Hiding Techniques – Performing Remote Acquisition – Network Forensics – Email Investigations – Cell Phone and Mobile Devices Forensics

UNIT IV ETHICAL HACKING 9

Introduction to Ethical Hacking - Footprinting and Reconnaissance - Scanning Networks - Enumeration - System Hacking - Malware Threats - Sniffing

UNIT V ETHICAL HACKING IN WEB 9

Social Engineering - Denial of Service - Session Hijacking - Hacking Web servers - Hacking Web Applications – SQL Injection - Hacking Wireless Networks - Hacking Mobile Platforms.

Total: 45 Hours


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COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Understand the basics of computer forensics
- CO2:** Apply a number of different computer forensic tools to a given scenario
- CO3:** Analyse and validate forensics data
- CO4:** Identify the vulnerabilities in a given network infrastructure
- CO5:** Implement real-world hacking techniques to test system security

TEXT BOOKS:

- T1:** Bill Nelson, Amelia Phillips, Frank Enfinger, Christopher Steuart, —Computer Forensics and Investigations||, Cengage Learning, India Edition, 2016.
- T2:** CEH official Certified Ethical Hacking Review Guide, Wiley India Edition, 2015.

REFERENCE BOOKS:

- R1:** John R.Vacca, —Computer Forensics||, Cengage Learning, 2005
- R2:** 2. MarjieT.Britz, —Computer Forensics and Cyber Crime||: An Introduction||, 3rd Edition, Prentice Hall, 2013.
- R3:** 3. AnkitFadia — Ethical Hacking|| Second Edition, Macmillan India Ltd, 2006
- R4:** 4. Kenneth C.Brancik —Insider Computer Fraud|| Auerbach Publications Taylor & Francis Group—2008.

U19ITPE002

HIGH SPEED NETWORKS

L T P C
3 0 0 3

COURSE OBJECTIVES

The course aims to provide the students

- To introduce the new developments in modern networking systems, multimedia communications and high-speed networks

PREREQUISITES

- Computer Networks

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3		1							2	2	1
CO2	3	3	3	3		1							2	2	1
CO3	3	3	3	3		1							2	2	1
CO4	3	3	3	3		1							2	2	1
CO5	3	3	3	3		1							2	2	1
CO6	3	3	3	3		1							2	2	1

UNIT I NETWORK PERFORMANCE ANALYSIS 9

Objectives and requirements for Quality of Service (QoS) in high performance networks. Architecture of high performance networks (HPN), design issues, protocols for HPN, VHF backbone networks, virtual interface architectures, virtual interface for networking, High-speed switching and routing - internet and PSTN IP switching techniques, SRP protocols, SRP authentication, and key exchange, comparison of TCP/IP, FTP, TELNET, queuing systems, network modeling as a graph.

UNIT II HIGH SPEED NETWORKS 9

Frame relay: Frame relay protocols and services, frame relay congestion control. ATM: Architecture, protocol, switching, traffic and congestion control, flow control, error detection and control, traffic management, ATM service categories, ATM in LAN environment, classical IP over ATM. ISDN: ISDN overview, interfaces and functions, physical layer, Network layer, ISDN services. B-ISDN: Driving forces and need, B-ISDN standards and services, B-ISDN Functional Architecture, B-ISDN Transmission structure, B-ISDN protocol architecture.

UNIT III ADSL AND DSL TECHNOLOGIES 9

Background and technological capabilities, Standards and associations, Architecture, Conceptual overview of VDSL, Deployment Case study, Market status and future.

UNIT IV FIBER OPTICS COMMUNICATION 9

GPON (Gigabit capable Passive Optical Network), SONET/SDH and comparison with other available standards, SAN (Storage Area Networks) and Fiber Channel, DWDM, and CWDM.


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COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Demonstrate the knowledge of network planning and optimization
- CO2:** Develop an in-depth understanding, in terms of architecture, protocols and applications, of major high-speed networking technologies
- CO3:** Evaluate various technologies and identify the most suitable one to meet a given set of requirements for a hypothetical corporate network
- CO4:** Develop necessary background to be able to manage projects involving any of the high-speed networking and fiber optics technologies
- CO5:** Compare, analyse and implement the various routing protocols in simulation software tools
- CO6:** Demonstrate the knowledge of Wireless networks

REFERENCE BOOKS:

- R1:** Jochetl Schiller: Mobile Communication: Addison Wesley.
- R2:** Tanenbaum: Computer Networks: PHI
- R3:** M Shwartz: Telecommunication Network Protocol Modeling And Analysis: Addison Wesley
- R4:** Gallangar: Data Networks: Prentice Hall
- R5:** Fred Halsall: Data Communication Computer Networks, And Open Systems: Addison Wesley
- R6:** Kershanbaum : Telecommunication Network Design Algorithms: MGH
- R7:** William Stallings: ISDN And BISDN
- R8:** William Stallings: High Speed Networks
- R9:** Computer Networks And Internet: Comer
- R10:** Johnson: Fast Ethernet

U19CSPE009

FULL STACK WEB DEVELOPMENT

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

The course aims to provide the students

- Understand the fundamentals of Web.
- Learn to build web page with NodeJS and Express JS.
- Learn to integrate a Relational Database with a Web Application.
- Learn to develop web pages using Bootstrap.
- Learn to design a web application with NoSQL Database.

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3					3	3	3		3	3	2	3
CO2	3	3	3		3			3	3	3		3	3		3
CO3	3	3	3					3	3	3		3	3	2	3
CO4	3	3	3					3	3	3		3	3		3
CO5	3	3	3		3			3	3	3		3	3	2	3
CO6	3	2	2		3								2	2	2

UNIT I**INTRODUCTION****9**

The Internet- Basic Internet Protocols - Web Fundamentals - Web Clients - Web Servers. - Overview of Full stack – MVC Architecture – Front-end and Backend technologies - Middleware – Handling request and response - MEAN – MERN – Django

UNIT II**DESIGNING A STATIC WEB PAGE****9**

HTML – Structure of HTML - HTML tags - CSS – Styling – JavaScript -Introduction - Overview of NPM - **Node.js** – Introduction - Modules - HTTP Module –Installation and configuration – File structure - **Express.js** - Request - Response - Get - Post – Routing

UNIT III**RELATIONAL DATABASE****9**

DOM Manipulation - DOM Events - Call back function – Promises - Database Integration using MySQL - Working with Database Schemas - Implementing MVC in Express - Retrieve the data from Database - Template Engines - HTML Injection - EJS – Handle bars

UNIT IV**BOOTSTRAP****9**

Bootstrap - Introduction to Bootstrap- Bootstrap Basics - Grid system - Basic Components - Page Header - Button Groups – Dropdown -Nav&Navbars - **Responsive Web Design** - Viewport - Grid View - Media Queries – Validation - Understanding Client-side validation – JavaScript in Validation

UNIT V**NOSQL DATABASE****9**

NoSQL – Serialization - Modelling NoSQL data - Document Databases (MongoDB) – MongoDB - MongoDB Environment - Database - Collection - Read Operations - Write


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Operations –Working with NoSQL and MongoDB - Working with Mongoose – Creating a Cluster in MongoDB Atlas- Defining a Schema (Model in Node JS) – MongoDB Integration with NodeJS.

Total: 45 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Differentiate between Frontend and Backend Technologies.
- CO2:** Build a web page using NodeJS and Express JS
- CO3:** Work on JavaScript Events, Database schemas and Integrate a Relational Database with the web application
- CO4:** Develop a responsive web page using Bootstrap
- CO5:** Connect the web application with NoSQL Database
- CO6:** Implement CRUD operations in collection.

TEXT BOOKS:

- T1:** John Duckett, “HTML and CSS design and build websites”, John Wiley & Sons, Inc.
- T2:** Shay Howe, “Learn to Code HTML & CSS Develop & Style Websites”, New Riders, Pearson Education, 2014.
- T3:** Brad Dayley , Brendan Dayley, Caleb Dayley, “Node.js, MongoDB and Angular Web Development“, Second Edition, Pearson, 2017

WEB RESOURCES:

- R1:** <https://nodejs.org/api/>
- R2:** <https://expressjs.com/en/5x/api.html>
- R3:** <https://docs.atlas.mongodb.com/api/>

COURSE OBJECTIVES

The course aims to provide the students

- Understand the fundamentals of Web.
- Learn to build web page with NodeJS and Express JS.
- Learn to integrate a Relational Database with a Web Application.
- Learn to develop web pages using Bootstrap.
- Learn to design a web application with NoSQL Database.

Course Articulation Matrix : 3- High, 2- Medium, 3- Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3					3	3	3		3	3	2	3
CO2	3	3	3		3			3	3	3		3	3		3
CO3	3	3	3					3	3	3		3	3	2	3
CO4	3	3	3					3	3	3		3	3		3
CO5	3	3	3		3			3	3	3		3	3	2	3
CO6	3	2	2		3								2	2	2

LAB COMPONENTS

1. Develop a static page (HTML and CSS) for an online Book store. The website should consist the following pages. Home page, Registration and user Login, User profile page, Books Catalogue, Shopping cart, Payment by credit card, order confirmation
2. Develop a HTML page that includes JavaScript functions to check whether the,
 - a. Position in the string has right-most vowel
 - b. Number of characters in the string does not exceeds 12
3. DOM Manipulation and JS Events
4. Implement CRUD operations using MySQL in a web application
5. Design a web page to store information about a student in an engineering collegeaffiliated to Anna University. The information must include USN, Name, and Name of the College, Branch, Year of Joining, and email id. Make up sample data for 3 students.
6. Create an administrative interface for an online voting application that lets add, change and delete votes with JS Validation

LIST OF PROJECTS

1. Online Auction Management web application using Express, Node JS.
2. Movie – Ticket Booking

3. Secure messaging application
4. E-learning Site
5. E-Signature (Online Petition Signing app)
6. E-Blood Bank site

- CO1 Differentiate between Frontend and Backend Technologies.
- CO2 Build a web page using NodeJS and Express JS
- CO3 Work on JavaScript Events, Database schemas and Integrate a Relational Database with the web application
- CO4 Develop a responsive web page using Bootstrap
- CO5 Connect the web application with NoSQL Database
- CO6 Implement CRUD operations in collection.

Total: 30 Hours

U19CSPE008

INFORMATION RETRIEVAL TECHNIQUES

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

The course aims to provide the students

- To understand the basics of Information Retrieval.
- To understand machine learning techniques for text classification and clustering.
- To understand various search engine system operations.
- To learn different techniques of recommender system.

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	1										2	2	
CO2	3	2	2										2	2	
CO3	3	2	2	1									2	2	
CO4	3	2	2	1									2	2	
CO5	2	1	1	1									2	1	
CO6	2	1	1										2	2	

UNIT I INTRODUCTION 9

Information Retrieval – Early Developments – The IR Problem – The User’s Task – Information versus Data Retrieval - The IR System – The Software Architecture of the IR System – The Retrieval and Ranking Processes - The Web – The e-Publishing Era – How the web changed Search – Practical Issues on the Web – How People Search – Search Interfaces Today – Visualization in Search Interfaces.

UNIT II MODELING AND RETRIEVAL EVALUATION 9

Basic IR Models - Boolean Model - TF-IDF (Term Frequency/Inverse Document Frequency) Weighting - Vector Model – Probabilistic Model – Latent Semantic Indexing Model – Neural Network Model – Retrieval Evaluation – Retrieval Metrics – Precision and Recall – Reference Collection – User-based Evaluation – Relevance Feedback and Query Expansion – Explicit Relevance Feedback.

UNIT III CLASSIFICATION AND CLUSTERING 9

A Characterization of Text Classification – Unsupervised Algorithms: Clustering – Naïve Text Classification – Supervised Algorithms – Decision Tree – k-NN Classifier – SVM Classifier – Feature Selection or Dimensionality Reduction – Evaluation metrics – Accuracy and Error – Organizing the classes – Indexing and Searching – Inverted Indexes – Sequential Searching – Multi-dimensional Indexing

UNIT IV WEB RETRIEVAL AND WEB CRAWLING 9

The Web – Search Engine Architectures – Cluster based Architecture – Distributed Architectures – Search Engine Ranking – Link based Ranking – Simple Ranking Functions –


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Learning to Rank – Evaluations -- Search Engine Ranking – Search Engine User Interaction – Browsing – Applications of a Web Crawler – Taxonomy – Architecture and Implementation – Scheduling Algorithms – Evaluation.

UNIT V RECOMMENDER SYSTEM 9

Recommender Systems Functions – Data and Knowledge Sources – Recommendation Techniques – Basics of Content-based Recommender Systems – High Level Architecture – Advantages and Drawbacks of Content-based Filtering – Collaborative Filtering – Matrix factorization models – Neighborhood models.

Total: 45 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Interpret open-source search engine framework and explore its capabilities.
- CO2:** Apply appropriate method of classification or clustering.
- CO3:** Design and implement innovative features in a search engine.
- CO4:** Design and implement a recommender system.
- CO5:** Demonstrate an open source search engine framework and explore its capabilities
- CO6:** Demonstrate the entire process flow of a search engine

TEXT BOOKS:

- T1:** Ricci, F, Rokach, L. Shapira, B.Kantor, —Recommender Systems Handbook||, First Edition, 2011.
- T2:** Ricardo Baeza-Yates and BerthierRibeiro-Neto, —Modern Information Retrieval: The Concepts and Technology behind Search, Second Edition, ACM Press Books, 2011.

REFERENCE BOOKS:

- R1:** C. Manning, P. Raghavan, and H. Schütze, —Introduction to Information Retrieval, Cambridge University Press, 2008.
- R2:** Stefan Buettcher, Charles L. A. Clarke and Gordon V. Cormack, —Information Retrieval: Implementing and Evaluating Search Engines, The MIT Press, 2001.

U19ITPE003

AGILE TECHNOLOGIES

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

The course aims to provide the students

- To Knowledge the methodology and issues in Agile.
- To understand the fundamental principles and practices associated with various agile development methods
- To analyze how agile methods scale to large and distributed projects, including the role of systems engineering
- To develop a project using DevOps

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1			1	1	1	1					2	1	
CO2	2	2		2			1						2	2	
CO3	2	2		1		1		1					2	2	
CO4	1	3	2	1		1	1						1	1	
CO5			3	2	1		1	1							

UNIT I INTRODUCTION TO AGILE 9

Introduction to Agile Software Process Model - Agile Methodology & Principles – Types – Benefits - Life Cycle, Agile Project Management – Design and Construction - Agile Testing- Agile Tools.

UNIT II AGILE REQUIREMENTS 9

Trees : Basics: equivalent characterizations of trees, forests, Spanning trees and 2-switches , Distance and Meeting the requirements challenge iteratively-Requirements for Agile approach – Gathering & analysis –Behavior Driven Development (BDD) and Acceptance Test Driven Development (ATDD)- Designing storyboards and scrums in Agile approach

UNIT III SCRUM 9

Scrum Foundations - Scrum Roles - Scrum Master - Product Owner – Team - Scrum Meetings - Scrum Artifacts - Product Backlog - Sprint Backlog - Burn-down Charts - Scaling Scrum –Manager in Scrum and Product Backlog.

UNIT IV AGILE METHODOLOGIES 9

Pair Programming – Refactoring – Dynamic Systems Development (DSD) – Feature Driven Development (FDD) – Test Driven Development (TDD), Agile Unified Process – Agile Failure Models - Various reasons for agile failures

UNIT V DEV OPS INTRODUCTION 9

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Introduction to dev ops-Continuous Integration-Continuous deployment-Dev ops tool sets-Maven-Jenkins

Total: 45 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Explain the agile methodologies
- CO2:** Analyze various agile development process
- CO3:** Work on Scrum Framework and its application
- CO4:** Design a agile model
- CO5:** Deploy/built application in Dev Ops

TEXT BOOKS:

- T1:** K.S. Rubin, Essential Scrum: A Practical Guide to the Most Popular Agile Process, Addison-Wesley, 2012.
- T2:** DevOps: A Software Architect's Perspective by Len Bass, Ingo Weber, Liming Zhu

REFERENCE BOOKS:

- R1:** R.Diestel: Graph Theory, Springer(low price edition) 2000
- R2:** S.W. Ambler, M. Lines, Disciplined Agile Delivery: A Practitioner's Guide to Agile Software Delivery in the Enterprise, IBM Press, 2012.
- R3:** Kevin C. Desouza, Agile information systems: conceptualization, construction, and management, Butterworth-Heinemann, 2007
- R4:** K. Beck, C. Andres, Extreme Programming Explained: Embrace Change, 2nd Edition, Addison-Wesley, 2004.
- R5:** Practical DevOps by Joakim Verona

U19ITPE004**C# AND .NET PROGRAMMING**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

The course aims to provide the students

- Learn the technologies of the .NET framework
- Know the object oriented aspects of C#
- Be aware of application development in .NET
- Learn web based applications on .NET(ASP.NET)
- Learn to develop applications that connect with database.

PREREQUISITES

- Object Oriented Programming

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2		3		3	1	1								
CO2	1		3				1						2		
CO3			3		2								2		
CO4	2		2		2									2	
CO5			3				1								

UNIT I INTRODUCTION 9

Introducing C#, Understanding .NET, overview of C#, Literals, Variables, Data Types, Operators, checked and unchecked operators, Expressions, Branching, Looping, Methods implicit and explicit casting, Constant, Arrays, Array Class, Array List, String, String Builder, Structure, Enumerations, boxing and unboxing.

UNIT II OBJECT ORIENTED ASPECTS OF C# 9

Class, Objects, Constructors and its types, inheritance, properties, indexers, index overloading, polymorphism, sealed class and methods, interface, abstract class, abstract and interface, operator overloading, delegates, events, errors and exception, Threading.

UNIT III APPLICATION DEVELOPMENT ON .NET 9

Building windows application, Creating our own window forms with events and controls, menu creation, inheriting window forms, SDI and MDI application, Dialog Box (Modal and Modeless), validating controls, windows application configuration.

UNIT IV WEB BASED APPLICATION DEVELOPMENT ON .NET 9


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COURSE OBJECTIVES:

The course aims to provide the students

- To develop an understanding and awareness how issues such as content, information architecture, motion, sound, design, and technology merge to form effective and compelling interactive experiences for a wide range of audiences and end users.
- To become familiar with various software programs used in the creation and implementation of multi- media
- To appreciate the importance of technical ability and creativity within design practice.
- To gain knowledge about graphics hardware devices and software used.
- To understand the two-dimensional graphics and their transformations.
- To understand the three-dimensional graphics and their transformations.
- To appreciate illumination and color models
- To become familiar with understand clipping techniques
- To become familiar with Blender Graphics

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	2									3	3	3
CO2	3	2	3	2									3	3	3
CO3	3	2	3	2									3	3	3
CO4	3	2	3	2									3	3	3
CO5	3	2	3	2									3	3	3
CO6	3	2	3	2									3	3	3

UNIT I**ILLUMINATION AND COLOR MODELS****9**

Light sources - basic illumination models – halftone patterns and dithering techniques;
 Properties of light - Standard primaries and chromaticity diagram; Intuitive colour
 concepts - RGB colour model - YIQ colour model - CMY colour model - HSV colour model -
 HLS colour model; Colour selection. Output primitives – points and lines, line drawing

algorithms, loading the frame buffer, line function; circle and ellipse generating algorithms; Pixel addressing and object geometry, filled area primitives.

UNIT II TWO-DIMENSIONAL GRAPHICS 9

Two dimensional geometric transformations – Matrix representations and homogeneous coordinates, composite transformations; Two-dimensional viewing – viewing pipeline, viewing coordinate reference frame; window-to-viewport coordinate transformation, Two dimensional viewing functions; clipping operations – point, line, and polygon clipping algorithms.

UNIT III THREE-DIMENSIONAL GRAPHICS 9

Three dimensional concepts; Three dimensional object representations – Polygon surfaces- Polygon tables- Plane equations - Polygon meshes; Curved Lines and surfaces, Quadratic surfaces; Blobby objects; Spline representations – Bezier curves and surfaces - B-Spline curves and surfaces. TRANSFORMATION AND VIEWING: Three dimensional geometric and modeling transformations – Translation, Rotation, Scaling, composite transformations; Three dimensional viewing – viewing pipeline, viewing coordinates, Projections, Clipping; Visible surface detection methods.

UNIT IV MULTIMEDIA SYSTEM DESIGN & MULTIMEDIA 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 file format 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 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Design two-dimensional graphics and two dimensional transformations.
- CO2:** Design three-dimensional graph and three dimensional transformations.
- CO3:** Apply Illumination and color models.
- CO4:** Apply clipping techniques to graphics.
- CO5:** Understood Different types of Multimedia File Format
- CO6:** Design Basic 3d Scenes using Blender

TEXT BOOKS:

- T1:** Donald Hearn and Pauline Baker M, —Computer Graphics", Prentice Hall, New Delhi, 2007 [UNIT I – III]


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T2: Andleigh, P. K and KiranThakrar, —Multimedia Systems and Design||, PHI, 2003. [UNIT IV, V]

REFERENCE BOOKS:

R1: Judith Jeffcoate, —Multimedia in practice: Technology and Applications||, PHI, 1998.

R2: Foley, Vandam, Feiner and Hughes, —Computer Graphics: Principles and Practice||, 2nd Edition, Pearson Education, 2003.

R3: Jeffrey McConnell, —Computer Graphics: Theory into Practice||, Jones and Bartlett Publishers,2006

R4: Hill F S Jr., "Computer Graphics", Maxwell Macmillan , 1990 .

R5: Peter Shirley, Michael Ashikhmin, Michael Gleicher, Stephen R Marschner, Erik Reinhard, KelvinSung, and AK Peters, —Fundamentals of Computer Graphics||, CRC Press, 2001 .

R6: William M. Newman and Robert F.Sproull, —Principles of Interactive Computer Graphics|| McGraw Hill 1978.
<https://www.blender.org/support/tutorials/>

U19ITPE006 NETWORK MANAGEMENT

L T P C
3 0 0 3

COURSE OBJECTIVES:

The course aims to provide the students

- Learn definitions of network analysis, architecture, and design and the importance of network analysis
- study about different types of requirements from the user, application, device and network component
- learn how to identify and characterize traffic flows
- learn several concepts about network design process
- Learn about SNMP

PRE-REQUISITES: U19ITTL506T

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2									3	3	2
CO2	3	3	3	2									3	3	2
CO3	3	3	3	2									3	3	2
CO4	3	3	3	2									3	3	2
CO5	3	3	3	2									3	3	2
CO6	3	3	3	2									3	3	2

UNIT I A SYSTEM APPROACH TO NETWORK DESIGN AND REQUIREMENT ANALYSIS 9

Introduction-Network Service and Service based networks- Systems and services- characterizing the services. Requirement Analysis: Concepts – Background – User Requirements- Application Requirements- Host Requirements-Network Requirements – Requirement Analysis: Guidelines – Requirements gathering and listing- Developing service metrics to measure performance – Characterizing behavior- developing performance threshold – Distinguish between service performance levels.

UNIT II	FLOW ANALYSIS	9
Individual and Composite Flows – Critical Flows - Identifying and developing flows – Data sources and sinks – Flow models- Flow prioritization – Flow specification algorithms – Example Applications of Flow Analysis.		
UNIT III	LOGICAL DESIGN	9
Background- Establishing design goals- Developing criteria for technology evolution- Making technology choices for design-case study- Shared Medium- Switching and Routing: Comparison and contrast- Switching- Routing-Hybrid Routing/Switching Mechanisms – Applying Interconnection Mechanism to Design – Integrating Network management and security into the Design- Defining Network Management- Designing with manageable resources- Network Management Architecture- Security- Security mechanism- Examples- Network Management and security plans- Case study.		
UNIT IV	NETWORK DESIGN: PHYSICAL, ADDRESSING AND ROUTING	9
Design Concepts – Design Process - Network Layout – Design Traceability – Design Metrics –Logical Network Design – Topology Design – Bridging, Switching and Routing Protocols- Physical Network Design – Selecting Technologies and Devices for Campus and Enterprise Networks – Optimizing Network Design.		
UNIT V	NETWORK MANAGEMENT AND SNMP PROTOCOL MODEL	9
Network and System management, Network management system platform; Current SNMP Broadband and TMN management, Network management standards. SNMPV1, SNMPV2 system architecture, SNMPV2, structure of management information. SNMPV2 – MIB – SNMPV2 protocol, SNMPV3-Architecture, Application, MIB, security user-based security model, access control RMON.		

Total: 45 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Gather, derive, define and validate real requirements for the specified network.
 - CO2:** Understand different types of requirements from the user, application, device and network component
 - CO3:** Develop traceability between requirements, architecture decisions, and design decisions
 - CO4:** Implement how and where addressing and routing, security, network management, and performance are required in the network.
 - CO5:** Use SNMPv1, v2 and v3 protocols.
- Design a policy-based network management framework

TEXT BOOKS:

- T1:** James.D.McCabe, —Practical Computer Network Analysis and Design||, 1st Edition, Morgan Kaufaman, 1997.


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T2: Mani Subramanian,—Network Management –Principles & Practice|| – 2nd EditionPrentice Hall,2012.

REFERENCE BOOKS:

R1: Network Analysis, Architecture, and Design By James D. McCabe, Morgan Kaufmann, Third Edition, 2007.ISBN-13: 978- 01237048 01

R2: Computer Networks: A Systems Approach by Larry L. Peterson, Bruce S. Davie - 2007, Elsevier Inc.

R3: Top-down Network Design: [a Systems Analysis Approach to Enterprise Network Design] By Priscilla Oppenheimer, Cisco Press, 3rd Edition, ISBN-13: 978-1-5872 - 283-4 ISBN-1 : 1-5872 -283-2

R4: J.Radz,||Fundamentals of Computer Network Analysis and Engineering: Basic Approaches for Solving Problems in the Networked Computing Environment||, Universe, 2005.

R5: Mark Newman, —Networks: An Introduction||,Kindle Edition,2001 .

R6: Laura Chappel and Gerald Combs,—Wireshark 1 1: Essential Skills for Network Analysis||,Kindle Edition,2013.

R7: William Stallings., —SNMP, SNMP2, SNMP3 and RMON1 and 2||, Pearson Education, 2004.

