S.A.ENGINEERING COLLEGE, CHENNAI -600 077
(An Autonomous Institution, Affiliated to Anna University)
REGULATION 2020A
B.TECH INFORMATION TECHNOLOGY
CHOICE BASED CREDIT SYSTEM

VISION OF THE DEPARTMENT

The Department's vision is clearly defined and it is in line with the college's vision. The vision of the department is,

- To transform our department into a quality hub, by providing technology updated education with ethical values.

MISSION OF THE DEPARTMENT

The mission of the Department is concise and supports the College's mission. The mission of the Department is,

- To develop our students, with comprehensive knowledge across the technological areas and to build their ability, to apply the technical theory, design and implementation for the given problems.
- To prepare our students, by facilitating an prominent environment for their learning and applications of Information Technology, which will enable them to work in teams and to become successful in their careers.
- To motivate Scientific Research among students, that will help them in establishing technological innovations and management for the society.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

I. Demonstrate core competence in basic engineering and mathematics to design, formulate, analyze, and solve hardware/software engineering problems.

II. Develop insights in foundational areas of Information Technology and related engineering to address real-world problems using digital and cognitive technologies.

III. Collaborate with industry, academic and research institutions for state-of-the- art product development and research.

IV. Inculcate a high degree of professionalism, effective communication skills and team spirit to work on multidisciplinary projects in diverse environments.

PROGRAMME OUTCOMES (POs):

Engineering Graduates will be able to:

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

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

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

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

5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling tocomplex 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 theknowledge 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 effectivepresentations, 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 abilityto engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs):

PSO1: Ability to apply programming principles and practices for the design of software solutions in an internet-enabled world of business and social activities.

PSO2: Ability to identify the resources to build and manage the IT infrastructure using the current technologies in order to solve real world problems with an understanding of the tradeoffs involved in the design choices.

Mapping of PEO with PO & PSO:

PROGRAMME EDUCATIONAL OBJECTIVES	PROGRAMME OUTCOMES & PROGRAMME SPECIFIC OUTCOMES													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
PEO I	✓	✓	✓	✓	✓							✓		✓
PEO II	✓	✓	✓	✓	✓							✓	✓	
PEO III						✓	✓	✓	✓	✓	✓	✓	✓	✓
PEO IV		✓				✓	✓	✓	✓	✓	✓	✓		✓

MAPPING OF COURSE OUTCOME AND PROGRAMME OUTCOME:

A broad relation between the Course Outcomes and Programme Outcomes and Programme Specific Outcomes is given inthe following table

YR	Course Title	Programme Outcome(PO) & Programme Specific outcomes (PSO)													
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PSO 2
	SEMESTER I														
1ST YEAR	Technical English						√	√		√	√	√	√		
	Calculus and its applications	√	√	√											
	Applied Physics	√	√												
	Engineering Chemistry	√	√	√											
	Problem Solving and Python Programming	√	√	√	√	√							√	√	√
	Engineering Graphics	√	√												
	Tamilar Marabu/ Heritage of Tamils														
	Physics and Chemistry Laboratory	√	√	√	√										
	Problem Solving and Python Programming Laboratory	√	√	√	√	√						√		√	√
	Indian Constitution						√	√		√	√	√	√		
	SEMESTER II														
	English for Communication					√	√			√	√		√		
	Complex Variables and Transforms	√	√	√											
	Material Science	√	√												
	Basic Electrical, Electronics and Measurement Engineering	√	√								√	√	√		
	Programming in C	√	√	√	√									√	√
	Information Technology Essentials	√	√	√	√	√	√							√	√

	Tamilar Thozhil Nutpam/ Tamil and Technology													
	Programming in C Laboratory	√			√	√						√	√	√
	Engineering Practice Laboratory	√	√	√	√									
	Information Technology Essentials Laboratory	√	√	√	√	√	√	√				√	√	√
	Environmental Science and Engineering	√	√	√	√		√	√						
2nd YEAR	**SEMESTER III**													
	Discrete Mathematics	√	√	√	√								√	
	Object Oriented Programming	√	√	√	√	√	√	√		√	√	√	√	√	√
	Data Structures	√	√	√									√	√	√
	Digital Principles and System Design	√	√	√	√	√	√	√		√	√		√	√	
	Analog and Digital Communication	√	√	√	√								√	√	
	Object Oriented Programming Laboratory	√	√	√	√	√				√	√	√	√	√	√
	Data Structures Laboratory	√	√	√						√	√		√	√	√

	Interpersonal Skills Laboratory					√	√	√		√	√	√	√		
	SEMESTER IV														
	Probability and Statistics	√	√	√	√									√	
	Computer Architecture	√	√	√		√							√	√	√
	Database Management Systems	√	√	√									√	√	√
	Design and Analysisof Algorithms	√	√	√	√								√	√	√
	Universal Human Values	√					√	√		√	√		√	√	√
	Microprocessors and Microcontrollers	√	√	√					√					√	√
	Database Management Systems Laboratory	√	√	√		√				√	√			√	√
	Design and Analysisof Algorithms Laboratory	√	√	√	√	√							√	√	√
	Employability And Soft Skills Laboratory					√	√	√		√	√	√	√		
									√						

3rd YEAR	**SEMESTER V**													
	Algebra and Number Theory	√	√	√									√	
	Computer Networks	√	√	√	√	√		√		√	√	√	√	√
	Operating Systems	√	√	√								√	√	√
	Artificial Intelligence	√	√	√	√						√	√	√	√
	Web Technology	√	√	√	√	√						√	√	√
	Open Elective I													
	Networks Laboratory	√	√	√	√	√		√		√	√	√	√	√
	Web Technology Laboratory	√	√	√	√	√						√	√	√
	Operating Systems Laboratory	√	√	√						√	√		√	√	√
	SEMESTER VI													
	Cryptography and Network Security	√	√	√	√	√							√	√	√
	Mobile Communication	√	√	√									√	√	√
	Big Data Analytics	√	√	√		√		√		√	√	√	√	√	√

	Software Engineering	√	√	√		√			√	√	√	√	√	√	√
	Object Oriented Analysis and Design	√	√	√	√	√				√	√	√	√	√	√
	Professional Elective I	√	√	√		√			√	√	√		√		
	Professional Readiness for Innovation, Employability and Entrepreneurship	√	√	√	√		√		√	√	√	√	√		√
	Mobile Application and Development Laboratory	√	√	√		√	√		√	√	√		√		
	Mini Project	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Professional Communication Laboratory					√	√	√	√	√	√	√	√		

4th YEAR	**SEMESTER VII**														
	Principles of Management						√		√	√	√	√	√	√	√
	Distributed Systems and Cloud Computing	√	√	√	√	√							√	√	√
	Machine Learning	√	√	√	√	√							√	√	√
	Open Elective II														
	Professional Elective II														
	Machine Learning Laboratory	√	√	√	√	√					√		√	√	√
	Cloud Computing Laboratory	√	√	√	√	√							√	√	√
	Design Thinking and Prototyping Laboratory	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	SEMESTER VIII														
	Professional Elective III														
	Professional Elective IV														
	Project Work	√	√	√	√	√	√	√	√	√	√	√	√	√	√

SEMESTER I

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT HOURS	L	T	P	C
THEORY								
1.	HS1101A	Technical English	HS	3	3	0	0	3
2.	MA1101A	Calculus and its Applications	BS	4	3	1	0	4
3.	PH1101A	Applied Physics	BS	3	3	0	0	3
4.	CY1101A	Engineering Chemistry	BS	3	3	0	0	3
5.	CS1101A	Problem Solving and Python Programming	ES	3	3	0	0	3
6.	ME1101A	Engineering Graphics	ES	4	2	0	2	3
7.	TA1101A	தமிழரும் ததொழில்நுட்பமும் /Tamils and Technology	HSMC	1	0	0	1	1
PRACTICALS								
7.	BS1101A	Physics and Chemistry Laboratory	BS	4	0	0	4	2
8.	CS1102A	Problem Solving and Python Programming Laboratory	ES	4	0	0	4	2
MANDATORY COURSE								
9.	CI1101A	Indian Constitution	MC	2	2	0	0	0
TOTAL				31	19	1	11	24

SEMESTER II

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT HOURS	L	T	P	C
THEORY								
1.	HS1201A	English for Communication	HS	3	3	0	0	3
2.	MA1201A	Complex Variables and Transforms	BS	4	3	1	0	4
3.	PH1201A	Materials Science	BS	3	3	0	0	3
4.	EE1202A	Basic Electrical, Electronics and Measurement Engineering	ES	3	3	0	0	3
5.	CS1201A	Programming in C	PC	3	3	0	0	3
6.	IT1201A	Information Technology Essentials	PC	3	3	0	0	3
7.	TA1201A	தமிழர்மரபு/Heritage of Tamils	HSMC	1	0	0	1	1
PRACTICALS								
7.	CS1203A	Programming in C Laboratory	PC	4	0	0	4	2
8.	GE1201A	Engineering Practices Laboratory	ES	4	0	0	4	2
9.	IT1202A	Information Technology Essentials Laboratory	PC	2	0	0	2	1
MANDATORY COURSE								
10.	CY1201A	Environmental Science and Engineering	MC	2	2	0	0	0
TOTAL				32	20	1	11	25

SEMESTER III

S.NO	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT HOURS	L	T	P	C
THEORY								
1.	MA1303A	Discrete Mathematics	BS	4	3	1	0	4
2.	IT1301A	Object Oriented Programming	PC	3	3	0	0	3
3.	CS1301A	Data Structures	PC	3	3	0	0	3
4.	EC1306A	Digital Principles and System Design	ES	3	3	0	0	3
5.	EC1307A	Analog and Digital Communication	PC	3	3	0	0	3
PRACTICALS								
6.	IT1302A	Object Oriented Programming Laboratory	PC	4	0	0	4	2
7.	CS1303A	Data Structures Laboratory	PC	4	0	0	4	2
8.	HS1301A	Interpersonal Skills Laboratory	EEC	2	0	0	2	1
TOTAL				26	15	1	10	21