R8: Daw Sudira, —Network Management||, Sonali Publications, 2004.

U19ITPE007

DATA PRIVACY

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

The course aims to provide the students

- To create architectural, algorithmic and technological foundations for the maintenance of the privacy of individuals
- The confidentiality of organizations, and the protection of sensitive information, despite the requirement that information be released publicly or semi-publicly.

PRE-REQUISITES: U19ITTL506T

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3			2							2	3	2
CO2	2	3	3	2		2							2	3	2
CO3	3		3	2		2							2	3	2
CO4	3		3			2	2						2	3	2
CO5	3	3	3	3		2							2	3	2
CO6						2	2						2		3

UNIT I INTRODUCTION 9

Fundamental Concepts, Definitions, Statistics, Data Privacy Attacks, Data linking and profiling, access control models, role-based access control, privacy policies, their specifications, languages and implementation, privacy policy languages, privacy in different domains- medical, financial, etc.

UNIT II DATA EXPLOSION 9

Statistics and Lack of barriers in Collection and Distribution of Person-specific information, Mathematical model for characterizing and comparing real-world data sharing practices and policies and for computing privacy and risk measurements, Demographics and Uniqueness.

UNIT III PROTECTION MODELS AND SURVEY OF TECHNIQUES 9

Null-map, k-map, Wrong map. Protection models (null-map, k-map, wrong map), Disclosure control, Inferring entity identities, Strength and weaknesses of techniques, entry specific databases.


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UNIT IV COMPUTATION SYSTEMS FOR PROTECTING DELIMITED 9
DATA

MinGen, Datafly, Mu-Argus, k-Similar, Protecting textual documents: Scrub.

UNIT V ADVANCED LEARNING 9

Technology, Policy, Privacy and Freedom- Medical privacy legislation, policies and best practices, Examination of privacy matters specific to the World Wide Web, Protections provided by the Freedom of Information Act or the requirement for search warrants.

Total: 45 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Understand the concepts of privacy in today's environment.
- CO2:** Obtain the understanding of how automation is changing the concepts and expectations concerning privacy and the increasingly interconnected issue of security.
- CO3:** Obtain the knowledge of the role of private regulatory and self-help efforts.
- CO4:** Have an understanding of how emerging issues are affecting society and business, with a concentration on how information security must shape corporate practices.
- CO5:** Have practical aspects of navigating the complex landscape of privacy requirements.
- CO6:** Better understanding of privacy laws and data protection of an organization.

TEXT BOOKS:

- T1:** Raghunathan, The Complete Book of Data Anonymization: From Planning to Implementation, Auerbach Pub, 2013.

REFERENCE BOOKS:

- R1:** L. Sweeney, Computational Disclosure Control: A Primer on Data Privacy Protection, MIT Computer Science, 2002.

COURSE OBJECTIVES:

The course aims to provide the students

- To study fundamental concepts in software testing, including software testing objectives, process, criteria, strategies, and methods
- To discuss various software testing issues and solutions in software unit test: integration, regression, and system testing.
- To learn how to planning a test project, design test cases and data, conduct testing operations, manage software problems and defects, generate a testing report.
- To expose the advanced software testing topics, such as object-oriented software testing methods, and component-based software testing issues, challenges, and solutions.
- To gain software testing experience by applying software testing knowledge and methods to practice- oriented software testing project.

PRE-REQUISITES: U19ITTL506T

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3						3				3	3	2
CO2	3												3	3	
CO3	3	2	2						2				3	3	2
CO4	3											2	3		
CO5	3	2	3						3				3		
CO6	3		3						2			2	3		

UNIT I**INTRODUCTION****10**

Introduction: Software Testing, Importance of testing, Roles and Responsibilities, Testing Principles, Attributes of Good Test, V-Model, Test Case Generation, SDLC Vs STLC, Software Testing Life Cycle-in detail. Types of Testing: Testing Strategies: unit testing, Integration Testing, System Testing, Smoke, Regression Testing, Acceptance Testing. Clean Room Software Engineering. Functional/Non- Functional Testing. Testing Tools, Categorization of testing method: Manual Testing, Automated Testing Vs. Manual Testing.

UNIT II**NON FUNCTIONAL TESTING****10**

Performance Test, Memory Test, Scalability Test, Compatibility Test, Security Test, Cookies Test, Session Test, Recovery Test, Installation Test, Ad-hoc Test, Risk Based Test, Compliance Test, McCall's Quality Factors, FURPS.

UNIT III**SOFTWARE TESTING METHODOLOGIES****10**


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Validation & Verification, White/Glass box Testing, Black Box Testing, Grey box Testing, Statement Coverage Testing, Branch Coverage Testing, Path Coverage Testing, Conditional Coverage Testing, Loop Coverage Testing, Boundary Value Analysis Equivalence class Partition, State Based Testing, Cause Effective Graph, Decision Table, Use case Testing, Exploratory Testing and Testing Metrics, Testing GUI.

UNIT IV TESTING LIFE CYCLE AND TEST CASES DESIGN 10

Requirement Analysis/Design Traceability Matrix, Test Planning, Objectives, Scope of testing, Schedule, Approach Roles & Responsibility, Assumption, Risk & Mitigation, Entry & Exit Criteria, Test Automation, Deliverables. Write Test cases, Review Test cases, Test Cases Template, Type of Test Cases, Difference between Test Scenarios and Test Cases, Test Environment setup, understand the SRS, Hardware and software requirement, Test Data.

UNIT V TEST EXECUTION AND TEST METRICS 10

Execute test cases, Error/defect detecting and reporting, DRE(Defect Removal Efficiency), Object, Types of Bugs, Art of Debugging, Debugging Approaches, Reporting the bugs, Severity and priority, Test Closure Criteria for test closure, Test summary report, Quality Assurance, What is quality control, Difference of QA, QC & Testing.

Total: 45 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- C01:** List a range of different software testing techniques and strategies and be able to apply specific (automated) unit testing method to the projects.
- C02:** Distinguish characteristics of structural testing methods.
- C03:** Demonstrate the integration testing which aims to uncover interaction and compatibility problems as Early as possible.
- C04:** Discuss about the functional and system testing methods.
- C05:** Understand where key testing concepts apply within the context of unified processes
- C06:** Demonstrate various issues for object oriented testing.

TEXT BOOKS:

- T1:** Roger S.Pressman, Software engineering- A practitioner's Approach McGraw- Hill International Editions.
- T2:** Ian Sommerville, Software engineering, Pearson education Asia.
- T3:** Software Testing Techniques, 2nd edition, Boris Bwizer, 1990 .
- T4:** Software Testing: Principles and Practices by Srinivasan Desikan.


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COURSE OBJECTIVES:

The course aims to provide the students

- Be exposed to big data
- To understand the big data frameworks
- Learn the classification and clustering
- To understand the big data issues

PRE-REQUISITES: NIL

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3												3		
CO2	3	2	2									2	2		
CO3	3	2	2									2	3		
CO4	3	2	2									2	3		
CO5	2	2	2									2	2		
CO6	3												3		

UNIT I INTRODUCTION TO BIG DATA 9

Introduction to Big Data Platform – Challenges of conventional systems - Web data – Evolution of Analytic scalability, analytic processes and tools, Analysis vs reporting - Modern data analytic tools, Statistical concepts: Sampling distributions, resampling, statistical inference, prediction error.

UNIT II HADOOP FRAMEWORK 9

Distributed File Systems - Large-Scale FileSystem Organization – HDFS concepts - MapReduce Execution, Algorithms using MapReduce, Matrix-Vector Multiplication – Hadoop YARN.

UNIT III CLUSTER ANALYSIS 9

Cluster Analysis, Types of Data in Cluster Analysis, Partitioning Methods, Hierarchical Methods, Density Based Methods, Grid Based Methods, Model Based Clustering Methods, Clustering High Dimensional Data.

UNIT IV CLASSIFICATION TECHNIQUES 9

Classification: Decision Trees - Overview of a Decision Tree - The General Algorithm - Decision Tree Algorithms - Evaluating a Decision Tree - Decision Trees in R - Naïve Bayes - Bayes' Theorem - Naïve Bayes Classifier.

UNIT V BIG DATA ISSUES**9**

Privacy, Visualization- Visual data analysis techniques, interaction techniques; Systems and applications:, Compliance and Security, Structured vs Unstructured Data

Total: 45 Hours**COURSE OUTCOMES**

At the end of the course students should be able to

CO1: Understand how to leverage the insights from big data analytics

CO2: Analyze data by utilizing various statistical and data mining approaches

CO3: Analyze data by utilizing clustering algorithms

CO4: Analyze data by utilizing classification algorithms

CO5: Understand and analyse the big data issues.

TEXT BOOKS:

T1: Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2007.

T2: Anand Rajaraman and Jeffrey David Ullman, Mining of Massive Datasets, Cambridge University Press, 2012.

REFERENCE BOOKS:

R1: EMC Education Services, "Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", Wiley publishers, 2015.

R2: Bart Baesens, "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications", Wiley Publishers, 2015.

R3: Dietmar Jannach and Markus Zanker, "Recommender Systems: An Introduction", Cambridge University Press, 2010.

R4: Kim H. Pries and Robert Dunnigan, "Big Data Analytics: A Practical Guide for Managers " CRC Press, 2015.

R5: Jimmy Lin and Chris Dyer, "Data-Intensive Text Processing with MapReduce", Synthesis Lectures on Human Language Technologies, Vol. 3, No. 1, Pages 1-177, Morgan Claypool publishers, 2010.

U19ITPE009

**ADVANCED BIG DATA AND ITS
ECOSYSTEM**

L T P C
3 0 0 3

COURSE OBJECTIVES

The course aims to provide the students

- Apply Stream data model.
- To explore tools and practices for working with big data
- To gain knowledge on Hadoop related tools such as HBase, Cassandra, Pig, and Hive for big data analytics
- To understand the competitive advantages of big data analytics with case studies.

PREREQUISITES

- **NIL**

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2											3	1	
CO2	3	3											2	2	
CO3	2	2	2	2									3	2	
CO4	3	3											2		
CO5	3												3		

UNIT I **ASSOCIATION AND RECOMMENDATION SYSTEM** **9**

Advanced Analytical Theory and Methods: Association Rules - Overview - Apriori Algorithm - Evaluation of Candidate Rules - Applications of Association Rules - Finding Association & finding similarity - Recommendation System: Collaborative Recommendation- Content Based Recommendation - Knowledge Based Recommendation- Hybrid Recommendation Approaches.

UNIT II **STREAM MEMORY** **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.

UNIT III **BIG DATA FRAMEWORKS** **9**

Introduction to NoSQL – Aggregate Data Models – Hbase: Data Model and Implementations – Hbase Clients – Examples – .Cassandra: Data Model – Examples – Cassandra Clients – Hadoop Integration


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U19ECTH706

WIRELESS NETWORKS

L T P C
3 0 0 3

COURSE OBJECTIVES

The course aims to provide the students

- To understand the concept about Wireless networks, protocol stack and standards
- To understand and analyse the network layer solutions for Wireless networks
- To study about fundamentals of 3G Services, its protocols and applications
- To have in depth knowledge on internetworking of WLAN and WWAN
- To learn about evolution of 4G Networks, its architecture and applications

PREREQUISITES

- **U19CSTL101** - Computational Thinking and Problem Solving

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3				2								2		
CO2	3	2	2		2	2							2	2	
CO3	3	2											2		
CO4	3	3	3	3	2	2							3	2	

UNIT I WIRELESS LAN 9

Introduction-WLAN technologies: - IEEE802.11: System architecture, protocol architecture, 802.11b, 802.11a – Hiper LAN: WATM, BRAN, HiperLAN2 – Bluetooth: Architecture, WPAN – IEEE 802.15.4, Wireless USB, Zigbee, 6LoWPAN, WirelessHART

UNIT II MOBILE NETWORK LAYER 9

Introduction - Mobile IP: IP packet delivery, Agent discovery, tunneling and encapsulation, IPV6-Network layer in the internet- Mobile IP session initiation protocol - mobile ad-hoc network: Routing: Destination Sequence distance vector, IoT: CoAP

UNIT III 3G OVERVIEW 9

Overview of UTMS Terrestrial Radio access network-UMTS Core network Architecture: 3GPP Architecture, User equipment, CDMA2000 overview- Radio and Network components, Network structure, Radio Network, TD-CDMA, TD – SCDMA

UNIT IV INTERNETWORKING BETWEEN WLANS AND WWANS 9

Internetworking objectives and requirements, Schemes to connect WLANS and 3G Networks, Session Mobility, Internetworking Architecture for WLAN and GPRS, System Description, Local Multipoint Distribution Service, Multichannel Multipoint Distribution System.


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UNIT V**4G & BEYOND****9**

Introduction – 4G vision – 4G features and challenges - Applications of 4G – 4G Technologies: Multicarrier Modulation, Smart antenna techniques, IMS Architecture, LTE, Advanced Broadband Wireless Access and Services, MVNO.

Total: 45 Hours**COURSE OUTCOMES**

At the end of the course students should be able to

- CO1:** Conversant with the latest 3G/4G networks and its architecture
- CO2:** Design and implement wireless network environment for any application using latest wireless protocols and standards
- CO3:** Ability to select the suitable network depending on the availability and requirement
- CO4:** Implement different type of applications for smart phones and mobile devices with latest network strategies

TEXT BOOKS:

- T1:** Jochen Schiller, ||Mobile Communications||, Second Edition, Pearson Education 2012.(Unit I,II,III)
- T2:** Vijay Garg, —Wireless Communications and networking||, First Edition, Elsevier 2007.(Unit IV,V)

REFERENCE BOOKS:

- R1:** Erik Dahlman, Stefan Parkvall, Johan Skold and Per Beming, "3G Evolution HSPA and LTE for Mobile Broadband||, Second Edition, Academic Press, 2008.
- R2:** Anurag Kumar, D.Manjunath, Joy kuri, —Wireless Networking||, First Edition, Elsevier 2011.
- R3:** Simon Haykin , Michael Moher, David Koilpillai, —Modern Wireless Communications||, First Edition, Pearson Education 2013

U19ITPE011

SOFTWARE ARCHITECTURE

L T P C
3 0 0 3

COURSE OBJECTIVES

The course aims to provide the students

- Understand the fundamentals of software architecture.
- Study the various software development methodologies.
- Learn the importance of architectural documentation and evaluation.
- Learn the various software architecture design components.
- Relate software architecture and software quality.
- Knowledge of software architecture tools and technologies: Students should be familiar with various tools and technologies used in software architecture, such as UML, architectural frameworks, and architectural patterns.

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1									3	3	2	2			1
CO2									3	3	2	2			1
CO3									3	3	2	2			1
CO4									3	3	2	2			1
CO5									3	3	2	2			1
CO6									3	3	2	2			1

UNIT I INTRODUCTION 9

Basic concepts of software architecture – Context of Software Architecture – ABC cycle – What software architecture is and what it isn’t – Architectural patterns – Good Architecture- Reference models – Architectural structures and views-Introduction to styles – Decentralized Architectures.

UNIT II DESIGN METHODOLOGIES 9

Structured design- Design practices-Stepwise refinement – Incremental design- Structured system analysis and design –Jackson structured programming – Jackson system Development.

UNIT III ARCHITECTURAL DESCRIPTION DOCUMENTATION AND EVALUATION 9

Early architecture description languages-Domain and style specific ADL’s- Extensible ADL’s –Documenting software architecture – Uses and Audiences for Architecture Documentation – Views – Choosing Views – Combining Views –Architecture evaluation – Evaluation Factors –Architecture Tradeoff Analysis Method – Lightweight Architecture Evaluation – ATAM.

UNIT IV ARCHITECTURE DESIGN 9


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U19ITPE012

**MERN STACK – WEB APPLICATION
DEVELOPMENT**

L T P C
3 0 0 3

COURSE OBJECTIVES

The course aims to provide the students

- Understand the concept of Authentication
- Learn to design a web application with Server-side validation
- Learn to create web page using Angular JS
- Understand the basics of React
- Learn to develop a web application using MERN

PREREQUISITES: Full Stack Development

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2										3	1	
CO2	3	2	2										3		
CO3	2		2	2							1	3	3	2	
CO4	2	3		1							1			2	2
CO5	2	3	3	3							2	3	2	3	1

UNIT I AUTHENTICATION 9

Session and Cookies- Authentication – Passport.js – Installation and Configuration - Serializing and Deserializing User Instances Passport Strategies – Logout Functionality – Protecting rules – JWT

UNIT II VALIDATION AND API 9

Validation – Server-side Validation - Client vs Server-side – Error Handling – API – Introduction – Integration of Weather API – Email Authorization –Transporter Object - Token Verification – REST API – Working of REST API - Postman

UNIT III ANGULAR JS 9

AngularJS -Introduction to AngularJS - Expressions - Modules - Data Binding - Scope - Directives & Events - Controllers - Filters - Services - HTTP - Tables - Select - Fetching Data from MySQL - Validation - AngularJS API - Animations - AngularJS i18n and i10n

UNIT IV REACT 9


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React - React Accessibility – React Code Splitting - Context – Error Boundaries – Forwarding Refs – Fragments – Higher Order Components – Integrating with Other Libraries – JSX in depth – Optimizing Performance – Portals – React without ES6 – React without JSX – Reconciliation – Refs and DOM – Render Props – Static Type Checking – Strict Mode – Type checking – Uncontrolled Components – Web Components

UNIT V

REDUX

9

Redux – Introduction – Core Concepts –Dataflow –Store –Actions –Pure Functions – Reducers – Redux Middleware –Dev Tools – testing – Integrating React

Total: 45 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Build an application with Authentication using Passport.js
- CO2:** Differentiate between Client-side and Server-side Validation
- CO3:** Design a web page using Angular JS
- CO4:** Develop a web application with React components
- CO5:** Understand the core concepts of Redux .

TEXT BOOKS:

- T1:** Amos Q Haviv, “MEAN Web Development”, Second Edition, Packt Publishing 2016
- T2:** Colin J Ihrig & Adam Bretz, “Full Stack Javascript Development with MEAN”, Sitepoint Pty. Ltd. 2014.

U19ITPE013

ARTIFICIAL INTELLIGENCE

L T P C
3 0 0 3

COURSE OBJECTIVES

The course aims to provide the students

- To study the concepts of Artificial Intelligence
- Methods of solving problems using Artificial Intelligence
- Learn to represent knowledge in solving AI problems
- Analyze the different ways of designing software agents and its application.

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	2										3	2	2
CO2	3	3	2										3	3	3
CO3	2	2	3										3	3	3
CO4	2	3	3										3	3	3
CO5	3	3	3										3	3	3
CO6	3	3	3										3	3	3

UNIT I INTRODUCTION TO ARTIFICIAL INTELLIGENCE 9

Overview of Artificial intelligence, Definition, Future of Artificial Intelligence , Behavioral 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.

UNIT III AI AND GAME 9

Game Playing , Optimal Decisions in Games , Alpha , Beta Pruning , Stochastic Games, Rule, based systems, Decision tree learning, Reinforcement learning.

UNIT IV 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 V SOFTWARE AGENTS AND APPLICATIONS 9


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Architecture for Intelligent Agents , Agent communication , Negotiation and Bargaining ,
Argumentation among Agents , Trust and Reputation in Multi-agent systems, AI
applications , Language Models , Information Retrieval, Information Extraction , Natural
Language Processing , Machine Translation , Speech Recognition , Robot , Hardware ,
Perception , Planning, Moving.

Total: 45 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Understand the basics of Artificial Intelligence
- CO2:** Summarize the appropriate search algorithms for any AI problem
- CO3:** Represent a problem using behavioral logics
- CO4:** Apply AI problem solving techniques, information representation, and cognitive methods in AI based systems.
- CO5:** Develop simple intelligent / expert system that uses Artificial Intelligence.
- CO6:** Design software agents to solve a problem.

TEXT BOOKS:

- T1:** S. Russell and P. Norvig, "Artificial Intelligence: A Modern Approach", Prentice Hall, Third Edition, 2016.
- T2:** I. Bratko, "Prolog: Programming for Artificial Intelligence", Fourth edition, Addison-Wesley Educational Publishers Inc., 2011.

REFERENCE BOOKS:

- R1:** M. Tim Jones, "Artificial Intelligence: A Systems Approach (Computer Science)", Jones and Bartlett Publishers, Inc.; First Edition, 2015
- R2:** Nils J. Nilsson, "The Quest for Artificial Intelligence", Cambridge University Press, 2009
- R3:** William F. Clocksin and, Christopher S. Mellish, "Programming in Prolog: Using the ISO Standard", Fifth Edition, Springer, 2012 Reprint
- R4:** Ian Millington, John Funge, "Artificial intelligence for Games", Second edition, Morgan Kaufmann Publishers, CRC Press, 2012.
- R5:** Gerhard Weiss, "Multi Agent Systems", Second Edition, MIT Press, 2016.
- R6:** David L. Poole and Alan K. Mackworth, "Artificial Intelligence: Foundations of Computational Agents", Cambridge University Press, 2010.

COURSE OBJECTIVES

The course aims to provide the students

- To understand the image fundamentals necessary for Digital Image Processing.
- To apply the concept of image enhancement, degradation function, restoration and the image segmentation techniques.
- To Impart the knowledge on image compression and recognition methods

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1			1	1	1	1							
CO2	2	2		2			1							2	
CO3	2	2		1		1		1							
CO4	1	3	2	1		1	1							2	
CO5			3	2	1		1	1							

UNIT I**IMAGE PROCESSING FUNDAMENTALS****9**

Introduction to image processing – imaging modalities – image file formats- Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels– Color image fundamentals

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 – Selective Filtering

UNIT III**IMAGE RESTORATION AND WAVELETS****9**

Image Restoration – degradation model, Properties, Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering- Wavelets – Sub band coding – Multi resolution expansions

UNIT IV**IMAGE SEGMENTATION****9**

Edge detection – Thresholding – Region based segmentation–Region growing – Region splitting and merging – Morphological processing- erosion and dilation, Segmentation by morphological watersheds – basic concepts – Dam construction – Watershed segmentation algorithm.

UNIT V**IMAGE COMPRESSION AND RECOGNITION****9**

Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, JPEG standard, MPEG. Boundary representation, Boundary description, Fourier Descriptor, Texture – Patterns and Pattern classes – Recognition based on matching

Total: 45 Hours**COURSE OUTCOMES**

At the end of the course students should be able to

- CO1:** Review the fundamental concepts of a digital image processing system
- CO2:** Apply the techniques used for image enhancement in both spatial and frequency domain using various transforms..
- CO3:** Evaluate the techniques for image restoration and Wavelets
- CO4:** Evaluate various techniques for image segmentation.
- CO5:** Interpret image compression standards and the image representation techniques.

TEXT BOOKS:

- T1:** Rafael C Gonzalez, Richard E Woods, "Digital Image Processing" - 2nd Edition, Pearson Education 2003
- T2:** Jain A.K., "Fundamentals of Digital Image Processing", Pearson education

REFERENCE BOOKS:

- R1:** D, E. Dudgeon and RM. Mersereau, —" Multidimensional Digital Signal Processing", Prentice Hall Professional Technical Reference, 1990.
- R2:** William K. Pratt, —" Digital Image Processing", John Wiley, New York, 2002
- R3:** Milan Sonka et al. —" Image Processing, Analysis and Machine Vision", Brookes/Cole, Vikas

U19ITPE015**SOFTWARE PROJECT MANAGEMENT**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

The course aims to provide the students

- To understand the Software Project Planning and Evaluation techniques.
- To plan and manage projects at each stage of the software development life cycle (SDLC).
- To learn about the activity planning and risk management principles.
- To manage software projects and control software deliverables.
- To develop skills to manage the various phases involved in project management and people management.
- To deliver successful software projects that support organization's strategic goals

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2		2	2		2				3		2
CO2	3					2			2				3		2
CO3	3	3	3										3		2
CO4	3	3	3	2		2							3	3	
CO5	3	3	3			2							3		2
CO6						2		2							2

UNIT I PROJECT EVALUATION AND PROJECT PLANNING 9

Importance 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 – Dynamic System Development Method – Extreme Programming– Managing interactive processes – Basics of Software estimation – Effort and Cost estimation techniques – COSMIC Full function points - COCOMO II - a Parametric Productivity Model.


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U19CSPE005

SOFTWARE TEST AUTOMATION

L T P C
3 0 0 3

COURSE OBJECTIVES

The course aims to provide the students

- To Learn basic principles of Software testing.
- To Learn about the test data and test plan.
- To Understand the importance of automation testing and tools available.
- To understand the fundamentals of Selenium for automation.
- To understand basic concepts of TestNG and to Implement automated testing

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2											2		
CO2	1	2	2	1	1							2	1	2	1
CO3	1		2	2	2								1		
CO4	1	2	1	2	2							1	2		1
CO5	1	2	1		3									2	2

UNIT I SOFTWARE TESTING INTRODUCTION 9

Introduction: SDLC, Software Testing, Manual Testing, Automation Testing, Purpose of Test automation. Role of tester, Types of Testing, Use cases for testers, Test Basis, Test Bed.

UNIT II TEST CASES 9

Test case, Test case parameters, Test case Design Techniques, Test suite, Test completion criterion and report, Test data - management, Test Driven Development, Test Execution, Test plan.

UNIT III AUTOMATION TESTING AND TOOLS 9

Automation Testing – Need, Test cases to automation, Automated testing process, Test tool selection, Framework for automation, Automation tool best practices, Benefits of automation testing, Types of automated testing, Ways to choose automation tool, Types of Automation testing tools.

UNIT IV AUTOMATION USING SELENIUM 9

Selenium fundamentals, Components of Selenium Test environment – Swlwnium IDE, Java for selenium, Selenium WebDriver, Selenium Automation framework.

UNIT V TESTNG AND CASE STUDY 9

TestNG- Environment, writing tests, Basic Annotations, Execution Procedure, Test results, Checking reports generated by TestNG. Advantages of TestNG over JUnit. Implementation of automated testing for any web application using Selenium and Testing.