SEMESTER IV

S.NO	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT HOURS	L	T	P	C
THEORY								
1.	MA1403A	Probability and Statistics	BS	4	3	1	0	4
2.	CS1401A	Computer Architecture	PC	3	3	0	0	3
3.	IT1401A	Database Management Systems	PC	3	3	0	0	3
4.	CS1402A	Design and Analysis of Algorithms	PC	3	3	0	0	3
5.	EC1503A	Microprocessors and Microcontrollers	PC	3	3	0	0	3
6.	HV1401A	Universal Human Values	ES	3	2	1	0	3
PRACTICALS								
7.	IT1402A	Database Management Systems Laboratory	PC	4	0	0	4	2
8.	CS1404A	Design and Analysis of Algorithms Laboratory	PC	4	0	0	4	2
9.	HS1401A	Employability and Soft Skills Laboratory	EEC	2	0	0	2	1
	TOTAL			29	17	2	10	24

SEMESTER V

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT HOURS	L	T	P	C
THEORY								
1.	MA1501A	Algebra and Number Theory	BS	4	3	1	0	4
2.	IT1501A	Computer Networks	PC	3	3	0	0	3
3.	CS1501A	Operating Systems	PC	3	3	0	0	3
4.	CS1603A	Artificial Intelligence	PC	3	3	0	0	3
5.	IT1502A	Web Technology	PC	3	3	0	0	3
6.		Open Elective I	OE	3	3	0	0	3
PRACTICALS								
7.	IT1503A	Networks Laboratory	PC	4	0	0	4	2
8.	IT1504A	Web Technology Laboratory	PC	4	0	0	4	2
9.	CS1503A	Operating Systems Laboratory	PC	4	0	0	4	2
TOTAL				31	18	1	12	25

SEMESTER VI

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT HOURS	L	T	P	C
THEORY								
1.	CS1604A	Cryptography and Network Security	PC	3	3	0	0	3
2.	IT1601A	Mobile Communication	PC	3	3	0	0	3
3.	IT1602A	Big Data Analytics	PC	3	3	0	2	4
4.	CS1302A	Software Engineering	PC	3	3	0	0	3
5.	CS1403A	Object Oriented Analysis andDesign	PC	4	3	0	2	4
6.		Professional Elective I	PE	3	3	0	0	3
PRACTICALS								
7.	IT1603A	Mobile Application and Development Laboratory	PC	4	0	0	4	2
8.	HS1601A	Professional Communication Laboratory	EEC	2	0	0	2	1
9.	IT1604A	Mini Project	PC	2	0	0	2	1
TOTAL				27	18	0	12	24

SEMESTER VII

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT HOURS	L	T	P	C
THEORY								
1.	MG1701A	Principles of Management	HS	3	3	0	0	3
2.	IT1701A	Distributed Systems and Cloud Computing	PC	3	3	0	0	3
3.	CS1701A	Machine Learning	PC	3	3	0	0	3
4.		Open Elective II	OE	3	3	0	0	3
5.		Professional Elective II	PE	3	3	0	0	3
PRACTICALS								
6.	CS1702A	Machine Learning Laboratory	PC	4	0	0	4	2
7.	IT1702A	Cloud Computing Laboratory	PC	4	0	0	4	2
8.	IT1703A	Design Thinking and Prototyping Laboratory	PC	2	0	0	2	1
9.	IT1704A	Summer Internship	EEC	4	0	0	0	2
TOTAL				29	15	0	10	22

SEMESTER VIII

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT HOURS	L	T	P	C
THEORY								
1.		Professional Elective III	PE	3	3	0	0	3
2.		Professional Elective IV	PE	3	3	0	0	3
PRACTICALS								
3.	IT1801	Project Work	PC	6	0	0	14	8
TOTAL				12	6	0	14	14

TOTAL NO. OF CREDITS: 179

HUMANITIES AND SOCIAL SCIENCES (HS)

Sl.N O.	COURSE CODE	COURSE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	HS1101A	Technical English	HS	3	3	0	0	3
2.	HS1201A	English for Communication	HS	3	3	0	0	3
3.	MG1701A	Principles of Management	HS	3	3	0	0	3

(HSMC)

Sl.N O.	COURSE CODE	COURSE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	TA1101A	Tamilar Marabu/ Heritage of Tamils	HSMC	1	1	0	0	1
2.	TA1201A	Tamilar Thozhil Nutpam/ Tamils and Technology	HSMC	1	1	0	0	1

BASIC SCIENCES (BS)

Sl.N O.	COURSE CODE	COURSE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	MA1101A	Calculus and its applications	BS	4	3	1	0	4
2.	PH1101A	Applied Physics	BS	3	3	0	0	3
3.	CY1101A	Engineering Chemistry	BS	3	3	0	0	3
4.	BS1101A	Physics and Chemistry Laboratory	BS	4	0	0	4	2
5.	MA1201A	Complex Variables and Transforms	BS	4	3	1	0	4
6.	PH1201A	Material Science	BS	3	3	0	0	3
7.	MA1303A	Discrete Mathematics	BS	4	3	1	0	4
8.	MA1403A	Probability and Statistics	BS	4	3	1	0	4
9.	MA1501A	Algebra and Number Theory	BS	4	3	1	0	4

ENGINEERING SCIENCES (ES)

Sl.N O.	COURSE CODE	COURSE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	CS1101A	Problem Solving and Python Programming	ES	3	3	0	0	3
2.	ME1101A	Engineering Graphics	ES	4	2	0	2	3
3.	EE1202A	Basic Electrical, Electronics and Measurement Engineering	ES	3	3	0	0	3
4.	CS1102A	Problem Solving and Python Programming Laboratory	ES	4	0	0	4	2
5.	GE1201A	Engineering Practices Laboratory	ES	4	0	0	4	2
6.	EC1306A	Digital Principles and System Design	ES	3	3	0	0	3

7.	HV1401A	Universal Human Values	ES	3	2	1	0	3

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

Sl.N O.	COURSE CODE	COURSE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	HS1301A	Interpersonal Skills Laboratory	EEC	2	0	0	2	1
2.	HS1401A	Employability And Soft Skills Laboratory	EEC	2	0	0	2	1
3.	IT1704A	Summer Internship	EEC	4	0	0	0	2
4.	HS1601A	Professional Communication Laboratory	EEC	2	0	0	2	1

MANDATORY COURSES(MC)

Sl. N O.	COURSE CODE	COURSE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	CI1101A	Indian Constitution	MC	2	2	0	0	0
2.	CY1201A	Environmental Science and Engineering	MC	2	2	0	0	0

PROFESSIONAL CORE (PC)

Sl. N O.	COURSE CODE	COURSE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	CS1201A	Programming in C	PC	3	3	0	0	3
2.	IT1201A	Information Technology Essentials	PC	3	3	0	0	3
3.	CS1203A	Programming in C Laboratory	PC	4	0	0	4	2
4.	IT1202A	Information Technology Essentials Laboratory	PC	2	0	0	2	1
5.	IT1301A	Object Oriented Programming	PC	3	3	0	0	3
6.	CS1301A	Data Structures	PC	3	3	0	0	3
7.	CS1302A	Software Engineering	PC	3	3	0	0	3
8.	IT1302A	Object Oriented Programming Laboratory	PC	4	0	0	4	2
9.	CS1303A	Data Structures Laboratory	PC	4	0	0	4	2
10.	EC1307A	Analog and Digital Communication	PC	3	3	0	0	3
11.	CS1401A	Computer Architecture	PC	3	3	0	0	3
12.	IT1401A	Database Management Systems	PC	3	3	0	0	3
13.	CS1402A	Design and Analysis of Algorithms	PC	3	3	0	0	3
14.	EC1503A	Microprocessors and Microcontrollers	PC	3	3	0	0	3
15.	CS1403A	Object Oriented Analysis and Design	PC	4	3	0	2	4
16.	IT1402A	Database Management Systems Laboratory	PC	4	0	0	4	2
17.	CS1404A	Design and Analysis of Algorithms Laboratory	PC	4	0	0	4	2
18.	IT1501A	Computer Networks	PC	3	3	0	0	3
19.	CS1501A	Operating Systems	PC	3	3	0	0	3
20.	IT1502A	Web Technology	PC	3	3	0	0	3
21.	IT1503A	Networks Laboratory	PC	4	0	0	4	2
22.	IT1504A	Web Technology Laboratory	PC	4	0	0	4	2
23.	CS1503A	Operating Systems Laboratory	PC	4	0	0	4	2
24.	CS1603A	Artificial Intelligence	PC	3	3	0	0	3
25.	CS1604A	Cryptography and Network Security	PC	3	3	0	0	3
26.	IT1601A	Mobile Communication	PC	3	3	0	0	3
27.	IT1602A	Big Data Analytics	PC	3	3	0	0	3
28.	IT1603A	Mobile Application and Development Laboratory	PC	4	0	0	4	2
29.	IT1701A	Distributed Systems and Cloud Computing	PC	3	3	0	0	3
30.	CS1701A	Machine Learning	PC	3	3	0	0	3
31.	CS1702A	Machine Learning Laboratory	PC	4	0	0	4	2
32.	IT1702A	Cloud Computing Laboratory	PC	4	0	0	4	2
33.	IT1703A	Design Thinking and Prototyping Laboratory	PC	2	0	0	2	1
34.	IT1801A	Project Work	PC	6	0	0	6	3

PROFESSIONAL ELECTIVES-I (PE)
SEMESTER-VI

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	CS1607A	Cyber Security	PE	3	3	0	0	3
2.	CS1608A	Software Testing	PE	3	3	0	0	3
3.	CS1609A	Agile Methodologies	PE	3	3	0	0	3
4.	CS1610A	Graph Theory and Applications	PE	3	3	0	0	3
5.	CS1611A	Data warehousing and Data mining	PE	3	3	0	0	3