Total: 45 Hours


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COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Achieve Knowledge of testing and automation .
- CO2:** Understands the basic concepts of test data and test plan.
- CO3:** Achieve Knowledge of automation testing and tools for automation
- CO4:** Understands the concepts of Selenium for automation
- CO5:** Understands the concepts of TestNG and automated testing for web application.

TEXT BOOKS:

- T1:** Daniel J. Mosley, Bruce A. Posey, —Just Enough Software Test Automation, Prentice Hall PTR,2002.
- T2:** Unmesh Gundecha, Satya Avasarala, —Selenium WebDriver 3 Practical Guide, Second Edition, Packt Publishing, 2018.
- T3:** Robert C. Martin, The Clean Coder, Pearson Education, 2011.

U19ITPE016

MACHINE LEARNING WITH PYTHON PROGRAMMING

L T P C
3 0 0 3

COURSE OBJECTIVES

The course aims to provide the students

- To understand the basics of Python Programming
To understand the machine learning Packages
To learn the introduction to machine Learning
To learn Fundamentals of Statistics and Probability, Pre-processing the data
To Concepts of Regression and Classification and its Applications

PREREQUISITES : Linear algebra, Probability and statistics

Course Articulation Matrix : 3- High, 2- Medium, 3- Low
Table with 16 columns (PO1-PO12, PSO1-PSO3) and 6 rows (CO1-CO5) showing correlation values.

UNIT I INTRODUCTION TO PYTHON PROGRAMMING 9

Introduction to Python - Introduction to Python Language – Basic structure of a Python Program-keywords,Variables,Identifiers,commenting Style in Python(single-line, multi-line, and documentation),Multiline Statements- Reading input from console-Operators.

Control Structures - Decision making statement, iterative Statements, Loop Control statements-Pass,Continue,Break, range(),Nested Looping Statements

String - Mutable Vs Immutable types, String Operations- Indexing-Slicing-Striding, String Built-in functions. Tuple - Tuple operations and functions.

List - list operations, list slicing, Built-in list functions, List Comprehension Set - Set Operations-Built-in functions Dictionary - key-value pair, dictionary operations – functions..

UNIT II PYTHON PACKAGES FOR MACHINE LEARNING 9

NumPy- Basics of NumPy array, Broadcasting an array, Matrix indexing, Selection techniques, Saving and loading arrays. Pandas- Series, Indexing elements of a series, Dictionaries, Data frame, Different ways of indexing in a data frame, Conditional indexing in a data frame, Drop, fill, replace, Group by, merging similar to SQL logic, Filtering, sorting and indexing, Loops and functions, Saving and loading a csv, excel file.

Matplotlib, Seaborn- Need for Visualization, Fundamentals for Matplotlib, Types of Plot-Dist plot, count plot, Boxplot, Bar chart, Pair plot, Reg plot, Joint plot, Point plot, Factor plot, Strip plot, Swarm plot, Violoin, Heat Map-Case Study Using all Packages

UNIT III INTRODUCTION TO MACHINE LEARNING 9

Introduction-Need for Machine Learning, ML is the future & Applications-How does the Machine Learning works?-Difference between ML Vs AI Vs Deep Learning, Machine Learning Categories- Supervised Learning, Unsupervised Learning, Reinforcement Learning. Machine Learning Life Cycle, Setting Up the Environment.

Descriptive Statistics and Probability- Basics of Probability, Bayes Theorem, Overall Statistical Measures(23)- Central Tendency (mean, mode, median), Correlation between variables and Analysis, Modality, Skewness & Kurtosis, Central Limit Theorem - Central limit theorem(Experimentation).

UNIT IV DATA PREPROCESSING AND VISUALIZATION 9

Inferential Statistics- Hypothesis- Type I and Type II errors, Hypothesis Testing and steps. Types of Hypothesis tests - One tailed vs Two tailed-Case Study in Hypothesis. ANOVA- Single sample test,z-test,t-test,Test for variance, Anova and Chi Square, Case Study.

Preprocessing-Dealing with Missing Data, Handling Categorical Data, Normalizing Data, Handling Outliers, Feature Scaling-Standardization, Normalization, Feature Selection and its uses Exploratory Data Analysis (EDA), Univariate Analysis, Multivariate Analysis. Case Study

UNIT V REGRESSION AND CLASSIFICATION 9

Regression-Concepts of Regression -Linear Regression, Multiple Regression - Assumptions of Regressions - Features' Exploration - Overfitting and Underfitting - Regression Metrics of Evaluation. Types of Regression, Applications Of Regression - Case Studies.

Classification- Classification Concepts, Performing Exploratory Data Analysis, Classification- Logistic Regression, Evaluating a Classification Model Performance, ROC Curve, Fitting Line, Stochastic Gradient Descent, Multiclass Logistic Regression, Applications – Case Studies. Bagging-Boosting..

Total: 45 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Understood the machine learning Types and Statistics and Probability.
- CO2:** Applied the machine learning Algorithms.
- CO3:** Learn Fundamentals of Statistics and Probability, Pre-processing the data
- CO4:** Implemented the Classification concepts and its Applications in Python
- CO5:** Understood the Unsupervised Learning and Types.

TEXT BOOKS:

- T1:** Danish Haroon –“Python Machine Learning Case Studies”,Apress Publications,2017,First Edition.
- T2:** Manohar Swamynathan – “Mastering Machine Learning with Python in Six Steps : A Practical Implementation Guide to Predictive Data Analytics Using Python”, Apress Publications,2017, First Edition.
- T3:** Joel Grus- “Data Science from Scratch”, Published by O’Reilly Media, April 2015: First Edition.
- T4:** Thomas Mailund .R- “Beginning Data Science in R”, Apress Publications,2017, First Edition


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T5: Jaynal Abedin- "Data Manipulation in R, Packt Publishing",2014, First Edition.

REFERENCE BOOKS

R1: Sabastine Raschka-"Python Machine Learning, Packt Publishing",2014, First Edition

R2: Samir Madhavan-"Mastering Python for Data Science",Packt Publishing,2015, First Edition.

R3: Gavin Hackeling-"Mastering Machine Learning with Scikit Learn", Packt Publishing,2014, First Edition.

U19ITPE017

OPEN-SOURCE TECHNOLOGIES

L 3 T 0 P 0 C 3

COURSE OBJECTIVES

The course aims to provide the students

- Be exposed to the context and operation of free and open source software (FOSS).
• communities and associated software projects.
• Be familiar with participating in a FOSS project.
• Learn scripting language like Python or Perl.
• Learn programming language like Ruby.
• Learn some important FOSS tools and techniques.

PREREQUISITES

- NIL

Course Articulation Matrix : 3- High, 2- Medium, 3- Low
Table with 16 columns (PO1-PO11, PSO1-PSO3) and 6 rows (CO1-CO5) showing credit values.

UNIT I PHILOSOPHY 9

Notion of Community--Guidelines for effectively working with FOSS community--, Benefits of Community based Software Development --Requirements for being open, free software, open source software --Four degrees of freedom - FOSS Licensing Models - FOSS Licenses -- GPL- AGPL- LGPL - FDL - Implications -- FOSS examples.

UNIT II LINUX 9

Linux Installation and Hardware Configuration -- Boot Process-The Linux Loader (LILO) - The Grand Unified Bootloader (GRUB) - Dual-Booting Linux and other Operating System - Boot-Time Kernel Options- X Windows System Configuration-System Administration -- Backup and Restore Procedures- Strategies for keeping a Secure Server.

UNIT III PROGRAMMING LANGUAGES 9

Programming using languages like Python or Perl or Ruby

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COURSE OBJECTIVES

The course aims to provide the students

- To comprehend the concept of semantic web and its associated applications.
- To acquire knowledge representation using ontology
- To understand human behaviour in social web and allied communities
- To Study visualization of social networks

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3			1										1	
CO2	3													2	
CO3	3	2	2	1	3									1	
CO4	3	3	3	2	3	2							1	2	
CO5	3	3	3	3	3	2							2	2	

UNIT I INTRODUCTION 9

Introduction to Semantic Web - Limitations of current Web - Development of Semantic Web - Emergence of the Social Web - Social Network analysis: Development of Social Network Analysis - Key concepts and measures in network analysis - Electronic sources for network analysis: Electronic discussion networks, Blogs and online communities - Web-based networks - Applications of Social Network Analysis.

UNIT II MODELING AND VISUALIZATION 9

Visualizing Online Social Networks - A Taxonomy of Visualizations - Graph Representation - Centrality- Clustering - Node-Edge Diagrams - Visualizing Social Networks with Matrix-Based Representations- Node-Link Diagrams - Hybrid Representations - Modelling and aggregating social network data – Random Walks and their Applications –Use of Hadoop and Map Reduce - Ontology and their role in the Semantic Web: Ontology-based knowledge Representation - Ontology languages for the Semantic Web: Resource Description Framework - Web Ontology Language

UNIT III MINING COMMUNITIES AND EXTRACTION IN SOCIAL NETWORKS 9

Extracting evolution of Web Community from a Series of Web Archive - Detecting communities in social networks - Definition of community - Evaluating communities – Methods for community detection and mining - Applications of community mining algorithms - Tools for detecting communities social network infrastructures and communities - Decentralized online social networks - Multi-Relational characterization of dynamic social network communities.

UNIT IV PREDICTING HUMAN BEHAVIOUR AND PRIVACY ISSUES 9

Understanding and predicting human behaviour for social communities – User data management – Inference and Distribution – Enabling new human experiences – Reality mining – Context – Awareness – Privacy in online social networks – Trust in online environment – Trust models based on subjective logic – Trust network analysis – Trust transitivity analysis – Combining trust and reputation – Trust derivation based on trust comparisons – Attack spectrum and countermeasures

UNIT V

APPLICATIONS

9

A Learning Based Approach for Real Time Emotion Classification of Tweets, A New Linguistic Approach to Assess the Opinion of Users in Social Network Environments, Explaining Scientific and Technical Emergence Forecasting, Social Network Analysis for Biometric Template Protection

Total: 45 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Work on the internal components of the social network
- CO2:** Model and visualize the social network
- CO3:** Mine the behaviour of the users in the social network
- CO4:** Predict human behaviour in social web and related communities
- CO5:** Visualize social networks in real time applications

TEXT BOOKS:

- T1:** Ajith Abraham, Aboul Ella Hassanien, Václav Snášel, —Computational Social Network Analysis: Trends, Tools and Research Advance, Springer, 2012
- T2:** Borko Furht, —Handbook of Social Network Technologies and Applications Springer, 1 st edition, 2011
- T3:** Peter Mika, “Social Networks and the Semantic Web”, , First Edition, Springer 2007

REFERENCE BOOKS:

- R1:** Charu C. Aggarwal, —Social Network Data Analytic, Springer; 2014
- R2:** Giles, Mark Smith, John Yen, —Advances in Social Network Mining and Analysis||, Springer, 2010.
- R3:** Guandong Xu , Yanchun Zhang and Lin Li, —Web Mining and Social Networking – Techniques and applications Springer, 1st edition, 2012
- R4:** Max Chevalier, Christine Julien and Chantal Soulé-Dupuy, “Collaborative and Social Information Retrieval and Access: Techniques for Improved user Modelling”, IGI Global Snippet, 2009
- R5:** John G. Breslin, Alexandre Passant and Stefan Decker, “The Social Semantic Web”, Springer, 2009

U19ITPE018**ELECTRONIC COMMERCE**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

The course aims to provide the students

- To learn the E-Commerce Platform and its concepts
- To Understand the Technology, infrastructure and Business in E-Commerce
- To Understand the Security and Challenges in E-Commerce
- To Build an Own E-Commerce using Open Source Frameworks

PREREQUISITES

- **U19CSTL101** - Computational Thinking and Problem Solving

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1			3		3	2			2		3		3		3
CO2	3		3		3	2			2		2		3		3
CO3	3		3		3	2			2		2		3		3
CO4		3	3			2								2	2
CO5	3	2	3	2		2	2		2		2		3	3	1
CO6	3	3	3	2		2	2		2		2		3	3	1

UNIT I	INTRODUCTION TO E-COMMERCE AND TECHNOLOGY INFRASTRUCTURE	9
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Working of Web - HTML Markup for Structure - Creating simple page - Marking up text - Adding Links - Adding Images - Table Markup - Forms - HTML5

UNIT II	BUILDING AN E-COMMERCE WEBSITE, MOBILE SITE AND APPS	9
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Systematic approach to build an E-Commerce: Planning, System Analysis, System Design, Building the system, Testing the system, Implementation and Maintenance, Optimize Web Performance – Choosing hardware and software – Other E-Commerce Site tools – Developing a Mobile Website and Mobile App

UNIT III	E-COMMERCE SECURITY AND PAYMENT SYSTEMS	9
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E-Commerce Security Environment – Security threats in E-Commerce – Technology Solutions: Encryption, Securing Channels of Communication, Protecting Networks, Protecting Servers and Clients – Management Policies, Business Procedure and Public Laws - Payment Systems


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UNIT IV BUSINESS CONCEPTS IN E-COMMERCE 9

Digital Commerce Marketing and Advertising strategies and tools – Internet Marketing Technologies – Social Marketing – Mobile Marketing – Location based Marketing – Ethical, Social, Political Issues in E-Commerce

UNIT V PROJECT CASE STUDY 9

Case Study : Identify Key components, strategy, B2B, B2C Models of E-commerce Business model of any e-commerce website - Mini Project : Develop E-Commerce project in any one of Platforms like Woo-Commerce, Magento or Opencart

Total: 45 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Design Website using HTML CSS and JS
- CO2:** Design Responsive Sites
- CO3:** Manage, Maintain and Support Web Apps
- CO4:** Understand the basic concepts and technologies used in the field of management information systems
- CO5:** Have the knowledge of the different types of management information systems.
- CO6:** Understand the processes of developing and implementing information systems.

TEXT BOOKS:

- T1:** Kenneth C.Laudon,Carol GuercioTraver—E-Commerce||, Pearson,1 thEdition,2016

REFERENCE BOOKS:

- R1:** <http://docs.opencart.com/>
- R2:** <http://devdocs.magento.com/>
- R3:** <http://doc.prestashop.com/display/PS15/Developer+tutorials>
- R4:** Robbert Ravensbergen, —Building E-Commerce Solutions with WooCommerce||, PACKT, 2ndEdition

U19ITPE019

ADVANCED MACHINE LEARNING

L 3 T 0 P 0 C 3

COURSE OBJECTIVES

The course aims to provide the students

- To understand the K-Means Clustering
To understand the Advanced Classification Algorithms.
To learn the Time Series Algorithm and its Applications.
To learn the Basics of Natural Language Processing
To understand the Fundamentals of Deep Learning.

PREREQUISITES :Fundamentals of Machine learning

Table with 16 columns (PO1-PO12, PSO1-PSO3) and 6 rows (CO1-CO5) showing course articulation matrix.

UNIT I CLUSTERING 9

Features' Exploration – Supervised Vs. Unsupervised Learning – Clustering- Data Transformation for Modeling- Metrics of Evaluating Clustering Models- Clustering Models- k-Means Clustering, Applying k- Means Clustering for Optimal Number of Clusters, Applications of Clustering, Case Studies

UNIT II ADVANCED CLUSTERING ALGORITHMS 9

Features' Exploration – Supervised Vs. Unsupervised Learning – Clustering- Data Transformation for Modeling- Metrics of Evaluating Clustering Models- Clustering Models- Hierarchical Clustering, Applications of Clustering, Case Studies

UNIT III ADVANCED CLASSIFICATION AND ALGORITHMS 9

Features' Exploration - Performing Data Wrangling - Performing Exploratory Data Analysis – Classification –K-NN,SVM,Naïve Bayes-Bayesian Classifier- Decision Tree Classification - Random Forest Classification - Model Evaluation Techniques - Applications of Classification - Case Study.

Time Series Forecasting-Introduction,ML Methods and Models - Evaluating the Stationary Nature of a Time Series Object - Tests to Determine If a Time Series Has Autocorrelation - Modeling a Time Series - Auto-Regressive Integrated Moving Averages – Scaling Back the Forecast – Applications of Time Series Analysis - Case Studies.

UNIT IV TEXT PROCESSING 9

Classical Approaches to NLP-Morphological and Lexical Analysis, Syntactic Analysis, Semantic Analysis, Discourse Integration, Pragmatic Analysis.

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U19ITPE020

GREEN COMPUTING

L T P C
3 0 0 3

COURSE OBJECTIVES

The course aims to provide the students

- To learn the fundamentals of Green Computing.
- To analyze the Green computing Grid Framework.
- To understand the issues related with Green compliance.
- To study and develop various case studies.
- Familiarizing with Green Computing standards and regulations, such as Energy Star, EPEAT, and LEED, and learning how to comply with them.
- Understanding of the ethical and social implications of Green Computing, such as the impact on labor practices, economic sustainability, and environmental justice.

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1									3	3	2	2			1
CO2									3	3	2	2			1
CO3									3	3	2	2			1
CO4									3	3	2	2			1
CO5									3	3	2	2			1
CO6									3	3	2	2			1

UNIT I FUNDAMENTALS 9

Green IT Fundamentals: Business, IT, and the Environment – Green computing: carbon foot print, scoop on power – Green IT Strategies: Drivers, Dimensions, and Goals – Environmentally Responsible Business: Policies, Practices, and Metrics.

UNIT II GREEN ASSETS AND MODELING 9

Green Assets: Buildings, Data Centers, Networks, and Devices – Green Business Process Management: Modeling, Optimization, and Collaboration – Green Enterprise Architecture – Environmental Intelligence – Green Supply Chains – Green Information Systems: Design and Development Models.

UNIT III GRID FRAMEWORK 9

Virtualization of IT systems – Role of electric utilities, Telecommuting, teleconferencing and teleporting – Materials recycling – Best ways for Green PC – Green Data center – Green Grid framework.


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UNIT IV **GREEN COMPLIANCE** **9**
Socio-cultural aspects of Green IT – Green Enterprise Transformation Roadmap – Green Compliance: Protocols, Standards, and Audits – Emergent Carbon Issues: Technologies and Future

UNIT V **CASE STUDIES** **9**
The Environmentally Responsible Business Strategies (ERBS) – Case Study Scenarios for Trial Runs – Case Studies – Applying Green IT Strategies and Applications to a Home, Hospital, Packaging Industry and Telecom Sector.

Total: 45 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Acquire knowledge to adopt green computing practices to minimize negative impacts on the environment.
- CO2:** Enhance the skill in energy saving practices in their use of hardware
- CO3:** Evaluate technology tools that can reduce paper waste and carbon footprint by the stakeholders.
- CO4:** Understand the ways to minimize equipment disposal requirements
- CO5:** Ability to identify and evaluate the environmental impact of computing systems and infrastructure, and to propose strategies and solutions to minimize this impact
- CO6:** Familiarity with Green Computing standards, regulations, and best practices, such as Energy Star, EPEAT, and LEED

TEXT BOOKS:

- T1:** Bhuvan Unhelkar, —Green IT Strategies and Applications-Using Environmental Intelligence||, CRC Press, June 2014.
- T2:** Woody Leonhard, Katherine Murray, —Green Home computing for dummies||, August 2012

REFERENCE BOOKS:

- R1:** Alin Gales, Michael Schaefer, Mike Ebbers, —Green Data Center: steps for the Journey||, Shroff/IBM rebook, 2011.
- R2:** John Lamb, —The Greening of IT||, Pearson Education, 2009.
- R3:** Jason Harris, —Green Computing and Green IT- Best Practices on regulations & industry||, Lulu.com, 2008
- R4:** Carl speshocky, —Empowering Green Initiatives with IT||, John Wiley & Sons, 2010
- R5:** Wu Chun Feng (editor), —Green computing: Large Scale energy efficiency||, CRC Press

U19ITPE021

CLIENT SERVER ARCHITECTURE

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

The course aims to provide the students

- The course is designed to develop a basic understanding of how to design a Client Server application.
- This course is to provide students with an overview of the concepts and fundamentals of client/server computing and network operating system

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	3									3		
CO2	3	3	2	2									3		
CO3	3	3	3	3									3	2	
CO4	3	3	3	3									3	2	

UNIT I CLIENT/SERVER COMPUTING 9

Client/Server Computing – Advantages of Client / Server Computing – Technology Revolution – Connectivity – Ways to improve Performance – How to reduce network Traffic

UNIT II THE CLIENT AND SERVER 9

Components of Client/Server Applications – The Client: Role of a Client – Client Services – Request for Service. Components of Client/Server Applications – The Server: The Role of a Server – Server Functionality in Detail – The Network Operating System – What are the Available Platforms – The Server Operating system.

UNIT III CONNECTIVITY 9

Components of Client/Server Applications – Connectivity: Open System Interconnect – Communications Interface Technology – Interprocess communication – WAN Technologies.

UNIT IV USER DEFINED DATATYPES 9

Components of Client/Server Applications–Software: Factors Driving demand for application software development – Rising Technology Staff costs – Need to improve Technology – Need for Common Interface across Platforms – Client/Server System Development Methodology. Components of Client/Server Applications–Hardware: Hardware/Network Acquisition – PCLevel Processing Units – Machintosh, notebooks, Pen – UNIX Workstation – x-terminals – Disk, Tape, Optical Disks, NIC and UPS.


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UNIT V**FILE HANDLING****9**

Components of Client/Server applications–Service and Support: System Administration.
The Future of Client/Server Computing: Enabling Technologies – Transformational
Systems.

Total: 45 Hours**COURSE OUTCOMES**

At the end of the course students should be able to

- CO1:** Identify the importance of client/server components, the role of client and server.
- CO2:** Understand the principles behind the client/server technology and its uses.
- CO3:** Design and implement a client-server internet application
- CO4:** Inculcate ability in creativity & model requirements and constraints for the purpose of designing and implementing application and skills for analyse problems and synthesize suitable solutions.

TEXT BOOKS:

- T1:** Patrick Smith, Steve Guengerich Client/Server Computing
Prentice Hall of India Private Limited, New Delhi, 2nd Edition
1994.

REFERENCE BOOKS:

- R1:** Dan Harkey, Jeri Edwards Client/Server survival Guide Wiley
Computer Publishing 1999
- R2:** Neil Jenkins Client/Server Unleashed Sams Publishing 1998
- R3:** Devendra Kumar Client/Server Computing Global Academic
Publishers & Distributors 2015

U19ITPE022

**NATURAL LANGUAGE
PROCESSING**

L T P C
3 0 0 3

COURSE OBJECTIVES

The course aims to provide the students

- To learn the fundamentals of natural language processing
- To understand the use of CFG and PCFG in NLP
- To understand the role of semantics of sentences and pragmatics
- To apply the NLP techniques to IR applications.
- Gaining proficiency in using NLP tools and libraries, such as NLTK, spaCy, and Gensim, and learning how to develop and implement NLP systems.
- Learning about the ethical and social implications of NLP, such as privacy, fairness, and bias, and understanding how to address these issues in NLP system development

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1									3	3	2	2			1
CO2									3	3	2	2			1
CO3									3	3	2	2			1
CO4									3	3	2	2			1
CO5									3	3	2	2			1
CO6									3	3	2	2			1

UNIT I INTRODUCTION 9

Origins and challenges of NLP – Language Modeling: Grammar-based LM, Statistical LM - Regular Expressions, Finite-State Automata – English Morphology, Transducers for lexicon and rules, Tokenization, Detecting and Correcting Spelling Errors, Minimum Edit Distance

UNIT II WORD LEVEL ANALYSIS 9

Unsmoothed N-grams, Evaluating N-grams, Smoothing, Interpolation and Backoff – Word Classes, Part-of-Speech Tagging, Rule-based, Stochastic and Transformation-based tagging, Issues in PoS tagging – Hidden Markov and Maximum Entropy models.

UNIT III SYNTACTIC ANALYSIS 9

Context-Free Grammars, Grammar rules for English, Treebanks, Normal Forms for grammar – Dependency Grammar – Syntactic Parsing, Ambiguity, Dynamic Programming parsing – Shallow parsing – Probabilistic CFG, Probabilistic CYK, Probabilistic Lexicalized CFGs - Feature structures, Unification of feature structures.


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U19ITPE023**SPEECH PROCESSING**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

The course aims to provide the students

- To understand the fundamentals of the speech processing
- Explore the various speech models
- Gather knowledge about the phonetics and pronunciation processing
- Perform wavelet analysis of speech
- To understand the concepts of speech recognition.
- To Understanding of the challenges and limitations of speech processing, including noise, variability, and accent, and the ability to design and implement techniques to address these challenges.

Course Articulation Matrix : 3- High, 2- Medium, 3- Low															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1									3	3	2	2			1
CO2									3	3	2	2			1
CO3									3	3	2	2			1
CO4									3	3	2	2			1
CO5									3	3	2	2			1
CO6									3	3	2	2			1

UNIT I**INTRODUCTION****9**

Introduction - knowledge in speech and language processing - ambiguity - models and algorithms - language - thought - understanding - regular expression and automata - words & transducers – N grams

UNIT II**SPEECH MODELLING****9**

Word classes and part of speech tagging – hidden markov model – computing likelihood: the forward algorithm – training hidden markov model – maximum entropy model – transformation- based tagging – evaluation and error analysis – issues in part of speech tagging – noisy channel model for spelling

UNIT III**SPEECH PRONUNCIATION AND SIGNAL PROCESSING****9**

Phonetics - speech sounds and phonetic transcription - articulatory phonetics - phonological categories and pronunciation variation - acoustic phonetics and signals - phonetic resources - articulatory and gestural phonology

UNIT IV**USER DEFINED DATATYPES****9**

Speech synthesis - text normalization - phonetic analysis - prosodic analysis – diphone waveform synthesis - unit selection waveform synthesis – evaluation


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UNIT V**SPEECH RECOGNITION****9**

Automatic speech recognition - architecture - applying hidden markov model - feature extraction: mfcc vectors - computing acoustic likelihoods - search and decoding - embedded training - multipass decoding: n-best lists and lattices- a* (‘_stack’) decoding - context-dependent acoustic models: triphones - discriminative training - speech recognition by humans

Total: 45 Hours**COURSE OUTCOMES**

At the end of the course students should be able to

- CO1:** Create new algorithms with speech processing
CO2: Derive new speech models
CO3: Perform various language phonetic analysis
CO4: Create a new speech identification system
CO5: Generate a new speech recognition system
CO6: Understanding of the challenges and limitations of speech processing, including noise, variability, and accent, and the ability to design and implement techniques to address these challenges.

TEXT BOOKS:

- T1:** Daniel Jurafsky and James H. Martin, — Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition||, Person education,2013

REFERENCE BOOKS:

- R1:** Kai-Fu Lee, —Automatic Speech Recognition||, The Springer International Series in Engineering and Computer Science, 1999.
R2: Himanshu Chaurasiya, —Soft Computing Implementation of Automatic Speech Recognition||, LAP Lambert Academic Publishing, 2010.
R3: Claudio Becchetti, Klucio Prina Ricotti, —Speech Recognition: Theory and C++ implementation||,Wiley publications 2008.
R4: Ikrami Eldirawy , Wesam Ashour, —Visual Speech Recognition||, Wiley publications , 2011

OPEN ELECTIVE I

B.TECH AGRICULTURAL ENGINEERING

U19AEOE001 AGRICULTURAL WASTE MANAGEMENT

L T P C
3 0 0 3

COURSE OBJECTIVES

- ☐ To impart knowledge to students on various methods of agricultural waste management foreco-friendly energy and manure production.

PREREQUISITES: NIL

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	1											
CO2	3	2	2											
CO3	2	1	1											
CO4	2	1	1											
CO5	2	1	1											
CO6	2	1	1											

UNIT I INTRODUCTION 10

Availability of different types of agriculture wastes - its overall characteristics – classification of agro wastes based on their characteristics- its recycling and utilization potential- current constraints in collection and handling of agricultural wastes – its environmental impact.

UNIT II COMPOSTING 8

Definition- Solid waste suitable for composting – Methods of composting - vermicomposting - Mineralization process in composting - Biochemistry of composting – Factors involved – Infrastructure required – maturity parameters – value addition – application method

UNIT III BIOMASS BRIQUETTING 9

Definition – potential agro residues and their characteristics for briquetting – fundamental aspects and technologies involved in briquetting – economic analysis of briquetting – setting up of briquetting plant- appliances for biomass briquettes.

UNIT IV BIOCHAR PRODUCTION 9

Definition - characteristics of agro wastes suitable for Biochar production – Methods of Biochar production – fast and slow pyrolysis – characteristics of Biochar – role of Biochar in soil nutrition and carbon sequestration

UNIT V**BIOGAS AND BIO ETHANOL PRODUCTION****9**

Screening of suitable ligno cellulosic substrate for biogas production -determination of bio-energy potential of agro-waste by estimating total solids - volatile solids - Calorific value- per cent total carbohydrates, moisture, lignin and cellulosic contents – preparation of feed stocks for anaerobic bio- digestion – types of digesters – factors affecting - nutrient value and utilization of biogas slurry. Ethanol production from ligno cellulosic wastes - Processing of Biomass to Ethanol –pre- treatment-fermentation-distillation

Total: 45 HOURS**COURSE OUTCOMES**

At the end of the course students should be able to

- CO1** Build various eco-friendly methods for agricultural waste management
 - To develop the process of composting of different types of solid wastes
- CO2**
- CO3** To understand the techniques of briquetting from agro-residues
- CO4** To understand the role of biochar in soil nutrition and carbon sequestration
- CO5** Nutritive value and energy production potential of agro wastes
- CO6** To develop and understand the techniques for processing of ethanol and biogas production

TEXT BOOKS:

- T1:** Rai G.D, Non conventional sources of Energy, Khanna publishers, New Delhi, 1995.
- T2:** Diaz, I.F., M. de Bertoldi and W. Bidlingmaier. 2007. Compost science and technology, Elsevier pub., PP.1-380.

REFERENCE BOOKS:

- R1:** P.D. Grover & S.K. Mishra, "Biomass Briquetting: Technology and Practices". Published by FAO Regional Wood Energy Development Programme in Asia, Bangkok, Thailand, 1996.
- R2:** Magdalena Muradin and Zenon Foltynowicz, "Potential for Producing Biogas from Agricultural Waste in Rural Plants in Poland". Sustainability, 2014, 6, 5065-5074.
- R3:** Biochar production from agricultural wastes via low-temperature microwave carbonization

U19AEOE002

FARM MANAGEMENT

L T P C
3 0 0 3

COURSE OBJECTIVES

- To impart the fundamental knowledge and basic concepts of Economics and Farm Management
- To understand the types of resources and Investment analysis in agriculture sector
- To understand the Farm financial analysis, Investment and Budgeting for farms.
- To expose the students to different extension methods for communication to take the work from lab to field
- To plan the financial aspects, economics related to farm management in a cost effective manner.

PREREQUISITES: NIL

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3													
CO2	3													
CO3	3	2	2	2										
CO4	3	2	2	2										
CO5	3	3	2	2										1
CO6	2	3	2	1										1

UNIT I FARM MANAGEMENT & PLANNING 10

Farm Management – definition – scope- Classification of farms – Basic concepts in farm management -Relationship between farm management and other basic sciences - Farm layout – Farm records and accounts– Farm appraisal techniques – Valuation - Farm management- need and analysis –Elements of farm planning– Whole farm planning and partial planning – Farm level management system – Farm budgeting – whole farm budgeting and partial budgeting – Estimation of credit - examples of farm planning and budgeting

UNIT II LAWS OF ECONOMICS 8

Agricultural Economics – definition and scope – Basic laws of economics – demand and supply concepts –law of increasing, diminishing and constant returns – Equi-marginal returns - Product relationship –Production function – definition and types – Production function curves – Optimum level of input use –Economies of scale external and internal economies and diseconomies - Cost concepts – types – Opportunity cost – comparison of costs – Factor relationship – concepts.

UNIT III COST CURVES 10

Principle of substitution – isoquant, isocline, expansion path, ridge line and least cost combination of inputs-Product-product relationship – Production possibility curve, isorevenue line and optimum combination of outputs – Cost curves –Optimum input and output levels –Factor &relationship – Least cost combination of inputs – Estimation of cost

B.E BIOMEDICAL ENGINEERING

U19BMOE00

BIO HEALTHCARE AND TELEMEDICINE

L	T	P	C
3	0	0	3

1

Course Objective

The student should be made:

- To enable the students to acquire knowledge about the principles and application of telemedicine in biomedical industry

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3	1									2	2
CO2	2	2	3	1									2	2
CO3	2	2	3	1									2	2
CO4	2	2	3	1									2	2
CO5	3	2	3	1									3	2
CO6	2	2	3	1									2	2

UNIT I

BACKGROUND OF TELEMEDICINE

9

Introduction ,definitions of telemedicine, telehealth and telecare, Origins and development of telemedicine: from beginning to modern times, modern telemedicine and telecare Drivers of telemedicine and telecare: technology drivers, non technological drivers, the funding dilemma Telemedicine in developed and underdeveloped countries ,benefits and limitations of telemedicine Types of information and transmission in telemedicine: audio, video, still images, text and data, Fax

UNIT II

COMMUNICATION AND NETWORK SYSTEMS IN TELEMEDICINE

9

Types of communication and network: public switched telephone network, plain old telephone service, integrated services digital network, internet, asynchronous transfer mode Wireless communications basics and its types Wireless sensor standards and homecare concerns, medical sensors for mobile communication devices Development of disposable adhesive wearable human monitoring system Implantable systems: implantable system architecture Signal Processing in implantable neural recording microsystems, electronic health signal processing

UNIT III

TECHNOLOGIES FOR SAFEGUARDING MEDICAL DATA AND PRIVACY

9

Data Exchanges: Network configuration, circuit and packet switching, H.320 series Data security and standards: Encryption, cryptography, mechanisms of encryption, phases of encryption Cryptography, safeguarding patient medical history Anonymous data collection and processing, biometric security and identification

UNIT IV

TELEHEALTH AND MOBILE HEALTH

9

Medical robotics: surgical robots, rehabilitation robots Modern devices for tele-surgery: Main component and functionalities of a robotics tele-surgery System, design guidelines and methodology Microsurgery Systems: Robot-assisted microsurgery system, miniaturization, microsurgical tools, visualization methods and systems Image-guided microsurgery: Image guidance component and workflow, image guidance by surgical domain

UNIT V IMPLEMENTATION OF TELEMEDICINE AND FUTURE TRENDS IN TECHNOLOGY 9

Telecardiology: Tools and devices Teleradiology and Tele-audiology Telepathology system development and implementation Acute care telemedicine and monitoring for elderly care Virtual doctor systems for medical practices, wireless electrical impedance tomography Synthetic biometrics in biomedical systems, bio-kinematics for mobility

Total:45 HOURS

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Explain the development and transmission techniques used in telemedicine
- CO2:** Describe the types of communication and network systems
- CO3:** Explain the technologies used in data exchange and privacy of telemedicine
- CO4:** Illustrate the current system of tele-health and mobile health
- CO5:** Describe the currents and futures perspective of telemedicine
- CO6:** Acquire knowledge about the principles and application of telemedicine

TEXTBOOKS:

- T1** Bernard Fong, A.C.M. Fong, C.K. Li, -Telemedicine Technologies: Information Technologies in Medicine and Telehealth||, Wiley, 1st edition,2010.
- T2** Halit Eren, John G. Webster, —The E-Medicine, E-Health, M-Health, Telemedicine, and Telehealth Handbook||, CRC Press, 1st edition, 2015.
- T3** Olga Ferrer-Roca, M. Sosa Ludicissa, —Handbook of Telemedicine||, IOS press, 1st edition, 2002.

REFERENCE BOOKS:

- R1** Georgi Grashew, Stefan Rakowsky, —Telemedicine Techniques and Applications, Itech, 1st edition, 2011
- R2** A.C. Norris, —Essentials of Telemedicine and Telecare, John Wiley & Sons, 1st edition, 2002.
- R3** Richard W. Carlson, -Telemedicine in the ICU, An Issue of Critical Care Clinics, (The Clinics: Internal Medicine)||, Elsevier, 1st edition, 2015.

U19BMOE002

EMBEDDED SYSTEMS IN MEDICAL DEVICES

L T P C
3 0 0 3

Course Objective

The student should be made:

- Understand the design of embedded system for various medical devices.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2	2	2					2	2	3	3
CO2	2	2	2	2	2	2					2	2	3	3
CO3	3	3	2	3	2	1					2	2	2	2
CO4	3	3	3	2	2	2					2	2	2	2
CO5	2	2	2	3	2	1					2	2	2	2
CO6	2	2	2	2	2	1					2	2	2	2

UNIT I EMBEDDED DESIGN WITH MICROCONTROLLERS 9

Product specification – hardware / software partitioning- Detailed hardware and software design – integration,product testing- Microprocessor Vsmicro controller- Performance tools, bench marking processors- RTOS micro controller -issues in selection of processors.

UNIT II PARTITIONING DECISION 9

Hardware / software duality- Hardware-software portioning, coding for hardware/software development, ASIC revolution- Managing the risk,co-verification, execution environment- Memory organization of controller, memory enhancement- Firmware, speed and code density, system startup.

UNIT III FUNCTIONALITIES FOR SYSTEM DESIGN 9

Timers, watch dog timers- RAM, flash memory, basic toolset, integration of hardware & firmware- Application programming, IDE, target configuration- Hostbaseddebugginganalyser- Remote debugging, ROM emulators, logic

UNIT IV DESIGN OF PATIENT MONITORING DEVICES 9

Design consideration of patient monitoring systems- Basic block diagram of pulse oximeter, design requirementof device- Circuit implementation of interfacing of oximeter sensors with microcontroller- Software coding and implementation.

UNIT V DESIGNING OF PACEMAKER 9

System description of pacemaker- Design requirement and basic block diagram of pacemaker- Interfacing of pacemaker elements with processors- Software coding of pacemaker and implementation.

Total:45 HOURS

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Attain knowledge on the basic concepts and the building blocks for embeddedsystem

- CO2:** Understand the hardware and software partitioning in embedded systems
- CO3:** Gain knowledge about timers and memory organization of embedded systems
- CO4:** Design a pulse oximeter using embedded tool
- CO5:** Design a pacemaker using embedded tool
- CO6:** Understand the design of embedded system for various medical devices

TEXTBOOKS:

- T1** James K. Peckol, —Embedded system Design||, John Wiley & Sons, 1st edition, 2010

REFERENCEBOOKS:

- R1** Geo Elicia White, —Making Embedded Systems||, O'Reilly Series, SPD, 1st edition, 2011.
Georgi Graschew Stefan Rakowsky, —Telemedicine Techniques and Applications, In Tech, 1st edition, 2011
- R2** G. Baura, "A Biosystems Approach to Industrial Patient Monitoring and Diagnostic Devices||, Morgan & Claypool, IEEE, 2008.

B.TECH BIOTECHNOLOGY

U19BTOE001

BASICS OF BIOINFORMATICS

L T P C
3 0 0 3

Course Objectives

To enable the students

- To improve the programming skills of the student
- To let the students know the recent evolution in biological science

Course Outcomes

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

CO1. Use bioinformatics tools with programming skills.

CO2. Apply computational based solutions for biological perspective

CO3. Alignment of nucleotide and protein sequences

CO4. Predict gene and protein structure.

CO5. Construct, interpret and assess the different molecular phylogenetic tree prediction and gene prediction algorithms

CO6. understand the Application of Bioinformatics

Course Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1		1				2							1	
2			3		2	3							1	
3			2		3	3							2	
4		3	2			2							2	
5			2		2	3							1	
6	1				1								1	

3 - High, 2 - Medium, 1 – Low

UNIT I

DATABASES

9

Introduction to Bioinformatics-Biological information resources-Genome sequence acquisition and analysis-Retrieval of biological data-Data acquisition, databases, structure and annotation-Data mining and data characteristics.

UNIT II

SEQUENCE ALIGNMENT AND DATABASE SEARCHES

9

Database searches and Sequence Alignment-Pair wise and multiple sequence alignment-Methods of local and global alignment-Dynamic programming, Scoring matrix, PAM, searching sequence databases by sequence similarity-BLAST and FASTA.

UNIT III

PHYLOGENY ANALYSIS

9

Phylogenetics, Molecular Phylogeny and evolutionary analysis-ClustalW, MSA, Dendrogram- Maximum likelihood, Maximum Parsimony, convergent and parallel evolution, Bootstrapping, Jackknifing-Phylograms.

UNIT IV **STRUCTURAL BIOINFORMATICS** **9**

Structural bioinformatics, analysis for protein structure, Predicting protein structure and function from Sequence-Homology modeling-Microarray Data analysis- proteomic data analysis- Visualization of molecular structures.

UNIT V **APPLICATIONS OF BIOINFORMATICS** **9**

Scope of bioinformatics-Bioinformatics in the Pharmaceutical Industry- Structure-Based Rational Drug Design and discovery-Chemi-informatics in Biology.

TOTAL: 45 HOURS

TEXT BOOKS:

1. Attwood, T. and P.S. David. 2006. Introduction to Bioinformatics. Pearson Education Ltd., New York.
2. Axevanis, A.D., and Ouellette, B.F.F. (eds) 2006. Bioinformatics A Practical Guide to Analysis of Genes and Proteins. 3rd Edition, John Wiley and Sons, New York.

Course Objectives

To enable the students

- This course will be focussed on achievement, acquisition of knowledge and enhancement of comprehension of information regarding bioenergy and biofuel technologies and their sustainable applications..

Course Outcomes

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

- CO1. Understand in depth of the bioenergy and biofuels.
 CO2. Distinguish various forms of bioenergy and biofuels production
 CO3. Analyse concepts related to and advantages of bioenergy.
 CO4. Develop novel products from biofuels.
 CO5. Understand the environmental sustainability.
 CO6. Understand the yield and efficiency of Biofuels

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	3	3										2	
2	3	2												
3	3	3	3	2	2	2		1	3					2
4	3	1	1			1		1						1
5	3	3	2	1	2			1						1
6	3	3	2	1	2			1						1

UNIT I**BASIC CONCEPTS OF BIO-FUELS****9**

Biopower, Bioheat, Biofuels, advanced liquid fuels, drop-in fuels, biobased products

UNIT II**FEEDSTOCKS****9**

Harvested Feedstocks: First generation biofuels, Second generation biofuels, third generation biofuels. Residue Feedstocks: Agricultural wastes, forestry wastes, farm waste, organic components of residential, commercial, institutional and industrial waste.

UNIT III**CONSERVATION TECHNOLOGIES****9**

Biorefinery concept – biorefineries and end products, Biochemical conversion – hydrolysis, enzyme and acid hydrolysis, fermentation, anaerobic digestion and trans-esterification, Thermochemical conversion – Combustion, Gasification, Pyrolysis, other thermochemical conversion technologies. Scaling up of emerging technologies.

UNIT IV**BIOMETHANE AND BIOHYDROGEN****9**

Biomethanol – Principles, materials and feedstocks, Process technologies and techniques, Advantages and limitations – Biological hydrogen production methods, Fermentative hydrogen production, Hydrogen economy – Advantages and limitations

UNIT V

SUSTAINABILITY AND RESILIENCE

9

Environmental Sustainability, bioenergy sustainability, emissions of biomass to power generation applications, emissions from biofuels. ILUC issues, Carbon footprint, Advanced low carbon fuels

TOTAL: 45 HOURS

TEXT BOOKS:

1. Biorenewable Resources – Engineering new products. Robert C Brown. Blackwell Publishing Professional, 2003.
2. Biomass for Renewable Energy, Fuels and Chemicals. Donald Klass. Academic press. 1999
3. Introduction to Bioenergy. Vaughn C. Nelson and Kenneth L. Starcher

B.E CIVIL ENGINEERING

U19CEO001

GREEN BUILDINGS

L T P C
3 0 0 3

Course Objectives:

This course aims to provide the students,

- ☐ About the importance and necessity of green buildings.
- ☐ Asses the boiling based in LEED Rating systems.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1		2	1	3		3					2	1	
CO2	2	1	3	2	1	2	3					1	1	
CO3	2	2	2	3	1	1	3					3	1	
CO4			1				3					2	2	
CO5	2		1	2	1		3					3	2	
CO6	3	2	1	2		1	3					1	1	

UNIT I INTRODUCTION 9

Green Building - Need for Green Building - Benefits of Green Buildings - Green Building Materials and Equipment in India - Key Requisites for Constructing a Green Building - Important Sustainable featuresfor Green Building.

UNIT II GREEN BUILDING CONCEPTS AND PRACTISES 9

Indian Green Building Council - Green Building Moment in India - Benefits Experienced in Green Buildings - Launch of Green Building Rating Systems - Residential Sector - Market Transformation. Green Building Opportunities And Benefits: Opportunities of Green Building - Green Building Features,Material and Resources - Water Efficiency - Optimum Energy Efficiency - Typical Energy Saving Approach in Buildings - LEED India Rating System and Energy Efficiency.

UNIT III GREEN BUILDING DESIGN 9

Introduction - Reduction in Energy Demand - Onsite Sources and Sinks - Maximise System Efficiency- Steps to Reduce Energy Demand and Use Onsite Sources and Sinks - Use of Renewable EnergySources. Eco-friendly captive power generation for factory - Building requirement.

UNIT IV UTILITY OF SOLAR ENERGY IN BUILDINGS 9

Utility of Solar energy in buildings concepts of Solar Passive Cooling and Heating of Buildings – Low Energy Cooling. Case studies of Solar Passive Cooled and Heated Buildings.

UNIT V GREEN COMPOSITES FOR BUILDINGS 9

Concepts of Green Composites - Water Utilisation in Buildings - Low Energy Approaches to Water Management, Management of Solid Wastes, Management of Sullage Water and Sewage, Urban Environment and Green Buildings, Green Cover and Built Environment.

Total: 45 Hours

Course Outcomes:

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

- CO1 :** Know about the importance and necessity of green buildings.
- CO2 :** Understand the principles of green building certifications (LEED) and low-energy building strategies.
- CO3 :** Understand the concepts and principles in Green Building Design..
- CO4 :** Suggest materials and technologies to improve energy efficiency of building.
- CO5 :** Gain ideas various green composites used in building and sustainable development.
- CO6 :** Have an Insight about criteria for rating systems along with established Indian codes and guideline.

Textbooks

- T1.** K.S.Jagadish, B. U. Venkataramareddy and K. S. Nanjundarao. "Alternative Building Materials and Technologies". New Age International, 2007.
- T2.** Low Energy Cooling for Sustainable Buildings. John Wiley and Sons Ltd, 2009.
- T3.** Sustainable Building Design Manual. Vol 1 and 2, Teri, New Delhi, 2004.

Reference Books

- R1.** Osman Attmann, "Green Architecture Advanced Technologies and Materials". McGraw Hill, 2010.
- R2.** Jerry Yudelson, "Green building Through Integrated Design". McGraw Hill, 2009.
- R3.** Fundamentals of Integrated Design for Sustainable Building By Marian Keeler, Bill Burke.

UNIT IV **DISASTER RISK MANAGEMENT IN INDIA** **9**

Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy - Other related policies, plans, programmes and legislation – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

UNIT V **DISASTERS, ENVIRONMENT AND DEVELOPMENT** **9**

Factors affecting vulnerability such as impact of developmental projects and environmental modifications (including of dams, land use changes, urbanization etc.), sustainable and environmentally friendly recovery; reconstruction and development methods.

Total: 45 Hours

Course Outcomes:

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

- CO1:** Explain the hierarchical structure in solid waste management and a requirement for an integrated solution.
- CO2:** Define and characterize solid and hazardous wastes from technical and regulatory points of view.
- CO3:** Make route optimization for a solid waste collection and transport system.
- CO4:** Understand the methods of handling, sampling and storage of solid and hazardous waste.
- CO5:** Select the appropriate method for solid waste processing technologies.
- CO6:** Describe disposal methods of solid and hazardous solid waste.

Textbooks:

- T1.** Singhal J.P. "Disaster Management", Laxmi Publications, 2010.
- T2.** Singh B.K., 2008, Handbook of Disaster Management: Techniques & Guidelines, Rajat Publication.
- T3.** Pradeep Sahni, 2004, Disaster Risk Reduction in South Asia, Prentice Hall.

Reference Books:

- R1.** Govt. of India: Disaster Management Act, Government of India, New Delhi, 2005.
- R2.** Disaster Medical Systems Guidelines. Emergency Medical Services Authority, State of California, EMSA no.214, June 2003.
- R3.** Government of India, National Disaster Management Policy, 2009.

B.E COMPUTER SCIENCE ENGINEERING

U19CSOE001 SOFTWARE ENGINEERING

L T P C
3 0 0 3

COURSE OBJECTIVES

To understand the phases in a software project

- To understand fundamental concepts of requirements engineering and Analysis Modeling.
- To understand the various software design methodologies
- To learn various testing and maintenance measures•

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	1											2
CO2	2	1	1											2
CO3	3	2	2											2
CO4	3	2	2											2
CO5	3	2	2											2
CO6	3	2	2											2

UNIT I SOFTWARE PROCESS AND AGILE DEVELOPMENT 9

Introduction to Software Engineering, Software Process, Perspective and Specialized Process Models –Introduction to Agility-Agile process-Extreme programming-XP Process.

UNIT II REQUIREMENTS ANALYSIS AND SPECIFICATION 9

Software Requirements: Functional and Non-Functional, User requirements, System requirements, Software Requirements Document – Requirement Engineering Process: Feasibility Studies, Requirements elicitation and analysis, requirements validation, requirements management Classical analysis: Structured system Analysis, Petri Nets- Data Dictionary.

UNIT III SOFTWARE DESIGN 9

Design process – Design Concepts-Design Model– Design Heuristic – Architectural Design - Architectural styles, Architectural Design, Architectural Mapping using Data Flow- User Interface Design: Interface analysis, Interface Design –Component level Design: Designing Class based components, traditional Components..

UNIT IV**TESTING AND MAINTENANCE****9**

Software testing fundamentals-Internal and external views of Testing-white box testing - basis path testing-control structure testing-black box testing- Regression Testing – Unit Testing – Integration Testing – Validation Testing – System Testing And Debugging – Software Implementation Techniques: Coding practices-Refactoring-Maintenance and Reengineering-BPR model-Reengineering process model-Reverse and Forward Engineering..

UNIT V**PROJECT MANAGEMENT****9**

Software Project Management: Estimation – LOC, FP Based Estimation, Make/Buy Decision COCOMO I & II Model – Project Scheduling – Scheduling, Earned Value Analysis Planning – Project Plan, Planning Process, RFP Risk Management – Identification, Projection - Risk Management-Risk Identification-RMMM Plan-CASE TOOLS

Total: 45 HOURS**COURSE OUTCOMES**

At the end of the course students should be able to

- CO1** Identify the key activities in managing a software project and recognize different process model
Explain the concepts of requirements engineering and Analysis Modeling.
- CO2**
- CO3** Outline the systematic procedures for software design and deployment
- CO4** Compare various testing and maintenance methods
- CO5** Interpret the project schedule, estimate project cost and effort required.
- CO6** Develop a software using the software engineering principles

TEXT BOOKS:

- T1:** Roger S. Pressman, “Software Engineering – A Practitioner’s Approach”, Seventh Edition, Mc Graw-Hill International Edition, 2010..
- T2:** Ian Sommerville, “Software Engineering”, 9th Edition, Pearson Education Asia, 2011.

REFERENCE BOOKS:

- R1:** Rajib Mall, “Fundamentals of Software Engineering”, Third Edition, PHI Learning Private Limited, 2009
- R2:** Pankaj Jalote, “Software Engineering, A Precise Approach”, Wiley India, 2010.
- R3:** Kelkar S.A., “Software Engineering”, Prentice Hall of India Pvt Ltd, 2007.
- R4:** Stephen R.Schach, “Software Engineering”, Tata McGraw-Hill Publishing Company Limited,2007.