PROFESSIONAL ELECTIVE – II

SEMESTER-VII

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	CS1704A	Service Oriented Architecture	PE	3	3	0	0	3
2.	CS1705A	Total Quality Management	PE	3	3	0	0	3
3.	CS1706A	Multi core Architectures and Programming	PE	3	3	0	0	3
4.	CS1707A	Human Computer Interaction	PE	3	3	0	0	3
5.	CS1708A	C# and .Net Programming	PE	3	3	0	0	3
6.	CS1709A	Wireless Adhoc and Sensor Networks	PE	3	3	0	0	3
7.	CS1710A	Advanced Topics on Databases	PE	3	3	0	0	3
8.	CS1711A	Full Stack Web development	PE	3	3	0	0	3
9.	CS1712A	Human Rights	PE	3	3	0	0	3
10	CS1713A	Blockchain Technologies	PE	3	3	0	0	3

PROFESSIONAL ELECTIVE – III
SEMESTER-VIII

Sl.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	EC1811A	Digital Image Processing	PE	3	3	0	0	3

2.	IT1803A	Social Network Analysis	PE	3	3	0	0	3
3.	IT1811A	Foundation of Design and Creativity	PE	3	3	0	0	3
4.	IT1804A	Cyber Forensics	PE	3	3	0	0	3
5.	CS1802A	Neural Networks And Deep Learning	PE	3	3	0	0	3
6.	GE1801A	Professional Ethics in Engineering	PE	3	3	0	0	3

PROFESSIONAL ELECTIVE – IV

SEMESTER-VIII

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	IT1802A	Electronic Commerce	PE	3	3	0	0	3
2.	IT1805A	Information Retrieval Techniques	PE	3	3	0	0	3
3.	CS1810A	Green Computing	PE	3	3	0	0	3
4.	IT1806A	GPU Architecture and Programming	PE	3	3	0	0	3
5.	IT1807A	Natural Language Processing	PE	3	3	0	0	3
6.	IT1808A	Parallel Algorithms	PE	3	3	0	0	3
7.	CS1811A	Mobile Pervasive Computing	PE	3	3	0	0	3
8.	IT1809A	Fundamentals of Nano Science	PE	3	3	0	0	3
9.	CS1811A	Software Defined Networks	PE	3	3	0	0	3
10	IT1810A	Logistics and Supply chain management	PE	3	3	0	0	3

OPEN ELECTIVES OFFERED TO OTHER DEPARTMENT

OPEN ELECTIVE -I

SEMESTER V

S.NO	COURSE CODE	COURSE TITLE	OFFERING DEPT	CONTACT PERIODS	L	T	P	C
1.	OIT501A	Database Management Systems	IT	3	3	0	0	3
2.	OIT502A	Cloud Computing	IT	3	3	0	0	3
3.	OIT503A	Artificial Intelligence	IT	3	3	0	0	3

OPEN ELECTIVES OFFERED TO OTHER DEPARTMENT

OPEN ELECTIVE –II

SEMESTER VII

S.NO	COURSE CODE	COURSE TITLE	OFFERING DEPT	CONTACT PERIODS	L	T	P	C
1.	OIT701A	Digital Forensics	IT	3	3	0	0	3
2.	OIT702A	Multimedia and Animation Techniques	IT	3	3	0	0	3
3.	OIT703A	Basics on Cyber Security and Ethical Hacking	IT	3	3	0	0	3

OPEN ELECTIVES OFFERED BY OTHER DEPARTMENTS

SEMESTER V

S.NO	COURSE CODE	COURSE TITLE	OFFERING DEPT	CONTACT PERIODS	L	T	P	C
1.	OEE501A	Basics of Bio medical Instrumentation	EEE	3	3	0	0	3
2.	OEE502A	Sensors and Transducers	EEE	3	3	0	0	3
3.	OEC501A	5G Communications	ECE	3	3	0	0	3
4.	OEC502A	Internet of things	ECE	3	3	0	0	3
5.	OEC503A	Information Security	ECE	3	3	0	0	3
6.	OME501A	Internal Combustion Engines	MECH	3	3	0	0	3
7.	OME502A	Robotics	MECH	3	3	0	0	3
8.	OCE501A	Geographical Information System	CIVIL	3	3	0	0	3
9.	OCE502A	Remote Sensing and GIS Techniques	CIVIL	3	3	0	0	3
10.	OCE503A	Air and Noise Pollution	CIVIL	3	3	0	0	3
11.	OCE504A	Pollution Control and Monitoring	CIVIL	3	3	0	0	3
12.	OCE505A	Environmental and Social Impact Assessment	CIVIL	3	3	0	0	3
13.	OHS501A	Material Science	PHYSICS	3	3	0	0	3
14.	OHS502A	Fundamentals of Nano Science	PHYSICS	3	3	0	0	3
15.	OHS503A	Advanced Engineering	CHEMISTRY	3	3	0	0	3

		Chemistry						
16.	OHS504A	Environment and Agriculture	CHEMISTRY	3	3	0	0	3

SUMMARY

SL. NO	COURSE AREA	CREDITS PER SEMESTER								CREDITS TOTAL	PERCENTAGE (% OF CONTRIBUTION)
		I	II	III	IV	V	VI	VII	VIII		
1.	HS	3	3					3		9	5.02
2.	BS	12	7	4	4	4				31	17.31
3.	ES	8	5	3	6					22	12.29
4.	PC		9	13	13	18	20	11	8	92	51.39
5.	PE						3	3	6	12	6.70
6.	OE					3		3		6	3.35
7.	EEC			1	1		1		2	5	2.79
8.	MC	*0	*0							0	0
9.	HSMC	1	1							2	1.11
TOTAL		24	25	21	24	25	24	20	16	179	

HS1101A **TECHNICAL ENGLISH** **L T P C**

3 0 0 3

COURSE OBJECTIVES:

- Develop strategies and skills to enhance their ability to read and comprehend engineering and technology texts.
- Nurture their ability in technical writing like to prepare professional job applications and effective reports.
- Develop their speaking skills by participating in various speaking activities.
- Strengthen their listening skill to comprehend lectures and talks in their areas of specialization.
- Improve their ability to explicit their excellence in all modes of technical communication.

COURSE OUTCOMES:

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

- Describe the memory of the previously learnt grammatical concepts and apply them in technical contexts.
- Interpret the professional proficiency by preparing the formal correspondence with global standards.
- Explain information and interrelate the technical and general texts.
- Use verbal and technical information concisely with coherence and cohesion.
- Show appropriate statements representing the global situations.

UNIT I 9

Reading- Reading short texts Listening- Listening to different formal / informal conversations Writing- Instructions, Jumbled sentences Speaking- Self introduction Language development- Parts of speech, Prepositions Vocabulary development- Word formation- root words from foreign language and their use in English.

UNIT II 9

Reading-Skimming and Scanning to find specific information Listening- Listening to INK talks Writing- Job Application – cover letter, resume writing Speaking- Asking and Giving directions Language development- Conjunctions, Types of Nouns Vocabulary development- Prefixes and Suffixes.

UNIT III 9

Reading- Reading for predicting the content Listening- Listening to situational short talks Writing- Types of paragraphs- Descriptive/Analytical/ compare and contrast Speaking- Mini presentations, Expressing greeting and thanks Language development- Adjectives, Numerical Adjectives, Conditional Clauses Vocabulary development- Homophones, Homonyms.

UNIT IV **9**

Reading- Practice in speed reading Listening- Listening to short texts and fill the data Writing- Interpretation of Graphics / Information, Note making Speaking-Contributing for Group Discussion Language development- Active, Passive, Impersonal passive voice

Vocabulary development- Definitions, Nominal Compounds.

UNIT V **9**

Reading- Reading short stories Listening- Listening for note taking Writing- Report writing, E-mail Writing Speaking- Picture descriptions, Speaking in familiar situations Language development- Tenses Vocabulary development- British and American Vocabulary.

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
HS1101A.1	-	-	-	-	-	1	1	-	2	3	2	1	-	-
HS1101A .2	-	-	-	-	-	2	1	-	3	3	2	1	-	-
HS1101A.3	-	-	-	-	-	1	1	-	1	3	2	2	-	-
C101.4	-	-	-	-	-	2	1	-	3	3	2	1	-	-
C101.5	-	-	-	-	-	2	1	-	2	3	2	2	-	-
AVERAGE	**-**	**-**	**-**	**-**	**-**	**1.60**	**1.00**	**-**	**2.20**	**3.00**	**2.00**	**1.40**	**-**	**-**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOKS:

1. Richards, C. Jack. Interchange Students' Book-2 New Delhi: CUP, 2015.
2. Board of editors. Fluency in English A Course book for Engineering and Technology. Orient Blackswan, Hyderabad: 2016.

REFERENCES:

1. Bailey, Stephen. Academic Writing: A practical guide for students. New York: Rutledge, 2011.
2. Comfort, Jeremy, et al. Speaking Effectively: Developing Speaking Skills for Business English. Cambridge University Press, Cambridge: Reprint 2011
3. Darlene Smith-Worthington, Sue Jefferson, Technical writing for Success, South-Western Cengage Learning,USA-2011
4. Means, L. Thomas and Elaine Langlois, English & Communication For Colleges. Cengage Learning, USA: 2007
5. Raman, Meenakshi and Sharma, Sangeetha- Technical Communication Principles and Practice. Oxford University Press: New Delhi, 2014
6. Swan Michael, Practical English Usage. Oxford University Press, Eighth impression 2002.

Recommended Websites

bbc.co.uk/1learning english
oxfordonlineenglish.com/
cambridgeenglish.org
inktalks.com/talks/
manageyourwriting.com

MA1101A **CALCULUS AND ITS APPLICATIONS** **L T P C**
3 1 0 4

COURSE OBJECTIVES:

- To understand the concepts of limits, continuity, differentiation and use it to find maximaand minima of functions of one variable.
- To make the student acquire sound knowledge of techniques in solving ordinary differential equations of first and second order that model in various engineering problems.
- To familiarize the student with functions of several variables that is needed in many branches of engineering.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.

COURSE OUTCOMES:

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

- Describe the basic concepts of differentiation rules to find the maxima and minima for function of one variable.
- Apply the knowledge of basic application problems involved in first order differential equation.
- Determine the solution of second order linear differential equations with constant coefficients.
- Show the concept of ordinary derivatives into partial derivatives and apply them to find extreme values of the functions of two variables and series approximation of the function of two variables.
- Calculate the double and Triple integration techniques over a region in two dimensional and three-dimensional geometry.

UNIT I DIFFERENTIAL CALCULUS **12**

Representation of functions – Limit of a function – Continuity – Derivatives – Differentiation rulesMaxima and Minima of functions of one variable.

UNIT II ORDINARY DIFFERENTIAL EQUATIONS OF FIRST ORDER WITH APPLICATIONS **12**

Basic concepts- Separable differential equations - Exact differential equations - Integrating factors - Linear differential equations - Bernoulli's equation - Geometric Applications- Orthogonal trajectories - Physical Applications - Simple electronic circuits-Newton law of cooling-Heat flow-Rate of decay ofradioactive materials-Chemical reaction and solutions.

UNIT III DIFFERENTIAL EQUATIONS **12**

Higher order linear differential equations with constant coefficients - Method of variation of parameters

– Homogenous equation of Euler's and Legendre's type – System of simultaneous linear differentialequations with constant coefficients - Method of undetermined coefficients.

UNIT IV FUNCTIONS OF SEVERAL VARIABLES 12

Partial differentiation – Homogeneous functions and Euler's theorem – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables – Maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers.

UNIT V MULTIPLE INTEGRALS 12

Double integrals – Change of order of integration – Double integrals in polar co-ordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double and triple integrals.

TOTAL: 60 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
MA1101A.1	3	3	2	-	-	-	-	-	-	-	-	-	-	-
MA1101A.2	3	3	2	-	-	-	-	-	-	-	-	-	-	-
MA1101A..3	3	3	2	-	-	-	-	-	-	-	-	-	-	-
MA1101A..4	3	3	2	-	-	-	-	-	-	-	-	-	-	-
MA1101A..5	3	3	2	-	-	-	-	-	-	-	-	-	-	-
AVERAGE	**3.00**	**3.00**	**2.00**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-	-

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXTBOOKS:

1. Grewal, B.S., Higher Engineering Mathematics, 43rd Edition, Khanna Publishers, 2016.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, Inc., 2016.

REFERENCES:

1. Bali,N.P., Goyal,M.,Watkins,C.,Advanced Engineering Mathematics, Laxmi Publications Pvt.Limited, 2007.
2. Boyce,W.E.,andDiPrima,R.C., Elementary Differential Equations and Boundary Value Problems, Wiley India, 2012.
3. O'Neil. P. V., "Advanced Engineering Mathematics", 7th Edition, Cengage Learning India Pvt., Ltd, New Delhi, 2011.
4. T.Veerarajan, Engineering Mathematics, Mc Grawhill Publications, New Delhi 2017.

PH1101A **APPLIED PHYSICS**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology.

COURSE OUTCOMES:

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

- Explain the basics of properties of matter and its applications
- Describe the concepts of waves and optical devices and their applications in Laser and fiber optics
- Use the properties of thermal materials and its applications
- Apply the advanced physics concepts of quantum theory and its application in one dimensional box
- Apply the different types of crystals structures and different crystal growth techniques.

UNIT I PROPERTIES OF MATTER **9**

Elasticity- plasticity – Different Types of Stress and Strain- concept of stress-strain diagram and its application - three types of modulus of elasticity- Poisson's Ratio – Bending of beams- Expression for bending moment –- young's modulus uniform and Non uniform bending : Theory and Experiment – I Shape girders – Torsional oscillation Theory and Experiment- Application of Elastic Materials.

UNIT II APPLIED OPTICS **9**

Laser : characteristics of laser - Principle of spontaneous emission and stimulated emission – Laser action – Einstein A & B coefficients - Population inversion - Pumping – Basic requirement of laser – Types of laser : Nd-YAG and CO_2 – Applications : Welding , Drilling & Cutting – Medical field Fiber optics: Introduction- Principle and propagation of light – Numerical aperture and acceptance angle – classification of optical fibers – Losses in optical fibers(Qualitative) – Fiber optics communication system (Block Diagram) – Advantages with fiber optic communication system.

UNIT III THERMAL PHYSICS **9**

Modes of heat transfer- thermal conduction, convection and radiation – Specific heat capacity- thermal conductivity- Newton's law of cooling - Searle's and Lee's disc methods: theory and experiment - conduction through compound media (series and parallel) – thermal expansion of solids, liquids and gases - Applications: heat exchangers, refrigerators and solar water heaters.

UNIT IV WAVE AND PARTICLE PHYSICS **9**

Inadequacy of Classical Mechanics - Development of quantum theory- Planck's Black body radiation and Distribution Laws(Qualitative) – Compton Effect (Derivation) - De Broglie wavelength – properties of matter waves – Experimental Verification (G.P Thomson experiment) – Heisenberg's uncertainty principle - Schrodinger's wave equation – time dependent – time independent wave equations – physical significance of Wave function – applications: particle in a one dimensional potential box**.**

UNIT V CRYSTALOGRAPHY **9**

Single crystalline, polycrystalline and amorphous materials Lattice - unit cell- Crystal systems-Bravais lattices- Lattice planes- Miller indices- Interplanar- d- Spacing in cubic Lattice- calculation of number of atoms per unit cell – atomic radius – packing factor for SC, BCC, FCC and HCP structures- Crystal Defects – types.

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
PH1101A 1	3	2	-	-	-	-	-	-	-	-	-	-	-	-
PH1101A.2	3	2	-	-	-	-	-	-	-	-	-	-	-	-
PH1101A.3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
PH1101A.4	3	2	-	-	-	-	-	-	-	-	-	-	-	-
PH1101A.5	3	2	-	-	-	-	-	-	-	-	-	-	-	-
AVERAGE	**3.00**	**2.00**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-	-

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOKS:

1. Gupta S.L. and Sanjeev Gupta, Modern Engineering Physics, Dhanpat Rai Publishers, 2015.
2. R. K. Gaur and S.C. Gupta, Engineering Physics, Dhanpat Rai Publication (P) Ltd, New Delhi, 2014.
3. Bhattacharya, D.K. and Poonam, T. Engineering Physics, Oxford University Press, 2015.

REFERENCES:

1. C. Kittel , Introduction to Solid State Physics 8th Edition , Wiley Eastern Ltd,2004.
2. Halliday, D., Resnick, R. and Walker, J. Principles of Physics. Wiley, 2015.
3. Tipler, P.A. and Mosca, G. Physics for Scientists and Engineers with Modern Physics, W.H.Freeman, 2007.
4. Einstein coefficient calculation,https://youtu.be/TvfiZHXUtXg(Video lecture)
5. Lattice structures, https://youtu.be/Rm-i1c7zr6Q(Video lecture)

CY1101A **ENGINEERING CHEMISTRY**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To make the students conversant with boiler feed water requirements, related problems and water treatment techniques.
- To develop an understanding of the basic concepts of phase rule and its applications to single and Two component systems and appreciate the purpose and significance of alloys.
- It enables the students to gain information about Principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills and fuel cells
- It deals with the information about the types of fuels, calorific value calculations and manufacture of solid, liquid and gaseous fuels.
- To impart knowledge about the nano materials synthesis, properties and applications

COURSE OUTCOMES:

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

- Explain the hardness of water, related problems and its treatment.
- Apply phase rule to construct phase diagram and predict the low melting alloys.
- Illustrate conventional and non-conventional energy sources and basics of electrochemistry, Types of batteries, their reactions and the importance.
- Demonstrate the use of fuels in real-world applications by analyzing their calorific values.
- Analyze the basics, types, preparation methods and recent trends in nanomaterial.

UNIT I WATER TREATMENT AND TECHNOLOGY **9**

Introduction – characteristics, Water quality parameters -hardness– types, Determination-EDTA method, Alkalinity ,boiler feed water requirements-boiler troubles – scale & sludge -Caustic Embrittlement, boiler explosion -softening of hard water - external treatment process - demineralization and zeolite, internal treatment - boiler compounds (phosphate, calgon, carbonate and colloidal conditioning methods) – desalination of brackish water –reverse osmosis.

UNIT II PHASE RULE AND ALLOYS **9**

Phase rule: Introduction, definition of terms with examples, One Component System- water system,Sulphur,CO2 system, Thermal Analysis and cooling curves, Reduced phase rule - Two Component Systems- classification – lead-silver system-problems. Alloys: Introduction- Definition- Properties of alloys- Significance of alloying, Functions and effect of alloying elements- Ferrous alloys- Nichrome and Stainless steel – heat treatment of steel.

UNIT III ENERGY SOURCES AND STORAGE DEVICES **9**

Energy – Types – Non-renewable energy - Nuclear energy -renewable energy - solar energy conversion - solar cells. Introduction to Electrochemistry, Nernst Equation-Electrochemical cells – reversible and irreversible cells –Cell construction and representation - Batteries -types of batteries – characteristics – construction and working of primary battery (dry cell) - secondary battery(lithium-ion-battery) - fuel cells (H2-O2).

9

UNIT IV FUELS AND COMBUSTION

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

UNIT V NANOCHEMISTRY **9**

Basics - distinction between nanoparticles and bulk materials; size- dependent properties, Nano cluster, Nano rod, nanotube(CNT)-Types of CNT and nanowire. Synthesis: precipitation, thermolysis, chemical vapour deposition, Properties, Characterization and applications.

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2
CY1101A		1	1	-	-	-	-	-	-	-	-	-	-	-
.2	3	2	1	-	-	-	-	-	-	-	-	-	-	-
.3	2	1	1	-	-	-	-	-	-	-	-	-	-	-
.4	2	1	1	-	-	-	-	-	-	-	-	-	-	-
.5	1	1	2	-	-	-	-	-	-	-	-	-	-	-
AVERAGE	**2.00**	**1.20**	**1.20**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-	-

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOKS:

1. Jain P.C. and Monica Jain, “Engineering Chemistry”, DhanpatRai Publishing Company (P) Ltd., New Delhi, 2010.

REFERENCES:

1. Dara S.S, Umare S.S, “Engineering Chemistry”, S. Chand & Company Ltd., New Delhi 2010
2. Sivasankar B., “Engineering Chemistry”, Tata McGraw-Hill Publishing Company, Ltd., New Delhi, 2008.
3. Ozin G. A. and Arsenault A. C., “Nanochemistry: A Chemical Approach to Nanomaterials”, RSC Publishing, 2005.