COURSE OBJECTIVES

- To learn the fundamentals of data models and to represent a database system using ER diagrams.
- To study SQL and relational database design.
- To understand the internal storage structures using different file and indexing techniques which will help in physical DB design.
- To understand the fundamental concepts of transaction processing-concurrency control techniques and recovery procedures.
- To have an introductory knowledge about the Storage and Query processing Techniques

PREREQUISITES: NIL

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	1											2
CO2	3	2	2											3
CO3	2	1	1											2
CO4	2	1	1											2
CO5	2	1	1											3
CO6	2	1	1											2

UNIT I RELATIONAL DATABASES 10

Purpose of Database System – Views of data – Data Models – Database System Architecture – Introduction to relational databases – Relational Model – Keys – Relational Algebra – SQL fundamentals – Advanced SQL features – Embedded SQL– Dynamic SQL

UNIT II DATABASE DESIGN 8

Entity-Relationship model – E-R Diagrams – Enhanced-ER Model – ER-to-Relational Mapping – Functional Dependencies – Non-loss Decomposition – First, Second, Third Normal Forms, Dependency Preservation – Boyce/Codd Normal Form – Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form

UNIT III TRANSACTIONS 9

Transaction Concepts – ACID Properties – Schedules – Serializability – Concurrency Control – Need for Concurrency – Locking Protocols – Two Phase Locking – Deadlock

Transaction Recovery - Save Points – Isolation Levels – SQL Facilities for Concurrency and Recovery

UNIT IV TESTING AND MAINTENANCE 9

RAID – File Organization – Organization of Records in Files – Indexing and Hashing – Ordered Indices – B+ tree Index Files – B tree Index Files – Static Hashing – Dynamic Hashing – Query Processing Overview – Algorithms for SELECT and JOIN operations – Query optimization using Heuristics and Cost Estimation.

UNIT V PROJECT MANAGEMENT 9

Distributed Databases: Architecture, Data Storage, Transaction Processing – Object-based Databases: Object Database Concepts, Object-Relational features, ODMG Object Model, ODL, OQL - XML Databases: XML Hierarchical Model, DTD, XML Schema, XQuery – Information Retrieval: IR Concepts, Retrieval Models, Queries in IR systems.

Total: 45 HOURS

COURSE OUTCOMES

At the end of the course students should be able to

- CO1** Discuss the fundamental concepts of relational database and SQL
Use ER model for Relational model mapping to perform database design effectively
- CO2**
- CO3** Summarize the properties of transactions and concurrency control mechanisms
- CO4** Outline the various storage and optimization techniques
- CO5** Compare and contrast various indexing strategies in different database systems
- CO6** Explain the different advanced databases

TEXT BOOKS:

- T1:** Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, Sixth Edition, Tata McGraw Hill, 2011.
- T2:** Ramez Elmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, Sixth Edition, Pearson Education, 2011.

REFERENCE BOOKS:

- R1:** C.J.Date, A.Kannan, S.Swamynathan, “An Introduction to Database Systems”, Eighth Edition, Pearson Education, 2006.
- R2:** Raghu Ramakrishnan, —Database Management Systems||, Fourth Edition, McGraw-Hill College Publications, 2015.
- R3:** G.K.Gupta, "Database Management Systems", Tata McGraw Hill, 2011.

B.E ELECTRONICS AND COMMUNICATION ENGINEERING

U19ECO001

SOFT COMPUTING

L T P C
3 0 0 3

COURSE OBJECTIVES

- To learn the basic concepts of Soft Computing
- To become familiar with various techniques like neural networks, genetic algorithms and fuzzy systems.
- To apply soft computing techniques to solve problems.

PREREQUISITES

- Basic concepts of communication theory
- Basics of Computer Networks
- Basics of Biological systems
- Linear Algebra

Course Articulation Matrix : 3- High, 2- Medium, 3- Low														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2							2	1		2
CO2	3	2	2	2							2	1		2
CO3	3	2	2	2							2	1		1
CO4	3	2	2	2							2	1		1
CO5	3	2	2	2							2	1		1
CO6	3	2	2	2							2	1		1

UNIT I INTRODUCTION TO SOFT COMPUTING 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 ARTIFICIAL NEURAL NETWORKS 9

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 III FUZZY SYSTEMS 9

Introduction to Fuzzy Logic, Classical Sets and Fuzzy Sets - Classical Relations and Fuzzy Relations -Membership Functions -Defuzzification - Fuzzy Arithmetic and Fuzzy Measures - Fuzzy Rule Base and Approximate Reasoning - Introduction to Fuzzy Decision Making.

UNIT IV GENETIC ALGORITHMS 9

Basic Concepts- Working Principles -Encoding- Fitness Function - Reproduction - Inheritance Operators - Cross Over - Inversion and Deletion -Mutation Operator - Bit-wise Operators -Convergence of Genetic Algorithm.

UNIT V HYBRID SYSTEMS 9

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 ArtMap: A Brief Introduction - Soft Computing Tools - GA in Fuzzy Logic Controller Design - Fuzzy Logic Controller

Total: 45 HOURS

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Apply suitable neural computing techniques for various applications.
Explain various ANN models
- CO2:**
- CO3:** Apply fuzzy concepts for various applications
- CO4:** Apply genetic algorithms to solve problems
- CO5:** Integrate various soft computing techniques for complex problems.

TEXT BOOKS:

- T1:** N.P.Padhy, S.P.Simon, "Soft Computing with MATLAB Programming", Oxford University Press, 2015.
- T2:** S.N.Sivanandam, S.N.Deepa, "Principles of Soft Computing", Wiley India Pvt.Ltd., 2nd Edition, 2011.
- T3:** S.Rajasekaran, G.A.Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithm, Synthesis and Applications ", PHI Learning Pvt.Ltd., 2017.

REFERENCE BOOKS:

- R1:** Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, —Neuro-Fuzzy and Soft Computing||, Prentice-Hall of India, 2002.
- R2:** Kwang H.Lee, —First course on Fuzzy Theory and Applications||, Springer, 2005.
- R3:** George J. Klir and Bo Yuan, —Fuzzy Sets and Fuzzy Logic-Theory and Applications||, Prentice Hall, 1996.

COURSE OBJECTIVES

- To gain knowledge about the various physiological parameters both electrical and non electrical and the methods of recording and also the method of transmitting these parameters
- To study about the various assist devices used in the hospitals
- To gain knowledge about equipment used for physical medicine and the various recently developed diagnostic and therapeutic techniques

PREREQUISITES

- Basic Electronics
- Electronic devices

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2							2	1	2	
CO2	3	2	2	2							2	1	2	
CO3	3	2	2	2							2	1	2	
CO4	3	2	2	2							2	1	2	
CO5	3	2	2	2							2	1	2	
CO6	3	2	2	2							2	1	3	

UNIT I ELECTRO-PHYSIOLOGY AND BIO-POTENTIAL RECORDING 9

Sources of bio medical signals, Bio-potentials, Biopotential electrodes, biological amplifiers, ECG, EEG, EMG, PCG, typical waveforms and signal characteristics

UNIT II NON ELECTRICAL PARAMETER MEASUREMENTS 9

Blood flow meter-Types, Cardiac output measurements-Types, respiratory measurement, blood pressure measurement, temperature and pulse measurement, Blood Cell Counters

UNIT III THERAPEUTIC EQUIPMENTS 9

Cardiac pacemakers - types, Cardiac defibrillators-types, Dialyzers, Heart Lung Machines – Oxygenations, Diathermies- Shortwave, ultrasonic and microwave type and their applications, Surgical Diathermy

UNIT IV MEDICAL IMAGING 9

X-Ray machine, computer axial tomography- CT scans, Positron Emission Tomography- PET Scans. MRI and NMR Ultrasonic Imaging systems, Medical Thermograph

UNIT V RECENT TRENDS IN MEDICAL INSTRUMENTATION AND 9
APPLICATION IN MEDICINE

Bio medical telemetry- remote patient monitoring systems, Telemedicine, Radio pill, Application of cryogenics in medicine, Application of LASERS in medicines. Diagnosis of Cancers and tumors using image processing, diagnosis of dental plague using image processing, diagnosis of various eye problems using image processing

Total: 45 HOURS

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Know the human body electro- physiological parameters and recording of bio-potentials
- CO2:** Comprehend the non-electrical physiological parameters and their measurement – body temperature, blood pressure, pulse, blood cell count, blood flow meter etc.
- CO3:** Interpret the various assist devices used in the hospitals viz. pacemakers, defibrillators, dialyzers and ventilators
- CO4:** Comprehend physical medicine methods eg. ultrasonic, shortwave, microwave surgical diathermies , and bio-telemetry principles and methods
- CO5:** Know about recent trends in medical instrumentation

TEXT BOOKS:

- T1:** Lie Cromwell, Biomedical Instrumentation and Measurement]], Prentice Hall of India, New Delhi, 2007. (UNIT I – V)
- T2:** Chandpur, R.S., -Handbook of Biomedical Instrumentation]], TATA McGraw-Hill, New Delhi, 2003.(UNIT I – V)

REFERENCE BOOKS:

- R1:** Dhake .A.M, “ Television and Video Engineering”, Mc graw Hill, New Delhi, India, 2006
- R2:** Modern television practice: Transmission, reception and applications, New age International, New Delhi, 2015

B.E ELECTRICAL AND ELECTRONICS ENGINEERING

U19EEOE002

INTRODUCTION TO CONTROL SYSTEMS

L T P C
3 0 0 3

COURSE OBJECTIVES

1. To understand the concepts of control systems-open loop and closed loop control systems.
2. To understand the (mathematical modelling) Transfer function from mechanical, electrical, block diagram and signal flow graph.
3. To learn the concepts of steady state and transient responses from first and second order systems at different inputs and also steady state errors.
4. To learn the stability concepts are Root locus, Bode plot and Polar plot
5. To learn the concept of state space analysis applying on multi-input/output state of the system to find the stability.

PREREQUISITES

- Basic concepts of circuit analysis
- Fundamentals of electrical engineering
- Basic concepts of Differentiation
- Basic concepts of Integration

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2	3			2			2			2	2	
CO2	1	2	3			2			2			2	2	
CO3	1	2	3			2			2			2	2	
CO4	1	2	3			2			2			2	2	
CO5	1	2	3			2			2			2	2	
CO6	1	2	3			2			2			2	3	

UNIT I

INTRODUCTION

9

Concepts of control systems-open loop and closed loop control systems and their differences-different examples of control systems-classification of control systems, feedback characteristics, effects of feedback. Mathematical models-differential equations, impulse response and transfer functions.

UNIT II

TRANSFER FUNCTION REPRESENTATION

9

Block diagram representation of systems considering electrical systems as examples-block diagram algebra-representation by signal flow graph-reduction using mason's gain formula.

UNIT III

TIME RESPONSE ANALYSIS

9

STABILITY AND FREQUENCY RESPONSE ANALYSIS

UNIT IV

The concept of stability-Routh's stability criterion- The root locus concept –construction of root loci effects of adding poles and zeros to $G(S) H(S)$ on the root loci - Frequency domain specifications bode diagrams- determination of frequency domain specifications and transfer function from the bode diagram-phase margin and gain margin-stability analysis from bode plots. Polar plots.

UNIT V STATE SPACE ANALYSIS 9

Concepts of state, state variables and state model, derivation of state models from block diagrams, diagonalization-solving the time invariant state equations-state transition matrix and its properties concepts of controllability and observability.

Total: 45 HOURS

COURSE OUTCOMES

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

Ability to find the Mathematical models-differential equations, impulse response and **CO1** transfer functions.

Ability to find the transfer function from mechanical, electrical, block diagram, signal flow **CO2** graph and electronic system

CO3 Describe the concept of steady state and transient response at different inputs

Apply the concepts of stability in s-domain and Routh criteria and the concepts of plotting **CO4** the response of a system on a graph

CO5 Design and implement any system using state space analysis

CO6 Ability to implement the real time applications of control systems

TEXT BOOKS:

T1: C. Kuo, Automatic Control Systems, 8th edition, John Wiley and sons, India, 2003

T2: J. Nagrath, M. Gopal, Control Systems Engineering, 2nd edition, New Age International (P) Limited, New Delhi.

REFERENCE BOOKS:

R1: Katsuhiko Ogata, Modern Control Engineering, 3rd edition, Prentice Hall of India Pvt. Ltd., India, 1998

R2: Norman S. Nice, Control Systems Engineering, 6th edition, John Wiley, India, 2015

R3: N. K. Sinha(1998), Control Systems, 3rd edition, New Age International (P) Limited Publishers, India.


Head of the Department
Information Technology
Sri Shakthi Inst. of Engg. & Tech.
Coimbatore - 641 014

COURSE OBJECTIVES

- To get exposure on renewable energy source.
- To know about the solar radiation and its environmental impact to power.
- To learn about the wind energy and its economic aspects.
- To know about geothermal energy with other energy sources.
- To get exposure on distributed generation in storage systems

PREREQUISITES

- Fundamentals of electrical engineering
- Basic concepts of Differentiation
- Basic concepts of Integration
- Fundamentals of Battery concepts

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3		2	2		1	3				2		2	
CO2	3		2	2		1	3				2		2	
CO3	3		2	2		1	3				2		2	
CO4	3		2	2		1	3				2		2	
CO5	3		2	2		1	3				2		2	
CO6	3		2	2		1	3				2		3	

UNIT I INTRODUCTION 9

Energy scenario: National and International – Energy resources and their availability – Conventional power generation plant (Thermal power plant) - Environmental aspects of fossil fuels – Necessity for renewable energy sources – Types of renewable energy source and its limitation.

UNIT II SOLAR PHOTOVOLTAIC SYSTEM 9

Introduction – Solar radiation and measurements – Basic principle of SPV conversion – Solar energy collectors – Solar energy storage: Solar pond – Types of solar PV cells – PV cell connections – Characteristics of PV module and its parameters - Application of solar energy: Solar pumping and solar cooking.

WIND ENERGY SYSTEM

UNIT III 9

Introduction – Wind energy conversion – Power produced from wind - Relationship between wind speed and power – Components of wind power plant (WPP) – Types of WPP – Selection of site for WPP – Advantages and challenges of WPP.

UNIT IV ENERGY FROM OTHER SOURCES 9

Geothermal energy (GTE): operation of GTE power plants - Types– Advantage of GTE- Tidal energy: Operation of tidal power plant – Ocean Thermal Energy Conversion system: Open and closed cycles - Fuel cell: Construction and working principle- Advantage and applications of Fuel cell.

UNIT V DISTRIBUTED GENERATION 9

Concept of DG – Benefits of DG – Types of DG resources – Security issues in integrating DG with power grid - Energy storage elements: Batteries, super-capacitors, flywheels - Captive power plants

Total: 45 HOURS

COURSE OUTCOMES

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

- CO.1:** Acquire knowledge on power demand scenario of world and the importance of renewable energy sources in meeting the power demand
- CO.2:** Understand the working principle of solar photovoltaic system and its applications
- CO.3:** Outline the various components and performance of wind energy conversion system
- CO.4:** Explain the operation of geothermal and tidal power plants, fuel cell and ocean thermal energy conversion scheme.
- CO.5:** Understand the necessity of distributed generation and energy storage elements.
- CO6:** Understand about the power generation through renewable energy sources

TEXT BOOKS:

- T1:** Rai, G.D., “Non-Conventional Energy Sources”, Khanna Publishers, Sixth Edition 2017
- T2:** Khan, B.H, Non-Conventional Energy Resources”, Mc. Graw Hill Education Ltd, third reprint 2017.

REFERENCE BOOKS:

- R1:** Rao S. Paruklekar,B.B, “Energy Technology –Non Conventional, Renewable and Conventional”, KhannaPublishers,1994
- R2:** John Twidell and Tony Weir, “Renewable Energy Resources”, Tylor and Francis Publications, Third edition, 2015.

R3: Mukund R.Patel, “Wind and Solar Power Systems”, CRC Press LLC..

Standard test signals-time response of first order systems- characteristic equation of feedback control systems, transient response of second order systems-time domain specifications-steady state response-steady state errors and error constants-effects of proportional derivative, proportional integral systems, PID controllers

UNIT IV STABILITY AND FREQUENCY RESPONSE ANALYSIS 9

The concept of stability-routh's stability criterion- The root locus concept –construction of root loci-effects of adding poles and zeros to $G(S)$ $H(S)$ on the root loci - Frequency domain specifications - bode diagrams- determination of frequency domain specifications and transfer function from the bode diagram-phase margin and gain margin-stability analysis from bode plots. Polar plots.

UNIT V STATE SPACE ANALYSIS 9

Concepts of state, state variables and state model, derivation of state models from block diagrams, diagonalization-solving the time invariant state equations-state transition matrix and it's properties-concepts of controllability and observability.

Total: 45 HOURS

COURSE OUTCOMES

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

- CO1** Ability to find the Mathematical models-differential equations, impulse response and transfer functions.
- CO2** Ability to find the transfer function from mechanical, electrical, block diagram, signal flow graph and electronic system
- CO3** Describe the concept of steady state and transient response at different inputs
- CO4** Apply the concepts of stability in s-domain and Routh criteria and the concepts of plotting the response of a system on a graph
- CO5** Design and implement any system using state space analysis
- CO6** Ability to implement the real time applications of control systems

TEXT BOOKS:

- T1:** C. Kuo, Automatic Control Systems, 8th edition, John Wiley and sons, India, 2003
- T2:** J. Nagrath, M. Gopal, Control Systems Engineering, 2nd edition, New Age International (P) Limited, New Delhi.

REFERENCE BOOKS:

- R1:** Katsuhiko Ogata, Modern Control Engineering, 3rd edition, Prentice Hall of India Pvt. Ltd., India, 1998
- R2:** Norman S. Nice, Control Systems Engineering, 6th edition, John Wiley, India, 2015
- R3:** N. K. Sinha(1998), Control Systems, 3rd edition, New Age International (P) Limited Publishers, India.

ENGLISH

U19ENOE01	ENGLISH for COMPETITIVE EXAMS (Common to ALL)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To prepare learners to face the challenges of regular/online competitive exams in the English language globally.
- To enable students to prepare for competitive exams of various kinds especially meant for testing ability in the English language.
- To introduce students to the common question types asked in competitive examinations concerning English- grammar, vocabulary, comprehension, and other significant topics.
- To help the students to overcome the fear of English as a compulsory subject in various competitive exams.
- To encourage students to appear and prepare for the competitive exams.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1							2	2	2	3		2	2	
CO2								1	2	3		2	2	
CO3						2		2	3	3		2	2	
CO4							3	2	1	3		3	2	
CO5						3	3	3	3	3		3	2	
CO6							2	2	2	3		2	3	

PRE-REQUISITES: Nil

UNIT I **9**

Types of Sentences - Sentence correction - Sentence sequence – Word Reordering - Data Interpretation: Tree Diagram, Flow Chart, Table, Line Graph – Discourse Markers – Identifying the exams interested to appear for - Online Course: Udemy, Edx, Future Learn

UNIT II **9**

Reading Comprehension: Focus on different levels of Comprehension- Literal, Inferential, Analytical, and Critical reasoning – Identifying keywords and signal words, decoding the building blocks of a passage, understanding the jargon and double distractors – Error Spotting Rules - Identification Common Errors

UNIT III **9**

Listening Comprehension: Micro skills and Macro skills of Listening – Idioms and Phrases- Homonyms and Homophones – Collocations- Synonyms and Antonyms: Banking, Indian Constitution, Education, Corporate, and Higher Education - Para jumbles

UNIT IV **9**

Speaking: Presentation and Public: Record of videos – Verbal Ability; Sentence Completion, and Verbal analogies –Confirmation of registering for competitive exams.

UNIT V **9**

Speech Project – Time Management – Stress Management –Standard Assessment: 5 Mock Tests

Total: 45 HOURS

COURSE OUTCOME

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

- CO1** Confidently use the English language at an advanced level sharing their points of view with effective conclusions.
- CO2** Construct correct sentences with the advanced vocabulary of the fields like Banking, Indian polity, Education, Corporate, etc.
- CO3** Read accurately using contextual, analytical thinking and logical thinking skills
- CO4** Aware of the opportunities available in the government and private sectors
- CO5** Demonstrate excellent Time Management skills with regard to various competitive exam patterns

TEXT BOOKS

- T1** Richards, C. Jack. Interchange Students Book-3 New Delhi: CUP, 2015.
- T2** Means,L. Thomas and Elaine Langlois. English and Communication For Colleges. Cengage Learning, USA: 2007.
- T3** The Official Guide to the GRE General Test, Third Edition (TEST PREP)by Educational Testing Service | 16 February 2017
- T4** The Yearly Current Affairs 2022 for Competitive Exams (Upssc, State Psc, Ssc, Bank Po/ Clerk, Bba, MBA, Rrb, Nda, Cds, Capf, Crpf), Disha Publication, Genre: General, ISBN: 9789355640888

REFERENCE BOOKS

- R1** Brians, Paul. (2013). Common errors in English usage: Third edition. Wilsonville:Franklin,Beedle& AssociatesInc
- R2** Harrison, Louis. (2009). Achieve IELTS grammar and vocabulary: English forinternationalaleducation. London: Cengage LearningEMEA.
- R3** Khashoggi, K.,&Astuni.A. (2014)SATreadingcomprehension workbook:Advancedpracticeseries. New York:IlexPublications.
- R4** Prasad, Hari Mohan.(2013). Objective English for competitive exams.New Delhi:TataMcGraw-Hill EducationIndia.

- R5** Seely, John. (2013). Oxford guide to effective writing and speaking: How to communicate clearly. Oxford: Oxford University Press.

WEB RESOURCES

- W1** <https://www.edubull.com/exams/competitive-exams>
W2 <https://sscstudy.com/>
W3 <https://examsdaily.in/important-study-materials-pdf>
W4 <http://www.recruitmenttopper.com/study-material-for-all-competitive-exams/>

B.TECH FOOD TECHNOLOGY

U19FTOE001

FOOD SCIENCE AND NUTRITION

L T P C
3 0 0 3

COURSE OBJECTIVES

Explain the basic concepts of food and nutrition. Define the overall classification, function, and source of carbohydrates, lipids and proteins. Discuss the overall aspects of vitamins. Outline the role of health and nutritional importance of micro and macro minerals. Summarize the recent trends in nutrition

PREREQUISITES

- Basic idea on biomolecules
- Knowledge of essential nutrition requirement
- Health benefits and function of nutrition
- Diet based nutrition
- Effect of storage and processing on nutrition

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1													2	
2	3	2		3									2	
3	1	3			3			2					1	
4	1				3			2					1	
5													1	
6	1	1		2									1	

UNIT I

HUMAN NUTRITION

9+3

Historical perspective of nutrient requirements – Assessment of nutritional status – recommended dietary allowances of macronutrients for all age groups – Assessment of protein quality – Malnutrition and related disorders – Balanced Diet. Factors influencing dietary intake: Food habits, food fads and fallacies, their influence on health and wellbeing.

UNIT II

BIOMOLECULES

9+3

Carbohydrates- Definition, classification, Functions, Sources of Carbohydrates, Deficiency. Lipids – Definition, classification, function, sources, Refined & Hydrogenated fats process. Proteins – Definitions, Classification, Function, Amino Acids, Sources of Proteins.

UNIT III

VITAMINS

9+3

Physiological role, bio-availability, requirements, sources and deficiency of Fat Soluble Vitamins: Vitamin A, Vitamin D, E & K. Water soluble vitamins: Vitamin C, Thiamine, Riboflavin, Niacin, Pantothenic acid, Biotin, Folic acid, Vitamin B12, Vitamin B6.

UNIT IV

MINERALS

9+3

Physiological role, bio-availability, requirements, sources and deficiency of Macro minerals: Calcium, Phosphorus Magnesium, Sodium, Potassium chloride. Micro minerals: Iron, Zinc, copper, selenium, chromium, iodine, manganese, Molybdenum and fluoride.

UNIT V

RECENT TRENDS IN DIETETICS

9+3

Principles of dietary management in gout, rheumatism, AIDS/HIV – Cancer-risk factors, symptoms, dietary management, role of food in prevention of Cancer. Role of functional foods, health foods and novel foods, organically grown foods, recent concepts in human nutrition like nutrigenomics, nutraceuticals etc.

Total: 60 HOURS

COURSE OUTCOMES

At the end of the course students should be able to

- CO1: Discuss the basics in the area of nutritional assessment in health and disease and to categorize the recommended dietary allowances for different age groups
- CO2: Express the classifications, functions and sources of carbohydrates, lipids and proteins
- CO3: List the various attributes of fat- and water-soluble vitamins
- CO4: Report the role, bioavailability, sources and deficiency diseases of macro and micro minerals
- CO5: Recognize the diets and concepts of foods suggested for nutritional, chronic and acute disorders
- CO6: Classify and to analyse the different techniques of qualitative and quantitative analysis

TEXT BOOKS:

- T1: Gordon M. Wardlaw. Perspectives in Nutrition. WCB McGraw-Hill Publishers, Boston, 9th Edition. 2013.
- T2: Shubhangini A. Joshi. Nutrition and Dietetics. Tata Mc Grow- Hill publishing Company Ltd, New Delhi. 4th Edition. 2016.
- T3: Prilakshmi. B. Nutrition Science. New Age International Pvt. Ltd, Publishers. 6th Edition. 2017.

REFERENCE BOOKS:

- R1: Ronald Ross Watson. Functional foods and Nutraceuticals in Cancer Prevention. Ed. Wiley – Blackwell. 2003.
- R2: Sunetra Roday. Food Science and Nutrition. Oxford Higher Education/Oxford University Press. 3rd edition 2018.

U19FTOE002

FOOD PRESERVATION TECHNIQUES

L T P C
3 0 0 3

Course Objectives

- To introduce the students to the area of Food Processing and preservation.
- To have an effective understanding of food processing and technology subjects.
- To enable students to appreciate the importance of food processing with respect to the large-scale production.
- To impart knowledge on processing of food waste

Course Outcomes

- At the end of the course, learners will be able to:
- C01: Describe the fundamentals of food processing and preservation
 - C02: Familiar with the functional properties of Carbohydrates, fats, lipids, proteins in food
 - C03: Knowledge about the importance of food additives and their function and will develop strategies that will promote food safety and prevent food borne illness
 - C04: Analyze the uses of enzymes, modified proteins and develop novel products, explain, analyze and evaluate scenarios related to various unit operations in food processing and preservation
 - C05: Identify spoilage and deterioration mechanism in food and methods to control deterioration and spoilage
 - C06: Demonstrate packing methods, materials and factors affecting food packing

Course Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3		3											
2	3													
3	2		3										3	
4	3	3	2								3			
5		3	2								3			
6	3	2	2	2	2	1	2							

3 - High, 2 - Medium, 1 – Low

UNIT I PROCESSING OF FOOD AND ITS IMPORTANCE 12

Source of food - significance for processing and preservation of foods – Different food groups-, food pyramids, classification and functions, cooking of foods – methods and cooking media, advantages of processing of foods, changes of nutritional components in cooking, effects of processing of foods on anti-nutritional components.