CS1101A PROBLEM SOLVING AND PYTHON PROGRAMMING

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

- Discuss the basics of algorithmic problem solving.
- Illustrate Python programs with data expressions and statements.
- Apply control flow and python functions for problem solving.
- Apply data structures such as lists, tuples, and dictionaries in Python for problem solving.
- Examine file concepts to read and write data from/to files.

UNIT I ALGORITHMIC PROBLEM SOLVING **9**

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

UNIT II DATA EXPRESSIONS, STATEMENTS **9**

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

UNIT III CONTROL FLOW, FUNCTIONS **9**

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

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

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

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

Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file- Case study: Simple Graphics using Turtle: Draw a Random Pattern of Circle, Square and Rectangle; Draw a Pattern of Straight Lines, Plotting Graphs in Python: Menu Driven Program to Create Mathematical 3D Objects.

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CS1101A.1	3	3	-	-	-	-	-	-	-	-	-	1	3	1
CS1101A.2	-	2	1	2	-	-	-	-	-	-	-	1	3	1
CS1101A.3	1	1	-	2	-	-	-	-	-	-	-	1	3	1
CS1101A.4	-	3	-	-	3	-	-	-	-	-	-	1	2	1
CS1101A.5	3	3	-	-	-	-	-	-	-	-	-	1	2	1
AVERAGE	**2.33**	**2.40**	**1.00**	**2.00**	**3.00**	**-**	**-**	**-**	**-**	**-**	**-**	**1.00**	**2.60**	**1.00**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOKS:

1. Allen B. Downey, `Think Python: How to Think Like a Computer Scientist', 2nd edition, Updated for Python Shr off/ O'Reilly Publishers, 2016(http://greenteapress.com/wp/thinkpython/)
2. Reema Thareja, Problem Solving and Programming with python, 2nd edition, Oxford University press, 2019.
3. Guido van Rossum and Fred L. Drake Jr, "An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

REFERENCES:

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

ME1101A **ENGINEERING GRAPHICS**

L	T	P	C
2	0	2	3

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

- Describe existing national standards of engineering drawing and visualization concepts
- Explain the projection of Points, Lines and Plane surfaces
- Summarize the projection of Solids
- Interpret the section of solids
- Discuss the development of surfaces

CONCEPTS AND CONVENTIONS (Not for Examination)

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

UNIT I PLANE CURVES AND ORTHOGRAPHIC PROJECTIONS **12**

Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves. Visualization principles – Layout of views- Orthographic projection of multiple views(Free Hand Sketching) from pictorial views of objects-Principal planes-Projection of points-Demo using CAD software for above topics.

UNIT II PROJECTION OF POINTS STRAIGHT LINES AND PLANE SURFACES **12**

Orthographic projections-principles-Principal planes-First angle projection-Projection of points-Projection of straight lines (only First angle projections) inclined to one of the principal planes - Determination of true lengths and true inclinations - Projection of planes (polygonal and circular surfaces) inclined to one of the principal planes - Demo using CAD software for above topics.

UNIT III PROJECTION OF SOLIDS **12**

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one of the principal planes by rotating object method-Demo using CAD software for above topics.

UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES **12**

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

12

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS

Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions –Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method-Demo using CAD software for above topics.

TOTAL: 60 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
ME1101A.1	2	2	-	-	-	-	-	-	-	-	-	-	-	-
ME1101A.2	2	2	-	-	-	-	-	-	-	-	-	-	-	-
ME1101A.3	3	3	-	-	-	-	-	-	-	-	-	-	-	-
ME1101A.4	2	2	-	-	-	-	-	-	-	-	-	-	-	-
ME1101A.5	2	3	-	-	-	-	-	-	-	-	-	-	-	-
AVERAGE	**2.20**	**2.40**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-	-

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOKS:

1. NatrajanK.V., “A text book of Engineering Graphics”, Dhanalakshmi Publishers,Chennai,2009.
2. Venugopal K. and Prabhu Raja V., “Engineering Graphics”, New Age International (P) Limited, 2008.

REFERENCES:

1. Bhatt N.D. and PanchalV.M., “Engineering Drawing”, Charotar Publishing House, 50th Edition,2010.
2. Basant Agarwal and Agarwal C.M., “Engineering Drawing”, Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.
3. Gopalakrishna K.R., “Engineering Drawing” (Vol. I&II combined), Subhas Stores,Bangalore, 2007.
4. Luzzader, Warren.J. and Duff, John M., “Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi,2005.
5. N S Parthasarathy and Vela Murali, “Engineering Graphics”, Oxford University, Press, NewDelhi, 2015.
6. Shah M.B., and Rana B.C., “Engineering Drawing”, Pearson, 2ndEdition, 2009.

BS1101A **PHYSICS AND CHEMISTRY LABORATORY** **L T P C**
0 0 4 2

PHYSICS LABORATORY

COURSE OBJECTIVES:

- To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics, properties of matter and liquids.
- To make the student to acquire practical skills in the determination of water quality parameters through volumetric and instrumental analysis.

COURSE OUTCOMES:

- Describe fundamental concepts of mechanical properties analysis
- Explain the fundamental principles of acoustic properties, and learn about semiconductor properties
- Summarize the fundamental principles of optical properties analysis.
- Apply hands-on knowledge in the quantitative chemical analysis of water.
- Solve the basics of instrumental analysis-conductivity meter, and potentiometer

LIST OF EXPERIMENTS: PHYSICS LABORATORY (Any 5 Experiments)

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

TOTAL: 30 PERIODS

LIST OF EXPERIMENTS: CHEMISTRY LABORATORY (Any seven experiments to be conducted)

1. Estimation of HCl using Na_2CO_3 as primary standard and Determination of alkalinity in water sample.
2. Determination of total, temporary & permanent hardness of water by EDTA method.
3. Determination of DO content of water sample by Winkler‘s method.
4. Determination of TDS of water sample.
5. Determination of strength of acids in a mixture of acids using conductivity meter.
6. Estimation of iron content of the given solution using potentiometer.
7. Estimation of iron content of the water sample using spectrophotometer (1, 10- Phenanthroline / thiocyanate method).
8. Determination of molecular weight of polyvinyl alcohol using Ostwald viscometer.
9. Conductometric titration of strong acid vs strong base.

TOTAL: 30 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
BS1101A.1	2	1	1	1	-	-	-	-	-	-	-	-	-	-
BS1101A.2	2	1	1	1	-	-	-	-	-	-	-	-	-	-
BS1101A.3	2	1	1	1	-	-	-	-	-	-	-	-	-	-
BS1101A.4	2	2	1	1	-	-	-	-	-	-	-	-	-	-
BS1101A.5	2	1	1	1	-	-	-	-	-	-	-	-	-	-
AVERAGE	**2.00**	**1.20**	**1.00**	**1.00**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-	-

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

CS1102A PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY

L	T	P	C
0	0	4	2

COURSE OBJECTIVES:

- To study python programs with conditionals and loops
- To use functions for python structured programs.
- Use strings for structuring Python programs.
- Represent compound data using Python lists, tuples and dictionaries.
- To read and write data from and to files in python.
-

COURSE OUTCOMES:

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

- Interpret the behavior of programs that use decision-making and iteration.
- Demonstrate the functions to solve mathematical problems
- Use strings for structuring Python programs.
- Illustrate compound data using Python lists, tuples, and dictionaries.
- Demonstrate file concepts to write programs to read and write datas.

LIST OF EXPERIMENTS:

1. Write a program to display the largest number among three numbers.
2. Write a program to display the Fibonacci series by using looping constructs.
3. Write a function to compute the GCD of two numbers.
4. Explore String Functions
5. With the help of strings, array or list, display a simple calendar in python program without usingthe calendar module.
6. With the help of list perform linear search and Binary search.
7. Write a program to perform Selection sort, Insertion sort, Merge sort
8. Create a text file using python file I/O. Read the content of the file and change them from lowerto upper case characters.
9. Programs that take command line arguments (word count)
10. Find the most frequent words in a text read from a file
11. Simulate bouncing ball using Pygame

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

HARDWARE: 30 terminals

SOFTWARE: Python 3 interpreter for Windows/Linux

TOTAL: 60 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CS1102A.1	3	3	1	-	-	-	-	-	-	-	-	-	3	1
CS1102A.2	2	3	1	2	-	-	-	-	-	-	-	-	3	1
CS1102A.3	2	3	1	-	2	-	-	-	-	-	-	-	3	1
CS1102A.4	2	3	1	-	3	-	-	-	-	-	-	-	2	1
CS1102A.5	2	2	1	-	-	-	-	-	-	-	2	-	2	1
AVERAGE	**2.20**	**2.80**	**1.00**	**2.00**	**2.50**	**-**	**-**	**-**	**-**	**-**	**2.00**	**-**	**2.60**	**1.00**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

CI1101A	INDIAN CONSTITUTION	L	T	P	C
		2	0	0	0

Prerequisites: Basic law.

The Constitution of India is the supreme law of India. Parliament of India cannot make any law which violates the Fundamental Rights enumerated under the Part III of the Constitution. The Parliament of India has been empowered to amend the Constitution under Article 368, however, it cannot use this power to change the "basic structure" of the constitution, which has been ruled and explained by the Supreme Court of India in its historical judgments. The Constitution of India reflects the idea of "Constitutionalism" – a modern and progressive concept historically developed by the thinkers of "liberalism" – an ideology which has been recognized as one of the most popular political ideology and result of historical struggles against arbitrary use of sovereign power by state. The historic revolutions in France, England, America and particularly European Renaissance and Reformation movement have resulted into progressive legal reforms in the form of "constitutionalism" in many countries. The Constitution of India was made by borrowing models and principles from many countries including United Kingdom and America.

The Constitution of India is not only a legal document but it also reflects social, political and economic perspectives of the Indian Society. It reflects India's legacy of "diversity". It has been said that Indian constitution reflects ideals of its freedom movement; however, few critics have argued that it does not truly incorporate our own ancient legal heritage and cultural values. No law can be "static" and therefore the Constitution of India has also been amended more than one hundred times. These amendments reflect political, social and economic developments since the year 1950. The Indianjudiciary and particularly the Supreme Court of India have played an historic role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme

Court of India and its historic contributions has been recognized throughout the world and it gradually made it "as one of the strongest court in the world".

COURSE OUTCOMES:

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

- Understand the emergence and evolution of Indian Constitution.
- Understand the structure and composition of Indian Constitution
- Understand and analyse federalism in the Indian context.
- Analyse Panchayathi Raj institutions as a medium of decentralization
- Understand and analyse the three organs of the state in the contemporary scenario.

Course content

1. Meaning of the constitution law and constitutionalism
2. Historical perspective of the Constitution of India
3. Salient features and characteristics of the Constitution of India
4. Scheme of the fundamental rights
5. The scheme of the Fundamental Duties and its legal status
6. The Directive Principles of State Policy – Its importance and implementation
7. Federal structure and distribution of legislative and financial powers between the Union and theStates
8. Parliamentary Form of Government in India – The constitution powers and status of thePresident of India
9. Amendment of the Constitutional Powers and Procedure
10. The historical perspectives of the constitutional amendments in India
11. Emergency Provisions: National Emergency, President Rule, Financial Emergency
12. Local Self Government – Constitutional Scheme in India

13. Scheme of the Fundamental Right to Equality
14. Scheme of the Fundamental Right to certain Freedom under Article 19
15. Scope of the Right to Life and Personal Liberty under Article 21

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CI1101A.1	-	-	-	-	-	3	3	-	3	3	1	3	-	-
CI1101A.2	-	-	-	-	-	3	3	-	3	3	1	3	-	-
CI1101A.3	-	-	-	-	-	3	3	-	3	3	1	3	-	-
CI1101A.4	-	-	-	-	-	3	3	-	3	3	1	3	-	-
CI1101A.5	-	-	-	-	-	3	3	-	3	3	1	3	-	-
AVERAGE	**-**	**-**	**-**	**-**	**-**	**3.00**	**3.00**	**-**	**3.00**	**3.00**	**1.00**	**3.00**	**-**	**-**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

HS1201A **ENGLISH FOR COMMUNICATION**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- Improve their language ability to improve the four basic skills of communication (LSRW).
- Enhance the skills and methods to enrich their reading and comprehending ability.
- Strengthen their skills to listen to the lectures and talks related to their fields of studies.
- Foster their ability to write effectively in all contexts.
- Cultivate their oral presentation skills through technical presentations and contribution in group discussions.

COURSE OUTCOMES:

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

- Identify technical and general texts using appropriate diction.
- Recall various styles of drafts in formal and informal contents.
- Use the verbal and technical skills in the given technical contexts.
- Apply meaningful utterances to present intense technical knowledge.
- Interpret key ideas by reviewing lexicon across the language in syntactical contexts.

UNIT I **9**

Reading- Reading for detailed comparison Listening- Listening to interviews Writing- Developing hints, summarizing Speaking- Talk about future plans, arrangements intensions Language development- Sentence structures Vocabulary development- Synonyms, Antonyms, Adverbs

UNIT II **9**

Reading-Extended reading Listening- Listening to telephonic conversations Writing- Formal Letter Writing - Letters for bona fide certificate - to the principal for permission for in plant training, industrial visit, paper presentations, inter college events, Letter to the Editor, Recommendations Speaking- Formal conversation Language development-Use of Punctuation, Modal verbs Vocabulary development- One word substitutes, Common Phrasal verbs

UNIT III **9**

Reading- Identify topic sentences by reading a passage Listening- Listening to TED talks Writing- Process/product description Speaking- Formal Conversations Language development-Relative Clauses, Concord, Error correction Vocabulary development- Idioms & Phrases, Minimal pair.

UNIT IV **9**

Reading- Reading newspaper articles Listening- Listening to inspirational speeches Writing- Essays, Checklist Speaking- Technical Presentations Language development- Degrees of Comparison Vocabulary development- Articles, Cause and Effect Expressions

UNIT V **9**

Reading- Close reading Listening- Listening for summarizing Writing- Dialogue conversations Speaking- Movie/ Book Review Language development- Wh Questions, Yes/ no Questions Vocabulary development- Foreign Expressions and its applications, Reference words

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
HS1201A.1	-	-	-	-	2	1	-	-	2	3	-	1	-	-
HS1201A.2	-	-	-	-	2	1	-	-	2	3	-	2	-	-
HS1201A.3	-	-	-	-	2	2	-	-	2	3	-	2	-	-
HS1201A.4	-	-	-	-	2	1	-	-	2	3	-	1	-	-
HS1201A.5	-	-	-	-	3	1	-	-	2	3	-	1	-	-
AVERAGE	**-**	**-**	**-**	**-**	**2.20**	**1.20**	**-**	**-**	**2.00**	**3.00**	**-**	**1.40**	-	-

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

REFERENCES:

1. Booth-L. Diana, Project Work, Oxford University Press, Oxford: 2014
2. Grussendorf, Marion, English for Presentations, Oxford University Press, Oxford: 2007
3. Kumar, Suresh. E. Engineering English. Orient Blackswan: Hyderabad,2015
4. Dutt P. Kiranmai and Rajeevan Geeta. Basic Communication Skills, Foundation Books: 2013
5. Means,L. Thomas and Elaine Langlois. English & Communication for Colleges. Cengage Learning
   USA: 2007.

RECCOMENDED WEBSITES:

TED.com
Learningenglish.voanews.com
islcollective.com
examenglish.com
englishclass101.com

COMPLEX VARIABLES AND TRANSFORMS L T P C

MA1201A

3 1 0 4

COURSE OBJECTIVES:

- Understand the concept of Divergence and curl and use it in evaluating Line, Surface and Volume integrals.
- Understand C-R equations and use it in the construction of Analytic Functions.
- Understand the methods of Complex Integration using Cauchy's Integral Formula and Cauchy Residue theorem, finding Taylor's and Laurent's Series expansions.
- Find the Laplace Transforms of standard Functions and to find the Inverse Laplace Transform of a function and use it in solving Differential Equations.
- To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes and to develop Z transform techniques for discrete time systems

COURSE OUTCOMES:

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

- Explain the concept of divergence and curl to Calculate the line, surface and volume integrals using vector integration.
- Solve the problems under analytic functions and construction of analytic function using C-R equation.
- Classify the singularities and pole, find residues and evaluate complex integrals using residue theorem.
- Outline the concepts of Laplace Transforms and its properties and to solve the differential equations.
- Analyze the properties of Z-transform and solve the difference equation.

UNIT I VECTOR CALCULUS **12**

Gradient and directional derivative – Divergence and curl – Vector identities – Irrotational and Solenoidal vector fields – Line integral over a plane curve – Surface integral – Area of a curved surface – Volume integral – Green's, Gauss divergence and Stoke's theorems – Verification and application in evaluating line, surface and volume integrals-simple applications involving cubes and rectangular parallelopipeds.

UNIT II ANALYTIC FUNCTIONS **12**

Analytic functions – Necessary and sufficient conditions for analyticity in Cartesian and polar coordinates – Properties – Harmonic conjugates – Construction of analytic function – Conformal mapping – Mapping by functions (w 1 z , wz^2, we^z, w sinh$z$, w cosh$z$) – Bilinear transformation.

UNIT III COMPLEX INTEGRATION. **12**

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

UNIT IV LAPLACE TRANSFORMS **12**

Existence conditions – Transforms of elementary functions – Transform of unit step function and unit impulse function – Basic properties – Shifting theorems -Transforms of derivatives and integrals – Initial and final value theorems – Inverse transforms – Convolution theorem –Transform of periodic functions – Application to solution of linear second order ordinary differential equations with constant coefficients.

UNIT V Z - TRANSFORMS AND DIFFERENCE EQUATIONS **12**

Z-transforms - Elementary properties – Inverse Z-transform (using partial fraction and residues) – Initial and final value theorems - Convolution theorem - Formation of difference equations – Solution of difference equations using Z - transform.

TOTAL: 60 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
MA1201A.1	3	3	2	-	-	-	-	-	-	-	-	-	-	-
MA1201A.2	3	3	2	-	-	-	-	-	-	-	-	-	-	-
MA1201A.3	3	3	2	-	-	-	-	-	-	-	-	-	-	-
MA1201A.4	3	3	2	-	-	-	-	-	-	-	-	-	-	-
MA1201A.5	3	2	2	-	-	-	-	-	-	-	-	-	-	-
AVERAGE	**3.00**	**2.80**	**2.00**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-	-

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXTBOOKS:

1. Grewal, B.S., Higher Engineering Mathematics, 43rd Edition, Khanna Publishers, 2016.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, Inc.,2016.

REFERENCES:

1. Bali,N.P.,Goyal,M.,Watkins,C.,AdvancedEngineeringMathematics,Laxmi Publications Pvt.Limited, 2007.
2. Boyce,W.E.,and DiPrima, R.C.,Elementary Differential Equation sand Boundary Value Problems, Wiley India, 2012.
3. O'Neil. P. V."Advanced Engineering Mathematics", 7th Edition, Cengage Learning India Pvt.,Ltd, New Delhi, 2011.
4. 4.T. Veerarajan, Engineering Mathematics, Tata Mcgraw Hill publications co. ltd, New Delhi.2017.

PH1201A **MATERIAL SCIENCE**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To enrich the understanding of various types of materials and their applications in engineering and technology.

COURSE OUTCOMES:

At the end of the course, students would:

- Describe the fundamental principles of conducting materials and analyze their behavior under varying temperature conditions.
- Explain knowledge on semiconductor physics, including carrier concentration, and apply it to the design and analysis of semiconductor devices.
- Apply the properties of magnetic and superconducting materials, and apply their concepts in practical engineering systems
- Examine knowledge on polarization mechanisms in dielectric materials and its applications
- Analyze the properties and applications of advanced nano materials and biomaterials for various engineering applications.