UNIT II FOOD COMPONENTS 12

Classification, Structure, nutritive value, processing outlines of major Cereals and millets- Pulses-fruits and vegetables, fats, oilseeds and nuts. Major and minor nutrients, sugar and related products, spices and aromatics, beverages and appetizers, organic foods

UNIT III PROCESSING OF ANIMAL FOODS 12

Meat, Poultry and Fish-Structure, composition, nutritive value and processing outline. Processing of milk and milk products, egg processing and storage, need and nutritional benefits of animal products, value added products

Visual and UI Principles - UI Elements and Patterns - Interaction Behaviors and Principles – Branding - Style Guides 126

UNIT III: FOUNDATIONS OF UX DESIGN 9

Introduction to User Experience - Why You Should Care about User Experience - Understanding User Experience - Defining the UX Design Process and its Methodology - Research in User Experience Design - Tools and Method used for Research - User Needs and its Goals - Know about Business Goals.

UNIT IV: WIREFRAMING, PROTOTYPING AND TESTING 9

Sketching Principles - Sketching Red Routes - Responsive Design – Wireframing - Creating Wireflows - Building a Prototype - Building High-Fidelity Mockups - Designing Efficiently with Tools - Interaction Patterns - Conducting Usability Tests - Other Evaluative User Research Methods - Synthesizing Test Findings - Prototype Iteration

UNIT V: RESEARCH, DESIGNING, IDEATING, & INFORMATION ARCHITECTURE 9

Identifying and Writing Problem Statements - Identifying Appropriate Research Methods - Creating Personas - Solution Ideation - Creating User Stories - Creating Scenarios - Flow Diagrams - Flow Mapping - Information Architecture.

Total: 45 HOURS

TEXT BOOKS

1. Joel Marsh, “UX for Beginners”, O’Reilly , 2022
2. Jon Yablonski, “Laws of UX using Psychology to Design Better Product & Services” O’Reilly 2021 127
3. Ralf Steinmetz, Klara Nahrstedt, “Multimedia Systems”, Springer IE, 2004. **REFERENCE BOOKS**

1. Jenifer Tidwell, Charles Brewer, Aynne Valencia, “Designing Interface” 3 rd Edition , O’Reilly 2020
2. Steve Schoger, Adam Wathan “Refactoring UI”, 2018
3. Steve Krug, “Don't Make Me Think, Revisited: A Commonsense Approach to Web & Mobile”, Third Edition, 2015
4. <https://www.nngroup.com/articles/>
5. [https://www.interaction-design.org/literature.](https://www.interaction-design.org/literature)

COURSE OUTCOMES:

At the end of the course students should be able to

CO1: Understand the principles of UI and UX design, including user-centered design, information architecture, visual hierarchy, and usability testing.

CO2:Build UI for user Applications

CO3:Evaluate UX design of any product or application

CO4:Demonstrate UX Skills in product development

CO5:Implement Sketching principles

CO6:Create Wireframe and Prototype

U19ITOE002

MULTIMEDIA SYSTEMS

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

- To enrich student learning in multimedia systems.
- To train the students to acquire knowledge in multimedia related technologies.
- To acquire knowledge about multimedia techniques to enhance quality of service.
- To acquire knowledge on multimedia architecture.
- To learn about the multimedia elements in a comprehensive way.

CO ^s	PROGRAMME OUTCOMES (POs)											PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3		3	2	2				3	2		1
CO2	3	2	3		3	2	2				3	2		1
CO3	3	2	3		3	2	2				3	2		2
CO4	3	2	3		3	2	2				3	2		2
CO5	3	2	3		3	2	2				3	2		2
CO6	3	2	3		3	2	2				3	2		2

UNIT I: INTRODUCTION TO MULTIMEDIA ELEMENTS**9**

Multimedia – Medium – Properties of a Multimedia System – Traditional Data Stream Characteristics – Data Stream Characteristics of Continuous Media – Basic Sound Concepts – Speech – Images and Graphics – Computer Image Processing – Video and Animation – Computer Based Animation.

UNIT II: MULTIMEDIA COMPRESSION**9**

Storage Space – Coding Requirements – Hybrid Coding – JPEG: Image Preparation, Lossy Mode, Lossless Mode, Hierarchical Mode – H.261 – MPEG: Video Encoding, Audio Encoding, Data Stream, MPEG 3, MPEG 7, MPEG 21 – DVI – Audio Encoding

UNIT III: MULTIMEDIA ARCHITECTURES**9**

User Interfaces – OS multimedia support – Multimedia Extensions – Hardware Support – Distributed multimedia applications – Real time protocols – Play back Architectures – Synchronization – Document and document architecture – Hypermedia concepts – Hypermedia design – Digital copyrights – Digital Library – Multimedia Archives.

UNIT IV: MULTIMEDIA OPERATING SYSTEM AND DATABASES 9

Real Time – Resource Management – Process Management – File systems – Interprocess communication and synchronization – Memory management – Device Management – Characteristics of MDBMS – Data Analysis – Data structures – Operations on data – Integration in a database model.

UNIT V: MULTIMEDIA COMMUNICATION & APPLICATIONS 9

Tele Services – Implementation of Conversational Services, Messaging Services, Retrieval Services, Tele Action Services, Tele Operation Services – Media Consumption – Media Entertainment – Virtual Reality – Interactive Audio – Interactive Video – Games.

Total: 45 HOURS

TEXT BOOKS

1. Ralf Steinmetz, Klara Nahrstedt, "Multimedia computing, communications, and applications", Pearson India, 2009.
2. Ranjan Parekh, "Principles of Multimedia", Second Edition, McGraw Hill Education, 2017.
3. Ralf Steinmetz, Klara Nahrstedt, "Multimedia Systems", Springer IE, 2004. **REFERENCE BOOKS**

1. Tay Vaughan, "Multimedia: Making it Work", McGraw – Hill Education, Ninth Edition, 2014.
2. Mark S Drew, Zee Nian Li, "Fundamentals of multimedia", Prentice Hall, 2006.
3. Jerry D. Gibson, Toby Berger, Tom Lookabaugh, Dave Lindergh, Richard L. "Baker Digital Compression for Multimedia: Principles and Standards", Elsevier, 2006.

COURSE OUTCOMES:

At the end of the course students should be able to

CO1: Handle the multimedia elements effectively

CO2: Encode and decode the multimedia elements.

CO3: Understand the underlying multimedia computing architectures used for media development.

CO4: Develop effective strategies to deliver Quality-of-Experience in multimedia applications.

CO5: Design and implement algorithms and techniques related to multimedia objects.

CO6: Design and develop multimedia applications in various domains.

Fullerenes: Introduction, synthesis and purification, physical properties, applications.
Semiconductor Quantum dots: Introduction, synthesis of Quantum dots, physical and chemical properties, applications.

Nanocomposites: Introduction, synthesis and processing of Inorganic nanotubes and polymeric nanocomposites, applications.

Nanowires: Introduction, physical properties of nanowires – (structural, Optical, Chemical), Applications.

UNIT III **PROPERTIES OF NANOMATERIALS** **9**

Mechanical Properties: Introduction, Grain Size Effect, Creep, Hardness, Fracture Strength, Strengthening and Toughening Mechanisms, Crack Healing (Annealing Treatment). [From Advanced nanomaterials by Hofman, Powder Technology Laboratory, IMX, EPFL, Version 1 Sept 2009].

Electrical and Optical properties: Electrical conduction and tunnelling conduction in nanoparticles, electronic conduction with nanoparticles (AC Conductivity & DC Conductivity).

Optical properties: Transmission, Absorption, Reflection in nanoparticles, optical constants (Absorption coefficient, extinction coefficient and Refractive index).

UNIT IV **CHARACTERIZATION TOOLS** **9**

XRD (X-Ray diffraction), SAXS (Small Angle X-ray Emission Spectroscopy), SEM (Scanning Electron Microscopy), TEM (Transmission Electron Microscopy), STM (Scanning Tunnelling Microscopy), AFM (Atomic Force Microscopy).

UNIT V **APPLICATIONS OF NANOTECHNOLOGY** **9**

Electrical and electronic applications: MEMS (Micro Electro Mechanical Systems), NEMS (Nano Electro Mechanical Systems), Nanosensors, nanolithography.

Nanotechnology for Renewable Energy: Hydrogen energy, fuel cell technology, wind and solar energy. Nanotechnology for information technology and Data Storage applications.

Total:45 Hours

COURSE OUTCOME

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

- | | |
|------------|---|
| CO1 | Apply the basic concepts of nanotechnology and gain basic knowledge on various synthesis and characterization techniques involved in Nanotechnology |
| CO2 | Understand the general types and different classes of Nanomaterials |
| CO3 | Apply the knowledge on different properties of Nanomaterials and selection of material for the specific purpose of application. |
| CO4 | Understand and apply the knowledge of different characterization tools and characterization of Nanomaterials |
| CO5 | Apply the basic knowledge about the wide applications of nanotechnology in various technological fields. |
| CO6 | Understand about different energy technology |

TEXT BOOKS

- T1** Köhler, Michael, and Wolfgang Fritzsche.
Nanotechnology - An Introduction to Nanostructuring
Techniques 2nd ed. Wiley.
- T2** T. Pradeep, Nano: The Essentials – Understanding
Nano Science and Nano Technology, McGraw-Hill
- T3** A. K. Bandyopadhyay, Nano Materials, New Age
International Publishers.
- T4** M. H. Fulekar, Nanotechnology - Importance and
applications. I.K. International publishing house pvt.
Ltd

REFERENCE BOOKS

- R1** B.S. Murty, P. Shankar, Baldev Raj, James Murday,
Textbook of Nanoscience and Nanotechnology,
Springer Berlin Heidelberg
- R2** B. Bhushan, Springer Handbook of Nano Technology

B.E MECHANICAL ENGINEERING

19MEOE001	ENGINEERING DRAWING	L	T	P	C
		2	0	2	3

COURSE OBJECTIVES

- To have the knowledge of interpretation of dimensions of different quadrant projections.
- To understand the basic principles of engineering drawing.
- To have the knowledge of generating the pictorial views

PRE-REQUISITES

Nil

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2		3									3	
CO2	3	2		3				2					3	
CO3	3	3		3									3	
CO4	3	2		3				2					2	
CO5	3	2		3									3	

THEORY COMPONENT CONTENTS

UNIT I INTRODUCTION TO ENGINEERING DRAWING 12

Principles of engineering graphics and their significance – drawing instruments and their use – conventions in drawing – lettering – BIS conventions. Dimensioning rules, geometrical construction **CURVES USED IN ENGINEERING PRACTICE AND THEIR CONSTRUCTIONS:** Conic Sections, Special Curves-Cycloids, Epicycloids, and Hypocycloids.

UNIT II ORTHOGRAPHIC PROJECTION IN FIRST ANGLE PROJECTION ONLY 12

Principles of orthographic projections – conventions – first and third angle projections. Projections of points and lines inclined to both the planes.

UNIT III PROJECTIONS OF PLANES AND SOLIDS 12

Projections of regular planes, inclined to both planes. Projections of regular solids inclined to both planes.

UNIT IV DEVELOPMENT OF SURFACES 12

Development of surfaces of right, regular solids – development of prisms, cylinders, pyramids, cones and their parts.

UNIT V ISOMETRIC PROJECTIONS 12

Principles of Isometric Projections-Isometric Scale- Isometric Views-Conventions-Plane Figures, Simple and Compound Solids.**TRANSFORMATION OF PROJECTIONS:** Conversion of isometric Views to Orthographic Views.Conversion of orthographic views to isometric projections vice-versa

Total:60 Hours

COURSE OUTCOMES

On completion of this course students will be able to

- CO1 :** Prepare and understand drawings.
- CO2 :** Identify various D curves used in Engineering Drawing and their applications.
- CO3 :** Use the principles of orthographic projections.
- CO4 :** By studying about projections of solids students will be able to visualize three dimensional objects and that will enable them to design new products.
- CO5 :** Design and fabricate surfaces of different shapes.

TEXT BOOKS

- T1. Basant Agarwal, "Engineering Drawing", TMH.
- T2. Jolhe, Dhananjay, "Engineering Drawing: With an Introduction to CAD", Tata McGrawHill, India. 2006.

REFERENCE BOOKS

- R 1. N. D. Bhat, "Engineering Drawing" Charotar Publications, New Delhi., 2006.
- R2. Trymbaka Murthy, "Computer Aided Engineering Drawing", I.K. International Publishers, 2007

U19MEOE002	MODERN MANUFACTURING TECHNIQUES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To understand the various advancements in casting processes
- To learn about the different types of welding techniques.
- To understand the principles and process of forming.
- To understand the significance of different advancements such as CAE in manufacturing.
- To learn about the mechanics of high speed machining.

PRE-REQUISITES

1. Fundamentals of manufacturing processes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2		2		2		2		2			2	
CO2				1									1	
CO3		1		2									2	
CO4	1	1		1		1				1			1	
CO5	2			1		1		2					1	

THEORY COMPONENT CONTENTS

UNIT I **ADVANCED CASTING PROCESSES** **9**

Expendable-Mold - shell mould casting, Vacuum Mould casting, investment casting, plaster-mold and ceramic-mold casting, Permanent-Mold casting processes - squeeze casting and semisolid metal casting, centrifugal casting, uses of Rapid Prototyping to produce pattern, process selection - dimensional tolerances for various casting processes and metals.

UNIT II **ADVANCED WELDING PROCESSES** **9**

Electron beam welding, laser beam welding, Solid-State welding - diffusion welding, friction welding, ultrasonic welding, physics of welding, design considerations in welding, NDT methods for testing.

UNIT III **ADVANCED FORMING PROCESSES** **9**

Material behavior in metal forming, temperature in metal forming, strain rate sensitivity, friction and lubrication in metal forming, bulk deformation processes, sheet metalworking, HERF, hydro forming, explosive forming, magnetic forming process

UNIT IV APPLICATION OF CAE IN MANUFACTURING 9

Need for CAE in manufacturing, simulation of molten metal flow using CAE Techniques, solidification process in casting, inspections of casting. Thermal analysis of Heat-Affected Zone (HAZ), analysis of forging process using CAE, CL data generation for machining process.

UNIT V HIGH-SPEED MACHINING 9

High-Speed machining centers, high-speed spindles, spindle speed, feed rate, cutting velocity, surface finish, selection of process parameters, ultra-high-speed machining centers, hard machining.

Total: 45 Hours

COURSE OUTCOMES

At the end of the course students should have the

- CO1 :** Use appropriate casting technique to develop a given component
- CO2 :** Make the right choice of welding technique as per the required application
- CO3 :** Understand about the different significant factors in forming
- CO4 :** Formulate real time problems with the help of computer simulation tools
- CO5 :** Implementing the probable capabilities of artificial intelligence to develop end user products such as robots.

TEXT BOOKS

- T1. Mikell P Grover "Principles of Modern Manufacturing (SI Version)" John Wiley & Sons, 2014.
- T2. Paul DeGarmo E, Black J T and Ronald A Kohjer, "Materials and Processes in Manufacturing, John Wiley India, 2011.

REFERENCE BOOKS

- R 1. Philip F Ostwald and Jairo Munoz, "Manufacturing Processes and Systems" John Wiley India, New Delhi, 2013.
- R2. Kaushish J P, "Manufacturing Processes", Prentice Hall India, 2013.
- R3. Sanjay K Mazumdar, "Composite Manufacturing: Materials, Product and Process Engineering", CRC Press, 2010.

U19ENOE01

ENGLISH for COMPETITIVE EXAMS
(Common to ALL)

L T P C
3 0 0 3

COURSE OBJECTIVES

- To prepare learners to face the challenges of regular/online competitive exams in the English language globally.
- To enable students to prepare for competitive exams of various kinds especially meant for testing ability in the English language.
- To introduce students to the common question types asked in competitive examinations concerning English- grammar, vocabulary, comprehension, and other significant topics.
- To help the students to overcome the fear of English as a compulsory subject in various competitive exams.
- To encourage students to appear and prepare for the competitive exams.

PRE-REQUISITES: Nil

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

UNIT I 9

Types of Sentences - Sentence correction - Sentence sequence – Word Reordering - Data Interpretation: Tree Diagram, Flow Chart, Table, Line Graph – Discourse Markers – Identifying the exams interested to appear for - Online Course: Udemy, Edx, Future Learn

UNIT II 9

Reading Comprehension: Focus on different levels of Comprehension- Literal, Inferential, Analytical, and Critical reasoning – Identifying keywords and signal words, decoding the building blocks of a passage, understanding the jargon and double distractors – Error Spotting Rules - Identification Common Errors

UNIT III 9

Listening Comprehension: Micro skills and Macro skills of Listening – Idioms and Phrases- Homonyms and Homophones – Collocations- Synonyms and Antonyms: Banking, Indian Constitution, Education, Corporate, and Higher Education - Para jumbles

UNIT IV 9

Speaking: Presentation and Public: Record of videos – Verbal Ability; Sentence Completion, and

Verbal analogies –Confirmation of registering for competitive exams.

UNIT V

9

Speech Project – Time Management – Stress Management –Standard Assessment: 5 Mock Tests

Total: 45 HOURS

COURSE OUTCOME

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

- CO1** Confidently use the English language at an advanced level sharing their points of view with effective conclusions.
- CO2** Construct correct sentences with the advanced vocabulary of the fields like Banking, Indian polity, Education, Corporate, etc.
- CO3** Read accurately using contextual, analytical thinking and logical thinking skills
- CO4** Aware of the opportunities available in the government and private sectors
- CO5** Demonstrate excellent Time Management skills with regard to various competitive exam patterns

OPEN ELECTIVE II

B.TECH AGRICULTURAL ENGINEERING

U19AEOE003

Introduction to Bio-
Energy

L T P C
3 0 0 3

COURSE OBJECTIVES

To introduce to the students the concepts of bio energy resources

- To expose the students to types of energy resources
- To enhance knowledge on estimation of bio energy plants.
- To expose the students to bio fuel production.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2				2	2						1	
CO2	3	2				2	2						1	
CO3	3	2				2	2						1	
CO4	3	2				2	2						1	
CO5	3	2				2	2						1	
CO6	3	2				2	2						1	

UNIT I BIO RESOURCE - AN INTRODUCTION

9

Bio resource – origin – biomass types and characteristics- biomass conversion technology- Biodegradation - steps in biogas production- parameters affecting gas production- Types of biogas plants- Construction details- operation and maintenance.

UNIT II

BIO ENERGY

9

Slurry handling- enrichment and utilization – Biogas appliances- Biochemical characteristics of bio resources- Bioenergetics –Biocatalysis –Kinetics of product formation.

UNIT III

BIO REACTORS AND FERMENTORS

9

Bio reactors/ fermentors – Batch type – continuous stirred tank reactors- Biological waste water treatment- Activated sludge process- Down stream processing-Recovery and purification of products.

UNIT IV **ALCOHOL PRODUCTION** **9**

Alcohol ethanol production - Acid hydrolysis - enzyme hydrolysis-Methanol synthesis - Antibiotics- enzymes- principles of thermochemical conversion – combustion - pyrolysis-Gasification – types of gasifiers

UNIT V **ENERGY AND ENVIRONMENT** **9**

Principles of operation- chemical reaction- cleaning and cooling - Utilization- Improved wood burning stove - Energy plantations- Biomass briquetting - co generation- Impact on Environment – Bioenergy policy.

Total: 45 HOURS

COURSE OUTCOMES

At the end of the course students should be able to

- CO1** Understanding the importance of bio resources .
Ability to classify the bio energy and characteristics of bio energy.
- CO2**
- CO3** Knowledge in bio reactors and fermentors.
- CO4** Ability to gain knowledge in Alcohol production process
- CO5** Understanding the importance of Energy and Environment
- CO6** Knowledge in capturing and applying bioenergy on replacement of fossil fuels.

TEXT BOOKS:

- T1:** Rai G.D, Non conventional sources of Energy, Khanna publishers, New Delhi, 1995.
- T2:** Bouley James .E & David Follis - Biochemical Engineering Fundamentals Mc Graw-Hill publishing company, Tokyo.1986

REFERENCE BOOKS:

- R1:** Chawla O.P, Advances in Biogas Technology ICAR publication New Delhi 1986
- R2:** Khandelwal K.C. and Mahdi, S.S. 1986. Biogas Technology. Tata Mc Graw Hill Pub. Co. Ltd., New Delhi.
- R3:** Srivastava, P.K., Shukla, B.D. and Ojha, T.P. 1993. Technology and application of biogas. Jain Brothers, New Delhi.
- R4:** Mathur, A.N. and Rathore, N.S. 1993., Biogas production Management and Utilisation. Himanshu Publication. New Delhi

U19AEOE004

ROBOTICS IN AGRICULTURE

L T P C
3 0 0 3

COURSE OBJECTIVES

- To introduce the overview of robotic systems and their dynamics
- To impart knowledge on system stability
- To acquire knowledge on joint space and task space control schemes
- To understand the concept of nonlinear control and observer schemes

PREREQUISITES: NIL

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3												1	
CO2	3												1	
CO3	3	2	2	2									1	
CO4	3	2	2	2									1	
CO5	3	3	2	2									1	
CO6	2	3	2	1									1	

UNIT I INTRODUCTION AND OVERVIEW OF ROBOTIC SYSTEMS AND THEIR DYNAMICS 10

Forward and inverse dynamics. Properties of the dynamic model and case studies. Introduction to nonlinear systems and control schemes.

UNIT II SYSTEM STABILITY AND TYPES OF STABILITY 8

Lyapunov stability analysis, both direct and indirect methods. Lemmas and theorems related to stability analysis.

UNIT III JOINT SPACE AND TASK SPACE CONTROL SCHEMES 10

Position control, velocity control, trajectory control and force control.

UNIT IV NONLINEAR CONTROL SCHEMES 9

Proportional and derivative control with gravity compensation, computed torque control, sliding mode control, adaptive control, observer based control, robust control and optimal control

UNIT V**NONLINEAR OBSERVER SCHEMES****8**

Design based on acceleration, velocity and position feedback. Numerical simulations using software packages namely MATLAB/MATHEMATICA.

Total: 45 HOURS**COURSE OUTCOMES**

At the end of the course students should be able to

- CO1** Understand basic concept of robotic systems and their dynamics.
- CO2** Analyze system stability and types of stability
- CO3** Know about joint space and task space control schemes
- CO4** Understand the concept of nonlinear control and observer schemes
- CO5** Gain knowledge on farm management and financial analysis
- CO6** Familiarize with budgeting and cost estimation for farm layout

TEXT BOOKS:

- T1:** R Kelly, D. Santibanez, LP Victor and Julio Antonio, —Control of Robot Manipulators in Joint Space||, Springer, 2005.
- T2:** A Sabanovic and K Ohnishi, —Motion Control Systems||, John Wiley & Sons (Asia), 2011

REFERENCE BOOKS:

- R1:** R M Murray, Z. Li and SS Sastry, —A Mathematical Introduction to Robotic Manipulation||, CRC Press, 1994.
- R2:** J J Craig, —Introduction to Robotics: Mechanics and Control, Prentice Hall, 4th Ed, 2018.

B.E BIOMEDICAL ENGINEERING

U19BMOE003

HOSPITAL MANAGEMENT SYSTEM

L T P C
3 0 0 3

Course Objective

The student should be made:

- To understand the fundamentals of hospital administration and management.
- To know the market related research process
- To explore various information management systems and relative supportive services.
- To learn the quality and safety aspects in hospital.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	3		1	2				1		2	2
CO2	2	3	3	3		1	3				1		3	2
CO3	2	3	3	3		1	3				1		3	3
CO4	3	2	3	3		1	2				1		2	3
CO5	2	2	3	3		1	2				1		2	2
CO6	2	2	3	3		1	2				1		2	2

UNIT I OVERVIEW OF HOSPITAL ADMINISTRATION 9

Distinction between Hospital and Industry, Challenges in Hospital Administration – Hospital Planning- Equipment Planning – Functional Planning - Current Issues in Hospital Management - Telemedicine - Bio-Medical Waste Management.

UNIT II HUMAN RESOURCE MANAGEMENT IN HOSPITAL 9

Principles of HRM – Functions of HRM – Profile of HRD Manager – Tools of HRD –Human Resource Inventory – Manpower Planning. Different Departments of Hospital, Recruitment, Selection, Training Guidelines –Methods of Training – Evaluation of Training – Leadership grooming and Training, Promotion – Transfer, Communication – nature, scope, barriers, styles and modes of communication.

UNIT III MARKETING RESEARCH PROCESS 9

Marketing information systems - assessing information needs, developing & disseminating information - Market Research process - Other market research considerations – Consumer Markets & Consumer Buyer Behaviour - Model of consumer behaviour - The buyer decision process - Model of business buyer behavior – Major types of buying situations - WTO and its implications.

UNIT IV HOSPITAL INFORMATION SYSTEMS & SUPPORTIVE SERVICES 9

Management Decisions and Related Information Requirement - Clinical Information Systems -

Administrative Information Systems - Support Service Technical Information Systems – Medical Transcription, Medical Records Department – Central Sterilization and Supply Department –Pharmacy– Food Services - Laundry Services.

UNIT V **QUALITY AND SAFETY ASPECTS IN HOSPITAL** **9**

Quality system – Elements, implementation of quality system, Documentation, Quality auditing, International Standards ISO 9000 – 9004 – Features of ISO 9001 – ISO 14000 – Environment Management Systems. NABA, JCI, NABL. Security – Loss Prevention – Fire Safety – Alarm System – Safety Rules. Health Insurance & Managing Health Care – Medical Audit – Hazard and Safety in a hospital Setup.