UNIT I CONDUCTING MATERIALS **9**

Conductors – classical free electron theory of metals – Electrical and thermal conductivity –Wiedemann – Franz law – Lorentz number – Draw backs of classical theory – Quantum theory –Fermi distribution function – Effect of temperature on Fermi Function – Density of energy states –carrier concentration in metals.

UNIT II SEMICONDUCTING MATERIALS **9**

Intrinsic semiconductor – carrier concentration derivation – Fermi level – Variation of Fermi level with temperature – electrical conductivity – band gap determination –Elemental and Compound Semiconductors – N-type and P-type semiconductor (Qualitative) – Hall effect –Determination of Hall coefficient – Applications.

UNIT III MAGNETIC AND SUPERCONDUCTING MATERIALS **9**

Origin of magnetic moment – Bohr magneton – comparison of Dia, Para and Ferro magnetism –Domain theory – Hysteresis – soft and hard magnetic materials – antiferromagnetic materials –Ferrites and its applications. Electro static Discharge (ESD)-Superconductivity: properties – Type I and Type II superconductors–BCS theory of superconductivity (Qualitative) - High Tc superconductors – Electrical, medical, magnetic and computer application of superconductors.

UNIT IV DIELECTRIC MATERIALS **9**

Electrical susceptibility – dielectric constant – electronic, ionic, orientation and space charge polarization – frequency and temperature dependence of polarisation – Clausius mosotti relation - dielectric loss – dielectric breakdown – uses of dielectric materials (capacitor and transformer).

UNIT V ADVANCED ENGINEERING MATERIALS **9**

Metallic glasses - melt spinning process, applications - shape memory alloys: Ni-Ti alloy, applications – nano materials: preparation (bottom up and top down approaches), properties and applications- Bio materials – introduction- properties of bio materials-examples- medical applications- Ophthalmology- bio sensors-characteristics.

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
PH1201A .1	3	2	-	-	-	-	-	-	-	-	-	-	-	-
PH1201A .2	3	2	-	-	-	-	-	-	-	-	-	-	-	-
PH1201A.3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
PH1201A .4	3	2	-	-	-	-	-	-	-	-	-	-	-	-
PH1201A .5	3	2	-	-	-	-	-	-	-	-	-	-	-	-
AVERAGE	**3.00**	**2.00**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-	-

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOKS:

1. S.Mohan, Principles of Materials Science, MJP Publishers, 2018.
2. Jasprit Singh, Semiconductor Devices, Basic Principles, Wiley 2012.
3. Umesh K Mishra and Jasprit Singh, Semiconductor Device Physics and Design‖, Springer, 2008.

REFERENCES:

1. Wahab, M.A. Solid State Physics: Structure and Properties of Materials‖, Narosa Publishing House, 2009.
2. William D.Callister Jr, David G. Rethwisch, Materials Science and Engineering, An Introduction, Wiley India (P) Ltd., 8th Edition, 2009.
3. Pillai S.O., Solid State Physics, New Age International (P) Ltd., Publishers, 2009.
4. Semiconductor Introduction, https://youtu.be/k6ZxP9Yr02E(Video lecture)
5. Superconductivity, https://youtu.be/D-9M3GWOBrw(Video lecture)

EE1202A **BASIC ELECTRICAL, ELECTRONICS & MEASUREMENT ENGINEERING**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To learn the fundamental laws, theorems of electrical circuits and also to analyze them
- To study the basic principles of electrical machines and their performance
- To study the different energy sources, protective devices and their field applications
- To understand the fundamentals of electronic circuit constructions
- To understand the principles and operation of measuring instruments and transducers

COURSE OUTCOMES:

At the end of the course, students would:

- Summarize key principles of fundamental electrical laws and theorems.
- Describe DC & AC static and rotating machines
- Explain renewable energy sources, various electrical protective devices
- Discuss the fundamentals of electronic circuits
- Apply the working principle & operation of measuring instruments and transducers

UNIT I ELECTRICAL CIRCUITS ANALYSIS **9**

Ohms Law, Kirchhoff‘s Law-Instantaneous power- series and parallel circuit analysis with resistive, capacitive and inductive network - nodal analysis, mesh analysis- network theorems –Thevenin’s theorem, Norton theorem and superposition theorem, three phase supply-Instantaneous, Reactive and apparent power-star delta conversion.

UNIT II ELECTRICAL MACHINES 9

DC and AC rotating machines: Types, Construction, principle, Emf and torque equation, application - Speed Control- Basics of Stepper Motor – Brushless DC motors- Transformers-Introduction- types and construction, working principle of Ideal transformer-Emf equation

UNIT III UTILIZATION OF ELECTRICAL POWER 9

Overview of “Renewable Energy Sources”. (Wind and Solar). Illumination by lamps- Energy Saving lamps (Compact Fluorescent Lamp, Cold Cathode Tube, LED bulbs). Domestic refrigerator and air conditioner-Electric circuit, construction and working principle. Li-Ion Battery’s Operation & Maintenance. Protection-need for earthing, fuses and circuit breakers – MCB, RCB and ELCB. Energy Tariff calculation for domestic loads.

UNIT IV ELECTRONIC CIRCUITS 9

Introduction to Electron Devices – PN Junction diode, Zener Diode, Transistor)-. Op-amps-Amplifiers, differentiator, integrator, ADC, DAC. Multi vibrator using 555 Timer IC. Voltage regulator IC using LM 723, LM 317.

UNIT V ELECTRICAL MEASUREMENT **9**

Characteristics of measurement-errors in measurement, torque in indicating instruments- moving coil and moving iron meters, Energy meter and watt meter. Transducers- classification- RTD, Strain gauge, LVDT, LDR and piezoelectric. Functional Block diagram of DSO

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
EE1202A.1	2	3	-	-	-	-	-	-	-	3	3	2	-	-
EE1202A.2	2	2	-	-	-	-	-	-	-	3	-	2	-	-
EE1202A.3	3	2	-	-	-	-	-	-	-	-	-	2	-	-
EE1202A.4	3	2	-	-	-	-	-	-	-	-	-	-	-	-
EE1202A.5	2	-	-	-	-	-	-	-	-	-	-	2	-	-
AVERAGE	**2.40**	**2.25**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3.00**	**3.00**	**2.00**	-	-

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOKS:

1. D.P. Kothari and I.J Nagrath, Basic Electrical and Electronics Engineering, McGraw Hill, 2016, Third Edition.
2. M.S. Sukhija and T.K. Nagsarkar, Basic Electrical and Electronic Engineering, Oxford, 2016.

REFERENCES:

1. S.B. LalSeksena and Kaustuv Dasgupta, fundaments of Electrical Engineering, Cambridge,2016.
2. B.L. Theraja, Fundamentals of Electrical Engineering and Electronics, Chand & Co, 2008.
3. S.K.Sahdev, Basic of Electrical Engineering, Pearson 2015.
4. John Bird,-Electrical and electronic principles and Technology, Fourth Edition, Elsevier, 2010.
5. Mittle, Mittal, Basic Electrical Engineering, 2nd edition, Tata McGraw-Hill Edition, 2016.
6. C.L.Wadhwa, "Generation, Distribution and utilization of Electrical Energy", New Age international pvt ltd .2003.

CS1201A PROGRAMMING IN C **L T P C**
3 0 0 3

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

At the end of the course, students would:

- Interpret the basic syntax and semantics of the programming language constructs.
- Examine derived data types like arrays in solving problems.
- Illustrate problem decomposition and reconstruction through multiple user-defined function methods.
- Examine user-defined data types like structures and unions and its applications to solve problems.
- Apply file handling techniques to develop programs using sequential and random-access processing

UNIT I BASICS OF C PROGRAMMING **9**

Introduction to programming paradigms - Structure of C program - C programming: Identifiers- Keywords- Data Types - Variables - Constants. Operators: Precedence and Associativity - Expressions- Input/ Output statements - Decision making statements - Switch statement - Looping statements - Pre- processor directives - Compilation process.

UNIT II ARRAYS AND STRINGS **9**

Introduction to Arrays: Declaration, Initialization - One dimensional array - Example Program: Computing Mean, Median and Mode - Two dimensional arrays - Example Program: Matrix Operations (Addition, Scaling, Determinant and Transpose) - String- String operations – String Arrays.

UNIT III FUNCTIONS AND POINTERS **9**

Introduction to functions: Function prototype,-function definition,- function call,- Built- in functions (string functions, math functions) - Recursion-Types of Recursion - Example Program: Computation of Sine series, Scientific calculator using built-in functions, Binary Search using recursive functions- Storage Classes - Pointers - Pointer operators - Null Pointers- Pointer arithmetic - Arrays and pointers - Array of pointers - Example Program: Sorting ofnames - Parameter passing: Pass by value, Pass by reference- Example Program: Swapping of two numbers and changing the value of a variable using pass by reference.

UNIT IV STRUCTURES **9**

Structures-Introduction – need for structure data type – structure definition – Structure declaration – Structure within a structure – Passing structures to functions – Array of structures – Pointers to structures – Union - Programs using structures and Unions, Enumerated data type-Dynamic Memory Allocation.

UNIT V FILEPROCESSING **9**

Files-Types of file processing: Sequential access, Random access- Sequential access file - Example Program: Finding average of numbers stored in sequential access file - Random access file - Example Program: Payroll System and Transaction processing using random access files - Command line arguments

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CS1201A.1	3	2	2	-	-	-	-	-	-	-	-	-	3	2
CS1201A.2	3	1	1	1	-	-	-	-	-	-	-	-	3	3
CS1201A.3	3	2	2	2	-	-	-	-	-	-	-	-	3	2
CS1201A.4	3	2	2	2	-	-	-	-	-	-	-	-	3	2
CS1201A.5	2	1	1	1	-	-	-	-	-	-	-	-	3	3
AVERAGE	**2.80**	**1.60**	**1.60**	**1.50**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3.00**	**2.40**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXTBOOKS:

1. Reema Thareja,"Programming in C", Oxford University Press, Second Edition, 2016.
2. Kernighan, B.W and Ritchie, D.M, "The C Programming language", Second Edition, Pearson Education,2006

REFERENCES:

1. Paul Deitel and Harvey Deitel,"C How to Program", Seventh editin, Pearson Publication
2. Juneja,B.L and Anita Seth ,"Programming in C",CENGAGE Learning India pvt.Ltd., 2011
3. Pradip Dey ,Manas Ghosh, "Fundamentals of Computing and Programming in C" ,First Edition,OxfordUniversityPress,2009.
4. Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", Dorling Kindersley(India)Pvt.Ltd.,PearsonEducationinSouthAsia,2011.
5. Byron S. Gottfried, "Schaum's Outline of Theory and Problems of Programming with C", McGraw-Hill Education, 1996. C", ,McGraw-HillEducation,1996.