TOTAL: 45 HOURS

Course Outcomes

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

- CO1: Explain the principles of Hospital administration.
- CO2: Identify the importance of Human resource management.
- CO3: List various marketing research techniques.
- CO4: Identify Information management systems and its uses.
- CO5: Understand safety procedures followed in hospitals
- CO6: Analyze the quality and safety aspects in hospital.

TEXT BOOKS

1. R.C.Goyal, —Hospital Administration and Human Resource Management||, PHI – Fourth Edition, 2006.
2. G.D.Kunders, —Hospitals – Facilities Planning and Management – TMH, New Delhi – Fifth Reprint 2007.

REFERENCE BOOKS

1. Cesar A.Caceres and Albert Zara, —The Practice of Clinical Engineering, Academic Press, New York, 1977.
2. Norman Metzger, —Handbook of Health Care Human Resources Management||, 2nd edition Aspen Publication Inc. Rockville, Maryland, USA, 1990.
3. Peter Berman —Health Sector Reform in Developing Countries|| - Harvard University Press, 1995.
4. William A. Reinke —Health Planning For Effective Management|| - Oxford University Press.1988
5. Blane, David, Brunner, —Health and SOCIAL Organization: Towards a Health Policy for the 21st Century||, Eric Calrendon Press 2002.
6. Arnold D. Kalcizony & Stephen M. Shortell, —Health Care Management||, 6th Edition Cengage Learning, 2011.

Course Objective

The student should be made:

To impart knowledge of the principle of operation and design of sensory equipment's.

To render a broad and modern account of neurological, muscular, cardiological and respiratory instruments.

To introduce idea about instrumentation in patient care and diagnosis.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3						2	2	2	3	3
CO2	3	3	3	3						2	3	2	3	3
CO3	3	3	3	3						2	2	3	3	3
CO4	3	3	3	3						2	2	2	3	3
CO5	3	3	3	3						2	3	2	3	3
CO6	3	3	3	3						2	2	2	3	3

UNIT I RECORDING OF BIOSIGNALS 9

Biosignals characteristics – frequency and amplitude ranges. ECG – Einthoven’s triangle, Lead configuration, 12 lead ECG machine circuit, common mode and interference reduction circuits, Vector cardiograph EEG – 10-20 electrode system. EMG– Recording, Electro encephalogram, Magneto encephalogram, EOG & ERG: origin, measurement of EOG, electroretinogram

UNIT II SENSORY INSTRUMENTATION 9

Psychophysiological Measurements – polygraph, basal skin resistance (BSR), galvanic skin resistance (GSR), Sensory responses - Audiometer-Pure tone, Hearing and speech aids: conductive and nervous, hearing aids- Types, constructional and functional characteristics. Cochlear implants- Need, constructional details, speech trainer.

UNIT III CARDIAC EQUIPMENTS 9

Normal and abnormal ECG waveform, diagnosis interpretation, cardiac pacemaker-external pacemaker, implantable pacemaker, different types of pacemakers, fibrillation, defibrillator, AC defibrillator, DC defibrillator, electrodes, synchronised and unsynchronised types. EEG diagnostic interpretation, recording and analysis of EMG waveforms.

UNIT IV RESPIRATORY MEASUREMENT SYSTEM 9

Instrumentation for measuring the mechanics of breathing – Spirometer -Lung Volume and vital capacity, measurements of residual volume, Pneumotachometer – Airway resistance measurement, Whole body Plethysmograph, Intra-Alveolar and Thoracic pressure measurements, Apnoea Monitor. Types of Ventilators – Pressure, Volume, and Time controlled. Flow, Patient Cycle Ventilators, Humidifiers, Nebulizers, Inhalators.

Cardiac pacemakers and modern stimulators, Hemodialysis ventilators, incubators, drug delivery devices, surgical instruments, Therapeutic application of laser, Neonatal Monitoring.

Total:45 HOURS

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Demonstrate the principle of operation and design of sensory equipments
- CO2:** Determine the basic parameters of the equipment used in patient diagnosis
- CO3:** Analyze the broad and modern account of neurological equipments.
- CO4:** Illustrate the principle and working of muscular and respiratory instruments
- CO5:** Impart knowledge of the principle of operation and design of sensory equipment's
- CO6:** Understand a broad and modern account of neurological, muscular, cardiological and respiratory instruments

TEXTBOOKS:

- T1** Siamak Najarian, Javad Dargahi, Ali Abouei Mehrizi, —Artificial Tactile Sensing in Biomedical Engineering||, McGraw Hill publication, 2009
- T2** Martin Grunwald, —Human Haptic Perception||, Birkhaeuser Verlag AG, Boston Basel Berlin publication, 2008

REFERENCE BOOKS:

- R1** Abdulmotaleb El Saddik, Mauricio Orozco, Mohamad Eid, Jongeun Cha,—Haptics Technologies: Bringing touch to multimedia||, Springer, 2011
- R2** Myer Kutz.,—Biomedical Engineering and Design Handbook|| Vol2, McGraw Hill

B.TECH BIOTECHNOLOGY

U19BTOE003

ANALYTICAL METHODS AND INSTRUMENTATION

L T P C
3 0 0 3

Course Objectives

- To inculcate the entrepreneurship spark among the student community by converting their research ideas into commercial products
- To develop the entrepreneurial skill in the field of biotechnology
- To study the Business strategy and Technology Transfer

Course Outcomes

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

CO1. Learn the different bio potential and its propagation.

CO2. get Familiarize the different electrode placement for various physiological recording

CO3. design bio amplifier for various physiological recording

CO4. understand various technique non electrical physiological measurements

CO5. Understand the different biochemical measurements

CO6. Characterize and analyze various macromolecules

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3			2										2
2	3	1	2	1		1							1	2
3	3	2	3										1	1
4	2	2	3											2
5	2	2	3			3								
6	2	2												

UNIT I

SPECTROMETRY

9

Properties of electromagnetic radiation- wave properties – components of optical instruments-Sources of radiation – wavelength selectors – sample containers – radiation transducers -Signal process and read outs – signal to noise ratio – sources of noise – Enhancement of signal to noise – types of optical instruments – Applications.

UNIT II

MOLECULAR SPECTROSCOPY

9

Molecular absorption spectrometry – Measurement of Transmittance and Absorbance – Beers law
– Instrumentation – Applications -Theory of fluorescence and Phosphorescence – Instrumentation

Course Objectives

- To emphasize on the importance of waste management in the industries

Course Outcomes

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

- CO1. This course will make the students to design biological treatment units
- CO2. To undertake projects on biological wastewater treatment
- CO3. To design the treatment plants with fundamental understanding
- CO4. Be familiar with sampling of wastes.
- CO5. The students will undertake projects related to waste management.
- CO6. Understand various case studies related to waste management

Course Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	3	3										2	
2	3	2												
3	3	3	3	2	2	2		1	3					2
4	3	1	1			1		1						1
5	3	3	2	1	2			1						1
6	3	3	2	1	2			1						1

UNIT I**INTRODUCTION TO WASTE MANAGEMENT****9**

Types of industries and industrial pollution – Characteristics of industrial wastes – Population equivalent – Bioassay studies – effects of industrial effluents on streams, sewer, land, sewage treatment plants and human health Environmental legislations related to prevention and control of industrial effluents and hazardous wastes.

UNIT II**CLEANER PRODUCTION****9**

Waste management Approach – Waste Audit – Volume and strength reduction – Material and process modifications – Recycle, reuse and byproduct recovery – Applications.

UNIT III**POLLUTION FROM MAJOR INDUSTRIES****9**

B.E CIVIL ENGINEERING

U19CEO003

REMOTE SENSING AND GIS

L	T	P	C
3	0	0	3

Course Objectives:

This course aims to provide the students,

- ☐ Understanding about the basic concepts of remote sensing and analyse satellite imagery and extract the required units.
- ☐ Usage of thematic maps for various application.

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	3	3	1	2	3	3		1			3	2	
2	3	2	2		3	1	3					2	2	
3	2	3	2			3	3					2	2	
4	2	2				3	3		1			2	2	
5	1	1			3	3	3		1			1	2	
6	2	2			3	3	3		-			2	2	

UNIT I **REMOTE SENSING** **9**

Basic concept of Remote sensing, Data and Information, Remote sensing data collection, Remote sensing advantages & Limitations, Remote Sensing process. Electromagnetic Spectrum, Energy interactions with atmosphere and with earth surface features (soil, water, and vegetation), Resolution, image registration and Image and False colour composite, elements of visual interpretation techniques.

UNIT II **REMOTE SENSING PLATFORMS AND SENSORS** **9**

Indian Satellites and Sensors characteristics, Remote Sensing Platforms, Sensors and Properties of Digital Data, Data Formats: Introduction, platforms – IRS, sensors, sensor resolutions, Basics of digital image processing - introduction to digital data, systematic errors and non-systematic errors, Image enhancements, image filtering.

UNIT III **GEOGRAPHIC INFORMATION SYSTEM** **9**

Introduction to GIS; components of a GIS; Geographically Referenced Data, Spatial Data- Attribute Data
 - Joining Spatial and attribute data, GIS Operations: Spatial Data Input – Attribute data Management, Geographic coordinate System, Datum; Map Projections: Types of

Map Projections, Projected coordinate Systems. UTM Zones.

UNIT IV DATA MODELS 9

Vector data model: Representation of simple features – Topology and its importance; coverage and its data structure, Shape file; Relational Database, Raster Data Model: Elements of the Raster data model, Types of Raster Data, Raster Data Structure, Data conversion.

UNIT V INTEGRATED APPLICATIONS OF REMOTE SENSING AND GIS 9

Applications in land use land cover analysis, change detection, water resources, urban planning, environmental planning, Natural resource management and Traffic management. Location Based Services and Its Applications.

Total: 45 Hours

Course Outcomes:

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

- CO1:** Understand the principles of aerial and satellite remote sensing, Able to comprehend the energy interactions with earth surface features.
- CO2:** Understand the basic concepts of remote sensing and know about different types of satellite and sensors.
- CO3:** Illustrate spatial and non-spatial data features in GIS and understand the map projections and coordinates systems
- CO4:** Collect data and delineate various elements from the satellite imagery using their spectral signature.
- CO5:** Apply knowledge of GIS and understand the integration of Remote Sensing and GIS.

Textbooks:

- T1.** Anji Reddy M., "Remote sensing and Geographical information system", B.S. Publications 2008.
- T2.** Narayan Panigrahi, "Geographical Information Science", and ISBN 10: 8173716285 / ISBN 13: 9788173716287, University Press 2008.
- T3.** Basudeb Bhatta, "Remote sensing and GIS", Oxford University Press 2011

Reference Books:

- R1.** Chor Pang Lo and Albert K.W Yeung, "Concepts & Techniques of GIS", PHI, 2006
- R2.** Peter A. Burrough, Rachael A. McDonnell, and Christopher D. Lloyd, "Principals of Geographical Information system", Oxford Publications 2004.
- R3.** S Kumar, "Basics of remote sensing & GIS", Laxmi publications 2005.

Course Objectives:

This course aims to provide the students,

- ☐ Knowledge on the principle and design of control of Indoor/ particulate / gaseous air pollutant and its emerging trends.

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2				1								2	
2	2	1			3								2	
3	3			1	2								2	
4	2		1	1	2								2	
5	2	1	2	1									2	
6	2				1								2	

UNIT I**INTRODUCTION****9**

Structure and composition of Atmosphere – Definition, Scope and Scales of Air Pollution – Sources and classification of air pollutants and their effect on human health, vegetation, animals, property, aesthetic value and visibility- Ambient Air Quality and Emission standards

UNIT II**METEOROLOGY****9**

Effects of meteorology on Air Pollution - Fundamentals, Atmospheric stability, Inversion, Wind profiles and stack plume patterns - Atmospheric Diffusion Theories – Dispersion models, Plume rise

UNIT III**CONTROL OF PARTICULATE CONTAMINANTS****9**

Factors affecting Selection of Control Equipment – Gas Particle Interaction – Working principle - Gravity Separators, Centrifugal separators Fabric filters, Particulate Scrubbers, Electrostatic Precipitators.

UNIT IV**CONTROL OF GASEOUS CONTAMINANTS****9**

Factors affecting Selection of Control Equipment – Working principle - absorption, Adsorption, condensation, Incineration, Bio filters – Process control and Monitoring.

Sources, types and control of indoor air pollutants, sick building syndrome and building related illness Sources and Effects of Noise Pollution – Measurement – Standards –Control and Preventive measures.

Total: 45 Hours

Course Outcomes:

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

- CO1:** Understanding of the nature and characteristics of air pollutants and basic concepts of air quality management.
- CO2:** Understand the type and nature of air pollutants, the behaviour of plumes and relevant meteorological determinants influencing the dispersion of air pollutants.
- CO3:** Ability to identify, formulate and solve air and noise pollution problems.
- CO4:** Ability to design stacks and particulate air pollution control devices to meet applicable standards.

CO5: Ability to select control equipment's.

CO6: Ability to ensure quality, control and preventive measures

Textbooks:

T1. Lawrence K. Wang, Norman C. Pareira, Yung Tse Hung, "Air Pollution Control Engineering", Tokyo, springer science media LLC,2004.

T2. Noel de Nevers, "Air Pollution Control Engineering", Waveland press, Inc 2017. **T3.** Anjaneyulu. Y, "Air Pollution and Control Technologies", Allied Publishers (P) Ltd., India 2002.

T1. Lawrence K. Wang, Norman C. Pareira, Yung Tse Hung, "Air Pollution Control Engineering", Tokyo, springer science media LLC,2004.

Reference Books:

R1. David H.F. Liu, Bela G. Liptak, "Air Pollution", Lweis Publishers, 2000.

R2. Arthur C. Stern, "Air Pollution (Vol. I – Vol. VIII)", Academic Press, 2006.

R3. Wayne T. Davis, "Air Pollution Engineering Manual", John Wiley & Sons, Inc, 2000.

B.E COMPUTER SCIENCE ENGINEERING

U19CSOE003 DATA STRUCTURES AND ALGORITHMS

L T P C
3 0 0 3

COURSE OBJECTIVES

- Understand the various algorithm design and analysis techniques
- To learn linear data structures – lists, stacks, and queues
- To learn different sorting and searching algorithms
- To understand Tree and Graph data structures

PREREQUISITES: NIL

Course Articulation Matrix : 3- High, 2- Medium, 3- Low														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3													1
CO2	3													2
CO3	3	2	2	2										2
CO4	3	2	2	2										2
CO5	3	3	2	2										1
CO6	2	3	2	1										1

UNIT I ALGORITHM ANALYSIS, LIST ADT 11

Algorithms: Notation - analysis – running time calculations. Abstract Data Types (ADTs): List ADT – array-based implementation – linked list implementation – singly linked lists- applications of lists: Polynomial Manipulation. Implementation of List ADT using an array and using a linked list in C.

UNIT II STACKS AND QUEUES 9

Stack ADT – Operations – Applications – Balancing Symbols – Evaluating arithmetic expressions- Infix to Postfix conversion – Function Calls – Queue ADT – Operations – Circular Queue – DeQueue – Applications of Queues.

UNIT III SEARCHING AND SORTING ALGORITHMS 8

Divide and conquer methodology - Searching: Linear Search - Binary Search. Sorting: Insertion sort – Merge sort – Quick sort – Heap sort. Analysis of searching and sorting techniques. Implementation of linear search, binary search, insertion sort, merge sort and quick sort algorithms in C.

UNIT IV TREES 9

Tree ADT – tree traversals - Binary Tree ADT – expression trees – binary search tree ADT – applications of trees. Heap – applications of heap. Implementation of Binary search tree and

its operations, tree traversal methods, finding height of the tree using C. Implementation of heap and heap sorting using arrays in C

UNIT V

GRAPHS

8

Definition – Representation of Graph – Breadth-first traversal - Depth-first traversal – Dynamic programming Technique – Warshall’s and Floyd’s algorithm – Greedy method - Dijkstra’s algorithm – applications of graphs. Implementation of graph, graph traversal methods, finding shortest path using Dijkstra’s algorithm in C

Total: 45 HOURS

COURSE OUTCOMES

At the end of the course students should be able to

- CO1** Define data structures like array, stack, queues and linked list.
- CO2** Explain insertion, deletion and traversing operations on data structures.
- CO3** Identify the asymptotic notations to find the complexity of an algorithm.
- CO4** Compare various searching and sorting techniques.
- CO5** Choose appropriate data structure while designing the algorithms.
- CO6** Design advance data structures using non linear data structures.

TEXT BOOKS:

- T1:** Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, 2nd Edition, Pearson Education,1997..
- T2:** Brian W. Kernighan and Dennis M. Ritchie, “The C Programming Language”, 2nd Edition, Pearson Education, 1988.

REFERENCE BOOKS:

- R1:** Aho, Hopcroft and Ullman, “Data Structures and Algorithms”, Pearson Education,1983
- R2:** S.Sridhar, “Design and Analysis of Algorithms”, First Edition, Oxford University Press. 2014
- R3:** Byron Gottfried, Jitender Chhabra, “Programming with C” (Schaum’s Outlines Series), Mcgraw Hill Higher Ed., III Edition, 2010
- R4:** Yashvant Kanetkar, “Data Structures Through C”, BPB publications, II edition, 2003

B.E ELECTRONICS AND COMMUNICATION ENGINEERING

U19ECO03

CONSUMER ELECTRONICS

L T P C
3 0 0 3

COURSE OBJECTIVES

- .Understand troubleshooting in loudspeakers and Microphones
- Gain knowledge on television signals and components
- Gain knowledge on various types of audio recording and playback techniques
- Understand communication systems
- Understand principle of working of home appliances

PREREQUISITES

- Basic Electronics
- Electronic devices

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2							2	1	2	
CO2	3	2	2	2							2	1	2	
CO3	3	2	2	2							2	1	2	
CO4	3	2	2	2							2	1	2	
CO5	3	2	2	2							2	1	2	
CO6	3	2	2	2							2	1	3	

UNIT I

LOUDSPEAKERS AND MICROPHONES

9

Dynamic Loudspeaker, Electrostatic loudspeaker, Permanent Magnet Loudspeaker, Woofers and Tweeters - Microphone Characteristics, Carbon Microphones, Dynamic Microphones and Wireless Microphones

UNIT II

TELEVISION STANDARDS AND SYSTEMS

9

Components of a TV system – interlacing – composite video signal. Colour TV – Luminance and Chrominance signal; Monochrome and Colour Picture Tubes - Colour TV systems – NTSC, PAL, SECAM - Components of a Remote Control.

UNIT III

OPTICAL RECORDING AND REPRODUCTION

9

Audio Disc – Processing of the Audio signal – read out from the Disc – Reconstruction of the audio signal – Video Disc – Video disc formats- recording systems – Playback Systems.

UNIT IV**TELECOMMUNICATION SYSTEMS****9**

Telephone services - telephone networks – switching system principles –PAPX switching – Circuit, packet and message switching, LAN, MAN and WAN, Integrated Services Digital Network. Wireless Local Loop. VHF/UHF radio systems, Limited range Cordless Phones; cellular modems

UNIT V**HOME APPLIANCES****9**

Basic principle and block diagram of microwave oven; washing machine hardware and software; components of air conditioning and refrigeration systems

Total: 45 HOURS**COURSE OUTCOMES**

At the end of the course students should be able to

- CO1** Troubleshoot different types of microphones and speakers
Maintain audio systems
- CO2:**
- CO3:** Analyse composite video signal used in TV transmission
- CO4:** Troubleshoot TV Receivers
- CO5:** Maintain various home appliances

TEXT BOOKS:

- T1:** S.P.Bali, “Consumer Electronics”, Pearson Education, 2005.
- T2:** Gupta. R.G, “ Audio Video Systems principles maintenance and trouble shooting, Mc graw Hill, New Delhi, India, 2010

REFERENCE BOOKS:

- R1:** Dhake .A.M, “ Television and Video Engineering”, Mc graw Hill, New Delhi, India, 2006
- R2:** Modern television practice: Transmission, reception and applications, New age International, New Delhi, 2015

COURSE OBJECTIVES

- To expose the students to the importance of improving capacity of wireless channel using MIMO
- To enable understanding of channel impairment mitigation using space-time block and Trellis codes
- To teach advanced MIMO system like layered space time codes, MU-MIMO System and MIMO-OFDM systems

PREREQUISITES

- Basic concepts of communication theory
- Basics of Computer Networks
- Limits and Continuity
- Basic concepts of Differentiation
- Basic concepts of Integration

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2							2	1	2	
CO2	3	2	2	2							2	1	2	
CO3	3	2	2	2							2	1	2	
CO4	3	2	2	2							2	1	2	
CO5	3	2	2	2							2	1	2	
CO6	3	2	2	2							2	1	2	

UNIT I CAPACITY OF WIRELESS CHANNELS 9

The crowded spectrum, need for high data rate, MIMO systems – Array Gain, Diversity Gain, Data Pipes, Spatial MUX, MIMO System Model. MIMO System Capacity – channel known at the TX, Channel unknown to the TX – capacity of deterministic channels, Random channels and frequency selective channels.

UNIT II RADIO WAVE PROPAGATION 9

Radio wave propagation – Macroscopic fading- free space and out door, small scale fading Fading measurements – Direct pulse measurements, spread spectrum correlation channel sounding frequency domain channel sounding, Antenna Diversity – Diversity combining methods

UNIT III SPACE TIME BLOCK CODES 9

Delay Diversity scheme, Alamoti space time code – Maximum likelihood decoding maximum ratio combining. Transmit diversity space time block codes for real signal constellation and complex signal constellation - decoding of STBC.

UNIT IV**SPACE TIME TRELLIS CODES****9**

Space time coded systems, space time code word design criteria, design of space time T C on slow fading channels, design of STTC on Fast Fading channels, performance analysis in slow and fast fading channels, effect of imperfect channel estimation and Antenna correlation on performance, comparison of STBC & STTC.

UNIT V**LAYERED SPACE TIME CODES****9**

LST transmitter – Horizontal and Vertical LST receiver – ML Rx, Zero forcing Rx; MMSE Rx, SIC Rx, ZF V-blast Rx- MMSE V-blast Rx, Iterative Rx - capacity of MIMO – OFDM systems – capacity of MIMO multi user systems.

Total: 45 HOURS**COURSE OUTCOMES**

At the end of the course students should be able to

- CO1:** Comprehend and appreciate the significance and role of this course in the present contemporary world
- CO2:** Apply the knowledge about the importance of MIMO in today's communication
- CO3:** Appreciate the various methods for improving the data rate of wireless communication system
- CO4:** Explain the working of layered space time transmitter and receiver
- CO5:** Describe various radio propagation techniques

TEXT BOOKS:

- T1:** Mohinder Jankiraman, Space-time codes and MIMO systems, Artech House, Boston, London . www.artechhouse.com, ISBN 1-58053-865-7-2004
- T2:** Paulraj Rohit Nabar, Dhananjay Gore, Introduction of space time wireless communication systems, Cambridge University Press, 2003.

REFERENCE BOOKS:

- R1:** David Tse and Pramod Viswanath, —Fundamentals of Wireless Communication||, Cambridge University Press, 2005.
- R2:** Sergio Verdu — Multi User Detection|| Cambridge University Press, 1998

B.E ELECTRICAL AND ELECTRONICS ENGINEERING

U19EEOE003

SENSORS AND TRANSDUCERS

L T P C
3 0 0 3

COURSE OBJECTIVES

- To understand the concepts of measurement technology
- To learn the various sensors used to measure various physical parameters
- To learn the fundamentals of signal conditioning, data acquisition and communication systems used in mechatronics system development.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2		3		3	2			2		2		2	
CO2	2		3		3	2			2		2		3	
CO3	2		3		3	2			2		2		2	
CO4	2		3		3	2			2		2		3	
CO5	2		3		3	2			2		2		2	
CO6	2		3		3	2			2		2		3	

UNIT I

INTRODUCTION

9

Basics of Measurement – Classification of errors – Error analysis – Static and dynamic characteristics of transducers – Performance measures of sensors – Classification of sensors – Sensor calibration techniques – Sensor Output Signal Types.

UNIT II

MOTION, PROXIMITY AND RANGING SENSORS

9

Motion Sensors – Potentiometers, Resolver, Encoders – Optical, Magnetic, Inductive, Capacitive, LVDT – RVDT – Synchro – Microsyn, Accelerometer.,– GPS, Bluetooth, Range Sensors – RF beacons, Ultrasonic Ranging, Reflective beacons, Laser Range Sensor (LIDAR).

FORCE, MAGNETIC AND HEADING SENSORS

UNIT III

9

Strain Gage, Load Cell, Magnetic Sensors –types, principle, requirement and advantages: Magneto resistive – Hall Effect – Current sensor Heading Sensors – Compass, Gyroscope, Inclinometers.

UNIT IV

OPTICAL, PRESSURE AND TEMPERATURE SENSORS

9

Photo conductive cell, photo voltaic, Photo resistive, LDR – Fiber optic sensors – Pressure – Diaphragm, Bellows, Piezoelectric – Tactile sensors, Temperature – IC, Thermistor, RTD, Thermocouple. Acoustic Sensors – flow and level measurement, Radiation Sensors - Smart Sensors - Film sensor, MEMS & Nano Sensors, LASER sensors.

Amplification – Filtering – Sample and Hold circuits – Data Acquisition: Single channel and multi channel data acquisition – Data logging - applications - Automobile, Aerospace, Home appliances, Manufacturing, Environmental monitoring.

Total: 45 HOURS

COURSE OUTCOMES

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

- CO1:** Expertise in various calibration techniques and signal types for sensors.
- CO2:** Understand about the various sensors
- CO3:** Apply the various sensors in the Automotive and Mechatronics applications
- CO4:** Study the basic principles of various smart sensors.
- CO5:** Implement the DAQ systems with different sensors for real time applications
- CO6:** Understand about different sensors with applications

TEXT BOOKS:

- T1:** Ernest O Doebelin, “Measurement Systems – Applications and Design”, Tata McGraw-Hill, 2009.
- T2:** Sawney A K and Puneet Sawney, “A Course in Mechanical Measurements and Instrumentation and Control”, 12th edition, Dhanpat Rai & Co, New Delhi, 2013.

REFERENCE BOOKS:

- R1:** Patranabis D, “Sensors and Transducers”, 2nd Edition, PHI, New Delhi, 2010.
- R2:** John Turner and Martyn Hill, “Instrumentation for Engineers and Scientists”, Oxford Science Publications, 1999
- R3:** Richard Zurawski, “Industrial Communication Technology Handbook” 2nd edition, CRC Press,2015.

COURSE OBJECTIVES

- Students will gain knowledge about different energy scenario
- To understand about the conventional energy sources.
- To understand about the non-conventional energy sources.
- To understand about the biomass energy sources.
- To learn the concept of energy conservation

PREREQUISITES

- Fundamentals of electrical engineering
- Basic concepts of Differentiation
- Basic concepts of Integration

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	3		3		2		2		2		2	
CO2	2	1	3		3		2		2		2		2	
CO3	2	1	3		3		2		2		2		2	
CO4	2	1	3		3		2		2		2		3	
CO5	2	1	3		3		2		2		2		2	
CO6	2	1	3		3		2		2		2		3	

UNIT I**ENERGY****9**

Introduction to energy – Global energy scene – Indian energy scene - Units of energy, conversion factors, general classification of energy, energy crisis, energy alternatives.

UNIT II**CONVENTIONAL ENERGY****9**

Conventional energy resources, Thermal, hydel and nuclear reactors, thermal, hydel and nuclear power plants

UNIT III**NON-CONVENTIONAL ENERGY****9**

Solar energy, flat plate collectors, focusing collectors, solar water heating, solar cooling, solar distillation, solar refrigeration, solar dryers, solar pond, solar thermal power generation, energy plantations. Wind energy, types of windmills, types of wind rotors, wind electric power generation, wind power in India, economics of wind farm, ocean wave energy conversion, ocean thermal energy conversion, tidal energy conversion, geothermal energy.

UNIT IV**BIOMASS ENERGY****9**

Biomass origin - Resources – Biomass estimation. Thermo chemical conversion – Biological conversion, – Hydrolysis & hydrogenation, solvolysis, biocrude, biodiesel power generation gasifier, biogas, integrated gasification.

UNIT V**ENERGY CONSERVATION****9**

Energy conservation - Act; Energy management importance, duties and responsibilities; Energy audit – Types methodology, reports, instruments. Benchmarking and energy performance, material and energy balance, thermal energy management.

Total: 45 HOURS**COURSE OUTCOMES**

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

- CO1:** Understand energy scenario in India
- CO2:** Understand conventional Energy sources,
- CO3:** Understand Non- conventional Energy sources,
- CO4:** Understand biomass sources and develop design parameters for equipment to be used in Chemical process industries
- CO5:** Understand energy conservation in process industries
- CO6:** Understand about different energy technology

TEXT BOOKS:

- T1:** Rao, S. and Parulekar, B.B., Energy Technology, Khanna Publishers, 2005.
- T2:** Rai, G.D., Non-conventional Energy Sources, Khanna Publishers, New Delhi, 1984.
- T3:** Nagpal, G.R., Power Plant Engineering, Khanna Publishers, 2008.

REFERENCE BOOKS:

- R1:** Nejat Veziroglu, Alternate Energy Sources, IT, McGraw Hill, New York.
- R2:** Handbook of Energy Audit by 7th edition Albert Thumann, P.E., C.E.M & William J Younger C.E.M, Fairmont Press 2008
- R3:** El. Wakil, Power Plant Technology, Tata McGraw Hill, New York, 2002.

ENGLISH

U19ENOE02	ENGLISH for EMPLOYABILITY SKILLS (Common to ALL)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To hone the employability-related communication skills of the students on the foundations built during Executive
- To assist students in becoming well-versed, responsible, creative communicators.
- To develop students' knowledge of communication skills in the structure, elucidation, and delivery of messages in diverse cultural and global communities; and
- To promote theoretical understanding and professional/personal practice of effective and ethical human communication between and within a broad range of contexts and communities.
- To write responses appropriately, organize ideas, and use vocabulary accurately

CO/PO MAPPING													CO/PSO Mapping	
COs	PROGRAMME OUTCOMES (POs)												PSOs	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1							2	2	2	3		2	1	
CO2								1	2	3		2	1	
CO3						2		2	3	3		2	1	
CO4							3	2	1	3		3	1	
CO5						3	3	3	3	3		3	1	

UNIT I 9

SWOT Analysis – Perception Management – Positive Attitude – Empathy – Altruism – Self Management - Etiquette: Social, Dinner, Corporate, Telephone and Netiquette – Interview Skills

UNIT II 9

Reading Comprehension: Technical passages –Kinds of sentences –Sentence correction – Error spotting – Idioms – Vocabulary: Jargon and Distractors – Punctuation errors – Online Course: Udemy, Edx, FutureLearn

UNIT III 9

Letter writing: Formal Letters – Letters accepting Offers - Chart description – process description – Essays — Internship Reports

UNIT IV**9**

Self-Introduction - Talking about friends and Family –Resume Preparation: Single Page and Detailed– Persuasion Skills – Emotional Intelligence – Teamwork - Establishing Credibility: Understanding the Workplace – Body Language

UNIT V**9**

Industry Psychology: Characteristics of the workplace: Physical working conditions: Noise, Illumination, Colour, Music, Miscellaneous Factors; Work Schedules: Working Hours, Permanent Part-Time Employment, Flexible Work Schedules; Psychological and Social Issues - Stress management – Time management

Total: 45 HOURS**COURSE OUTCOME**

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

- CO1** Be prepared for the personal interview through mock interviews while being aware of the various kinds of interviews.
- CO2** Introspect & develop a planned approach towards his career & life in general.
- CO3** Have clarity on his career exploration process and match his skills and interests with a chosen career path.
- CO4** Explain the use of a functional and chronological resume.
- CO5** Develop thinking ability and polish his expression in group discussions.

TEXT BOOKS

- T1** Richards, C. Jack. Interchange Students Book-3 New Delhi: CUP, 2015.
- T2** Skills for Employability, Dr. M. Sen Gupta, ISBN: 978-81-933819-1-5, 2020, First Edition
- T3** Soft Skills & Employability Skills, SABINA PILLAI, AGNA FERNANDEZ, Cambridge, ISBN: 9781316981320, 1316981320, 2017

REFERENCE BOOKS

- R1** Bridging the Soft Skills Gap: How to Teach the Missing Basics to Today's Young, ASIN : 8126563435, ISBN-10 : 9788126563432, ISBN-13 : 978-8126563432, Pan Macmillan India; 2016
- R2** Soft Skills Training: A workbook to develop skills for employment, Amazon Digital Services; Large edition, 2012, ISBN-10: 1468096494, ISBN-13 : 978-1468096491
<https://www.sirc-icai.org/images/cabf/Soft%20Skills%20&%20Personality%20Development.pdf>
- R3** <http://worldwideuniversity.org/library/bookboon/soft-skills.pdf>
- R4** <https://www.futurelearn.com/subjects/business-and-management-courses/soft-skills>
- R5**

WEB RESOURCES

- W1** https://bharatskills.gov.in/pdf/E_Books/EmployabilitySkillsSWB2W.pdf
- W2** <https://link.springer.com/book/10.1007/978-3-319-75166-5>
- W3** https://cbseacademic.nic.in/web_material/Curriculum21/publication/secondary/Employability_Skills10.pdf

COURSE OUTCOMES

At the end of the course students should be able to

- CO1: Capable of formulating beverages using various ingredients.
- CO2: Demonstrate various unit operations involved in the food beverage manufacturing
- CO3: Understand the various production techniques in beverages
- CO4: Evaluate the quality parameters of all beverages
- CO5: Familiarize with food laws and regulations of beverages
- CO6: Understand the natural and artificial colourants used in beverages

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2											1	
2	1	3											1	
3	1			3									2	
4					3			2					2	
5					3			2					1	
6	1	1		2									1	

TEXT BOOKS:

- T1: Jagan Mohan Rao and K.Ramalakshmi (2011)“Recent trend in Soft beverages”, Woodhead Publishing India Pvt Ltd.
- T2: Culton, Christopher, and David Quain (2008) Brewing yeast and fermentation. John Wiley & Sons.

REFERENCE BOOKS:

- R1: Liu, Yiu H., et al., eds. (2004) Handbook of food and beverage fermentation technology. Vol. 134. CRC Press.
- R2: Mitchell, Alan J. (199) “Formulation and Production Carbonated Soft Drinks”. Springer Science & Business Media.
- R3: Woodroof, Jasper Guy, and G. Frank Phillips. (1981) Beverages: carbonated and noncarbonated. AVI Pub. Co

U19FTOE004

PROCESSING OF FOOD MATERIALS

L T P C
3 0 0 3

COURSE OBJECTIVES

Explain the milling, extraction and manufacture of tremendous products from cereals, pulses and oil seeds. Summarize the production and processing methods of fruits and vegetables and to discuss the chemical composition, processing, production, spoilage and quality of milk and milk product. Outline the overall processes involved in the production of meat, poultry and fish products Review the production and processing methods of plantation and spice products

PREREQUISITES

- Need an idea of nature of food materials to be handled
- Prior storage conditions before processing the materials
- Basic handling techniques of materials
- Preparation of materials prior to processing

UNIT I CEREAL, PULSES AND OIL SEEDS TECHNOLOGY 9+3

Rice milling, Pulse milling, Wheat milling - Oil extraction - Methods of manufacture of Bread - different processes of manufacture - types of breads - buns, biscuits, cakes and cookies -Pasta products -Tortilla - Method of manufacture.

UNIT II FRUITS AND VEGETABLE PROCESSING 9+3

Production of Fruits and vegetables in India, Cause for heavy losses, preservation treatments - Basics of Canning, Minimal processing and Hurdle technology as applied to Vegetable and Fruit processing, Processing of fruit juices, Dehydration, Aseptic processing.

UNIT III DAIRY PROCESSING 9+3

Basic dairy terminology, composition, General tests at reception, Dairy Processing - Method of manufacture of Standardized, toned and double toned milk, milk powder - Equipment - Pasteurizers, homogenizers and pumps - Method of manufacture of dairy products – Ice cream, Cheese, Paneer, Yoghurt - Pasteurization and microorganisms involved in spoilage of milk.

UNIT IV MEAT, POULTRY AND FISH PROCESSING 9+3

Meat composition from different sources, Definitions and measurements, Carcass Processing, Meat Products, Processing of Poultry Products, Fish and other Marine Products Processing.

UNIT V PLANTATION PRODUCT TECHNOLOGY 9+3

Processing of Tea, Coffee and Cocoa - Outline of the methods of manufacture of - green tea, black tea, instant tea, Instant coffee, Cocoa and Chocolate. Outline of the methods of processing of Pepper, cardamom, ginger, vanilla and turmeric

Total: 60 HOURS

COURSE OUTCOMES

At the end of the course students should be able to

- CO1: Discuss the various processing technologies involved in cereal, pulses and oilseed technology
- CO2: Demonstrate the major operations applied in fruits and vegetable processing

- CO3: Illustrate the techniques involved in the processing of dairy products
 CO4: List the overall processing of meat, poultry and fish processing
 CO5: Outline the processing of spices and plantation products
 CO6: Analyse the manufacturing methods involved in various byproducts of food materials

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2													
2	1	3		3											
3	1													1	
4						3			2					1	
5						3			2						
6	1	1		2											

3 - High, 2 - Medium, 1 – Low

TEXT BOOKS:

- T1: Srivastava R.P. and Kumar S. Fruit and Vegetable Preservation: Principles and Practices. International Book Distributing Co. Lucknow. 3rd Edition. 2010.
- T2: Chakraverty A., Mujumdar A.S., Raghavan G.S.V and Ramaswamy H.S. Handbook of Post-harvest Technology: Marcel Dekker Press. USA. 1st Edition. 2003.

REFERENCE BOOKS:

- R1: Sukumar De. Outlines of Dairy Technology. Oxford University Press. New Delhi. 23rd impression. 2016.

B.TECH INFORMATION TECHNOLOGY

L T P C

U19ITOE003

FOUNDATION OF INFORMATION TECHNOLOGY

3 0 0 3

COURSE OBJECTIVES

- Understand the basic concepts and terminology of information technology
- Identify the components of a computer system and their functions
- Describe different types of software and their applications
- Explain the principles of computer networking and internet technologies
- Understand the basics of database design and management
- Use IT effectively in personal and professional settings

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3		3			2		2		3	2	3		
2	3		3			2		2		3	2	3		
3	3		3			2		2		3	2	3		
4	3		3			2		2		3	2	3		
5	3		3			2		2		3	2	3		
6	3		3			2		2		3	2	3		

UNIT I: Basics of Information Technology

9

Internet: World Wide Web, Web servers, Web Clients, Web sites, Web Pages, Web Browsers, Blogs, News groups, HTML, Web address, E-mail address, URL, HTTP, FTP, downloading and uploading files from remote site; Services available on Internet: Information Retrieval, Locating sites using search engines and finding people on the net; Web Services: Chat, email, Video Conferencing, e-Learning, e-Banking, e-Shopping, e-Reservation, e-Governance, e-Groups, Social Networking

UNIT II: Information Processing Tools

9

Office Tools: Database Management Tool: Basic Concepts and need for a database, Creating a database. DataTypes-Text, Number, Date, Time, Setting the Primary Key, Entering data into a database, Inserting and deleting Fields, Inserting and deleting Records, Field Size, Default Value, Creating Query using Design view.

UNIT III: Hyper Text Markup Language

9

Introduction to Web Page Designing using HTML, Creating and saving an HTML document, accessing a web page using a web browser (Google Chrome, Internet Explorer, Mozilla Firefox, Opera, Apple Safari, Net scape Navigator); Elements in HTML.

UNIT IV: XML**9**

Introduction to XML, Difference between XML and HTML with respect to the following: Data separation, data sharing, document structure, tags, nesting of elements, attributes, values. XML Elements - Defining own tags in XML, root elements, child elements and their attributes; Comments in XML, White space and new line in XML, well formed XML documents, validating XML documents, XML Parser, Viewing XML documents in a web browser.

UNIT V: Societal Impacts of IT**9**

Information Security: Virus, Worms, Trojans and Anti-Virus Software, Spyware, Malware, Spams, Data Backup and recovery tools and methods, Online Backups, Hacker and Cracker with regard to Computer Data and Applications, Social Networking Information security provisions in e-commerce, Benefits of ICT in Education, Healthcare, Governance, Virtual, School, emergence of Knowledge economy, Impact of ICT on Society: Knowledge based society, Infomania, Digital Unity and Digital Divide

Total: 45 HOURS**TEXT BOOKS**

1. Introduction to Information Technology" by Turban, Rainer, and Potter (Wiley, 2015)
2. Discovering Computers" by Vermaat, Sebok, and Freund (Cengage Learning, 2019)

REFERENCE BOOKS

1. Computer Science Illuminated" by Nell Dale and John Lewis (Jones & Bartlett Learning, 2018)
2. Computer Science Illuminated" by Nell Dale and John Lewis (Jones & Bartlett Learning, 2018)

COURSE OUTCOMES:

At the end of the course students should be able to

CO1: Understand fundamental concepts, principles, and applications of information technology

CO2: Understand the different types of software and their applications

CO3: Understand the basics of database design and management.

CO4: Understand the role of information systems in organizations and their applications

CO5: Understand the principles of computer networking and internet technologies

CO6: Apply IT effectively in personal and professional settings.

COURSE OBJECTIVES

- To Learn the basic concepts in HTML, CSS, Javascript.
- To Understand the responsive design and development.
- To Understand the responsive design and development.
- To Design a Website with HTML, JS, CSS / CMS - Word press.

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3		3		3	3	2		3		3	3		1
2	3		3		3	3	2		3		3	3		1
3	3		3		3	3	2		3		3	3		2
4	3		3		3	3	2		3		3	3		2
5	3		3		3	3	2		3		3	3		1
6	3		3		3	3	2		3		3	3		1

UNIT I: WEB DESIGN - HTML MARKUP FOR STRUCTURE 9

Working of Web - HTML Markup for Structure - Creating simple page - Marking up text - Adding Links - Adding Images - Table Markup - Forms - HTML5

UNIT II: CSS AND JAVASCRIPT 9

CSS - Formatting text - Colours and Background - Padding, Borders and Margins - Floating and positioning - Page Layout with CSS - Transition, Transforms and Animation - Javascript - Using Java Script

UNIT III: RESPONSIVE WEB DESIGN 9

Sass for Responsive Web Design - Marking Content with HTML5 - Mobile-First or Desktop-First - CSS Grids, CSS Frameworks, UI Kits, and Flexbox for RWD - Designing small UIs by Large Finger - Images and Videos in Responsive Web Design - Meaningful Typography for Responsive Web Design

UNIT IV: WEB PROJECT MANAGEMENT**9**

Project Life Cycle - Project Definition - Discovery and Requirements - Project Schedule and Budgeting - Running the project - Technical Documentation - Development ,Communicaton, Documentation - QA and testing -Deployment - Support and operations

UNIT V: PROJECT CASE STUDY**9**

Using HTML, CSS, JS or using Opensource CMS like Wordpress, design and develop a Website having Aesthetics, Advanced and Minimal UI Transitions based on the project - Host and manage the project live in any public hosting.

Total: 45 HOURS**TEXT BOOKS**

1. Jennifer Niederst Robbins, "Learning Web Design", O'REILLY 4th Edition
2. Ricardo Zea, "Mastering Responsive Web Design", PACKT Publishing, 2015
3. Justin Emond, Chris Steins, "Pro Web Project Management", Apress,2011

REFERENCE BOOKS

1. Jon Duckett, "HTML and CSS: Design and Build Websites", John Wiley and Sons, edition 2014
2. Jon Duckett, Jack Moore, "JavaScript & JQuery: Interactive Front-End Web Development", John Wiley and Sons, edition 2014
3. Uttam K. Roy "Web Technologies" Oxford University Press, 13th impression, 2017
4. Wordpress - <http://www.wpbeginner.com/category/wp-tutorials/>

COURSE OUTCOMES:

At the end of the course students should be able to

CO1: Understand the principles of web design, including layout, color theory, typography, and user experience design.

CO2: Design Website using HTML CSS and JS

CO3: Design Responsive Sites

CO4: Manage, Maintain and Support Web Apps

CO5: Gain practical experience working on real-world web design projects, and learn how to collaborate with clients, stakeholders, and team members.

CO6: Develop an understanding of web analytics and digital marketing, and learn how to use data to improve website performance and user engagement.

B.E MECHANICAL ENGINEERING

U19MEOE003

AUTOMOBILE TECHNOLOGY

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

- To gain knowledge on the automobile architecture and understand its performance.
- To learn about the significant parameters that determine the engine performance.
- To learn about the different types of transmission systems used in automobiles
- To understand the different components and mechanism of a suspension system
- To learn about the mechanism involved in operation of steering

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	1	1		3				3					1	
2	2	1						2					1	
3	3	2		1				1					1	
4	1	3		3				2					1	
5	3	2											1	

PRE-REQUISITES

Nil

THEORY COMPONENT CONTENTS

UNIT I AUTOMOBILE ARCHITECTURE AND PERFORMANCE 9

Automotive components, subsystems and their positions- Chassis, frame and body, front, rear and four wheel drives, Operation and performance, Traction force and traction resistance, Power required for automobile-Rolling, air and gradient resistance.

UNIT II ENGINE ARCHITECTURE AND PERFORMANCE 9

Types of engine, multi valve engine, in-line engine, vee-engine, Petrol engine direct, single point and multipoint injection, diesel engine-common rail diesel injection, supercharging and turbo charging, alternate fuels-ethanol and ethanol blend, compressed natural gas, fuel cells, hybrid vehicles, Engine Control Unit.

UNIT III TRANSMISSION SYSTEMS 9

Clutch : Types-coil spring and diaphragm type clutch, single and multi plate clutch, centrifugal clutch, Gear box : Types-constant mesh, sliding mesh and synchromesh gear box, layout of gear box, gear selector and shifting mechanism, overdrive, automatic transmission, Propeller shaft, universal joint, slip joint, differential and real axle arrangement, hydraulic coupling

U19MEOE004

CAD/CAM

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

To impart knowledge on computer graphics which are used routinely in diverse areas as science, engineering, medicine, etc.

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2		3										
2	3	2		3				2						
3	3	3		3										
4	3	2		3				2						
5	3	2		3										

PRE-REQUISITES

Engineering Drawing

THEORY COMPONENT CONTENTS

UNIT I INTRODUCTION TO COMPUTER GRAPHICS FUNDAMENTALS 9

Output primitives (points, lines, curves etc.), 2-D & 3-D transformation (Translation, scaling, rotation) windowing - view ports - clipping transformation.

UNIT II CURVES AND SURFACES MODELING 9

Introduction to curves - Analytical curves: line, circle and conics – synthetic curves: Hermite cubic spline- Bezier curve and B-Spline curve – curve manipulations. Introduction to surfaces - Analytical surfaces: Plane surface, ruled surface, surface of revolution and tabulated cylinder – synthetic surfaces: Hermitebicubic surface- Bezier surface and B-Spline surface- surface manipulations.

UNIT III NURBS AND SOLID MODELING 9

NURBS- Basics- curves, lines, arcs, circle and bi linear surface. Regularized Boolean set operations - primitive instancing - sweep representations - boundary representations – constructive solid Geometry - comparison of representations - user interface for solid modelling.

UNIT IV VISUAL REALISM 9

Hidden – Line – Surface – solid removal algorithms shading – coloring. Introduction to parametric and variational geometry based software's and their principles creation of prismatic and lofted parts using these packages.

UNIT V ASSEMBLY OF PARTS AND PRODUCT DATA EXCHANGE 9

Assembly modeling - interferences of positions and orientation - tolerances analysis – mass property calculations - mechanism simulation. Graphics and computing standards– Open GL Data Exchange standards – IGES, STEP etc– Communication standards.

Total:45 Hours

COURSE OUTCOMES

At the end of the course students should be able to

- CO1 :** Understand the fundamentals of computer graphics.
- CO2 :** Apply different techniques for geometric modelling.
- CO3 :** Apply different algorithm to create prismatic and lofted parts.
- CO4 :** Discuss tolerance analysis and mass property calculations.
- CO5 :** Explain data exchange standards and communication standards.

TEXT BOOKS

- T1. David F. Rogers, James Alan Adams, “Mathematical elements for computer graphics”, second edition, Tata McGraw-Hill edition.
- T2. Ibrahim Zeid, “Mastering CAD/CAM”, McGraw Hill, International Edition, 2007.

REFERENCE BOOKS

- R 1. Donald Hearn and M. Pauline Baker, “Computer Graphics” Prentice Hall, Inc., 1992.
- R2. William M Neumann and Robert F.Sproul, “Principles of Computer Graphics”, McGraw Hill Book Co. Singapore, 1989.

U19CHOE001

ENVIRONMENTAL SCIENCES

L T P C
3 0 0 3

Course Objective

The student should be made:

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

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1						3	3						2	
CO2						3	3						2	
CO3						3	3						2	
CO4						3	3						2	
CO5						3	3						3	
CO6						3	3						2	

UNIT I

ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY

14

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 and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation

– hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity. Field study of common plants, insects, birds; Field study of simple ecosystems – pond, river, hill slopes, etc

UNIT II ENVIRONMENTAL POLLUTION 8

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

UNIT III NATURAL RESOURCES 10

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

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 7

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

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 6

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

Total:45 HOURS

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Awareness on environmental factors
- CO2:** Finds scientific, technological, economic and political solutions to environmental problems
- CO3:** Knowledge on interrelationship between living organism and environment
- CO4:** Assess impact on the human world envision the surrounding environment, its functions and its value
- CO5:** Knowledge on the dynamic processes and understand the features of the earth's interior and surface
- CO6:** Understands the integrated themes and biodiversity, natural resources, pollution control and waste management.

TEXTBOOKS:

- T1** Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2006.
- T2** Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education, 2004.

REFERENCEBOOKS:

- R1** Dharmendra S. Sengar, 'Environmental law', Prentice hall of India Pvt Ltd, New Delhi, 2007.
- R2** Erach Bharucha, "Textbook of Environmental Studies", Universities Press(I) Pvt, Ltd, Hyderabad, 2015.
- R3** G. Tyler Miller and Scott E. Spoolman, "Environmental Science", Cengage Learning India Pvt, Ltd, Delhi, 2014.
- R4** Rajagopalan.R, 'Environmental Studies-From Crisis to Cure', Oxford University Press, 2005

U19EDOE01

INTELLECTUAL PROPERTY RIGHTS

L T P C
3 0 0 3

COURSE OBJECTIVES

- To give an idea about IPR, registration and its enforcement.

PREREQUISITES

- Fundamentals of Products

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1		3	2		2			2			2	2	
CO2	1		3	2		2			2			2	2	
CO3	1		3	2		2			2			2	2	
CO4	1		3	2		2			2			2	2	
CO5	1		3	2		2			2			2	2	
CO6	1		3	2		2			2			2	3	

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 HOURS

COURSE OUTCOMES

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

- CO1:** Ability to manage Intellectual Property portfolio to enhance the value of the firm.
- CO.2:** Ability to learn the registration of IPRs
- CO.3:** Ability to learn the agreements and legislations process
- CO.4:** Ability to understand the digital products and law
- CO.5:** Ability to learn the enforcement of IPRs.
- CO6:** Ability to patent filing and publishing

TEXT BOOKS:

- T1:** V. Scople Vinod, Managing Intellectual Property, Prentice Hall of India pvt Ltd, 2012
- T2:** S. V. Satakar, "Intellectual Property Rights and Copy Rights, Ess Ess Publications, New Delhi, 2002

REFERENCE BOOKS:

- R1:** Deborah E. Bouchoux, "Intellectual Property: The Law of Trademarks, Copyrights, Patents and Trade Secrets", Cengage Learning, Third Edition, 2012.
- R2:** Prabuddha Ganguli, "Intellectual Property Rights: Unleashing the Knowledge Economy", McGraw Hill Education, 2011.
- R3:** Edited by Derek Bosworth and Elizabeth Webster, The Management of Intellectual Property, Edward Elgar Publishing Ltd., 2013.