CS1203A **PROGRAMMING IN C LABORATORY** **L T P C**
0 0 4 2

COURSE OBJECTIVES:

- To develop programs in C using basic constructs.
- To develop programs in C using control statements.
- To develop applications in C using arrays, strings, pointers.
- To develop applications in C using functions, structures.
- To develop applications in C using file processing

COURSE OUTCOMES:

At the end of the course, students would:

- Interpret the basic syntax and semantics of the programming language constructs.
- Examine derived data types like arrays in solving problems.
- Illustrate problem decomposition and reconstruction through multiple user-defined function methods.
- Examine user-defined data types like structures and unions and its applications to solve problems.
- Apply file handling techniques to develop programs using sequential and random-access processing

LIST OF EXPERIMENTS

1. Input and Output statements.

2. Control statements – Branching &Looping.

- Write a C program to generate Pascal's triangle.
- Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*,/,% and use Switch Statement)
- Write a C program to find the sum of individual digits of a positive integer.
- A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence.
- Write a C program to generate the first n terms of the sequence.
- Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
- Write a C program to swap Numbers Using Temporary

Variables.3.**Arrays**

- Write a C program to search an array element using linear search.
- Write a C program to find both the largest and smallest number in a list of integers.
- Write a C program that uses functions to perform the following:
- Addition of Two Matrices
- Multiplication of Two Matrices
- Write a C program to implement Bubble Sort.

4.Strings

- Write a C program that uses functions to perform following operations

  (i)To insert a sub-string in to given main string from a given position.

  (ii)To delete n Characters from a given position in a given string.

- Write a C program to determine if the given string is a palindrome or not

5.Functions &Pointers:

- Write C programs that use recursive functions

  (i) To find factorial of given number

  (ii) To solve Towers of Hanoi Problem.

  (iii) To swap the variables using call by value and call by reference.

6.Generate mark sheet of students using structures.

7.Compute Salary Slip for five employees using structures and functions Insert, Update, delete and append telephone details of an individual or a company into a telephone directory using random accessfile.

LIST OF EQUIPMENTS FOR A BATCH OF 30 STUDENTS:

HARDWARE: 30 terminals

SOFTWARE:C compiler

TOTAL: 60 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CS1203A.1	**2**	-	-	**2**	-	-	-	-	-	-	-			
CS1203A.2	**2**	-	-	**2**	**2**	-	-	-	-	-	-			
CS1203A.3	**2**	-	-	-	**3**	-	-	-	-	-	-			
CS1203A.4	-	-	-	-	**3**	-	-	-	-	-	-			
CS1203A.5	-	-	-	-	-	-	-	-	-	-	-			
AVERAGE	**2.00**	**-**	**-**	**2.00**	**2.67**	**-**	**-**	**-**	**-**	**-**	**-**			

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

GE1201A ENGINEERING PRACTICES LABORATORY

L	T	P	C
0	0	4	2

COURSE OBJECTIVES:

- To provide exposure to the students with hands on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.

COURSE OUTCOMES:

At the end of the course, students would:

- Describe the basic principle of welding
- Explain the basic principle of Sheet Metal Work
- Discuss the basic principle of joints
- Summarize the basic principle of Machine assembly practice
- Apply the basic principle of Drilling

GROUP A (CIVIL & MECHANICAL)

CIVIL ENGINEERING PRACTICE **13**

Buildings:

Study of plumbing and carpentry components of residential and industrial buildings. Safety aspects.

Plumbing Works:

Study of pipeline joints, its location and functions: valves, taps, couplings, Unions, reducers, elbows in household fittings.

Study of pipe connections requirements for pumps and turbines.

Preparation of plumbing line sketches for water supply and sewage works.

Hands-on-exercise: Basic pipe connections – Mixed pipe material connection –.pipe connections with different joining components.

Demonstration of plumbing requirements of high-rise buildings.

Carpentry using Power Tools only:

Study of the joints in roofs, doors, windows and furniture.

Hands-on-exercise: Wood work, joints by sawing, planning and cutting.

MECHANICAL ENGINEERING PRACTICE **18**

Welding:

Preparation of butt joints, lap joints and T- joints by Shielded metal arc welding.Gas welding Practice basic

Machining:

Simple Turning and Taper turning Drilling

Practice Sheet Metal Work:

Forming & Bending:

Model making – Trays and funnels.

Different type of joints.

Machine assembly practice:

Study of centrifugal pump

Study of air conditioner Demonstration on:

Smithy operations, upsetting, swaging, setting down and bending. Example – Exercise – Production of Hexagonal headed bolt.

Foundry operations like mould preparation for gear and step cone pulley.Fitting – Exercises – Preparation of square fitting and V – fitting models.

GROUP -B (ELECTRICAL & ELECTRONICS)

ELECTRICAL ENGINEERING PRACTICE **13**

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

ELECTRONICS ENGINEERING PRACTICE **16**

Study of Electronic components and equipment's – Resistor, color coding measurement of AC Signal parameter (peak-peak, rms period, frequency) using CR.
Study of logic gates AND, OR, EX-OR and NOT.
Generation of Clock Signal.
Soldering practice – Components Devices and Circuits – Using general purpose PCB.
Measurement of ripple factor of HWR and FWR.

TOTAL: 60 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
GE1201A.1	2	-	3	3	-	-	-	-	-	-	-	-	-	-
GE1201A.2	3	3	2	-	-	-	-	-	-	-	-	-	-	-
GE1201A.3	3	3	-	-	-	-	-	-	-	-	-	-	-	-
GE1201A.4	-	2	1	2	-	-	-	-	-	-	-	-	-	-
GE1201A.5	3	3	-	2	-	-	-	-	-	-	-	-	-	-
AVERAGE	**2.75**	**2.75**	**2.00**	**2.33**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-	-

correlation levels as 1, 2, 3
1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

IT1201A INFORMATION TECHNOLOGY ESSENTIAL L T P C

3 0 0 3

COURSE OBJECTIVES:

- To acquire the concepts of web essentials
- To know the basics of scripting languages.
- To understand Network Essentials related to information Technology
- To understand Mobile Communication Essentials
- To understand various applications related to Information technology

COURSE OUTCOMES:

On Completion of the course, the students should be able to:

- Design and deploy web-sites
- Design and deploy simple web-applications using PHP
- Gain knowledge on Basics of Networking
- Apply the concepts of Mobile communications.
- Develop information system

UNIT I WEB ESSENTIALS 9

Creating a Website - Working principle of a Website - Browser fundamentals - Authoring tools - Types of servers: Application Server - Web Server - Database Server

UNIT II SCRIPTING ESSENTIALS 9

Need for Scripting languages – Types of scripting languages – Client side scripting – Server side scripting – PHP : Introduction to PHP-Incorporating PHP Within HTML-The Structure of PHP - Using Comments - Basic Syntax - Variables -Operators - Variable Assignment -Multiple-Line Commands - The Difference Between the echo and print Commands - Functions - Variable Scope.

UNIT-III NETWORKING ESSENTIALS 9

What is a Computer Network? – Network fundamentals – The Internet & World Wide Web – Network Applications: Discovery, Communication, Collaboration, and Education.

UNIT IV MOBILE COMPUTING ESSENTIALS 9

Wireless Technologies – Wireless Computer Networks & Internet access –Mobile Computing & Mobile Commerce – The Internet of Things –Wireless Security.

UNIT V APPLICATION ESSENTIALS 9

Creation of simple interactive applications - Simple database applications - Multimedia applications - Design and development of information systems – Personal Information System – Information retrieval system – Social networking applications.

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
IT1201A .1	2	3	3	3	2	3	3	-	-	-	-	1	3	3
IT1201A .2	1	3	2	1	2	3	3	-	-	-	-	1	3	3
IT1201A .3	2	2	3	3	2	-	1	-	-	-	-	-	3	3
IT1201A .4	2	2	2	2	2	2	2	-	-	-	-	-	3	3
IT1201A .5	2	1	1	2	1	2	2	-	-	-	-	-	3	3
AVERAGE	**1.80**	**2.20**	**2.20**	**2.20**	**1.80**	**2.50**	**2.20**	**-**	**-**	**-**	**-**	**1.00**	**3.00**	**3.00**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOKS:

1.Robin Nixon, "Learning PHP, MySQL, JavaScript, CSS & HTML5" Third Edition, O'REILLY, 2014.
2.R. Kelly Rainer , Casey G. Cegielski , Brad Prince, Introduction to Information Systems, Fifth Edition, Wiley Publication, 2014.

REFERENCE BOOKS:

1.Gottapu Sasibhushana Rao, "Mobile Cellular Communication", Pearson, 2012.
2.James F. Kurose, ―Computer Networking: A Top-Down Approach‖, Sixth Edition, Pearson, 2012.
3.it-ebooks.org.

IT1202A INFORMATION TECHNOLOGY ESSENTIALS LAB **L T P C**
0 0 2 1

COURSE OBJECTIVES:

- To Write Simple Scripts for the creation of Websites
- To Create various Information Technology enabled Applications

COURSE OUTCOMES:

On Completion of the course, the students should be able to:

- Design interactive websites using basic HTML tags, different styles, links and with all Basic control elements.
- Create client side and server side programs using scripts using PHP.
- Design dynamic web sites and handle multimedia components.
- Create applications with PHP connected to database.
- Create Personal Information System.
- Design interactive websites using basic HTML tags, different styles, links and with all Basic control elements.

LIST OF EXPERIMENTS

1. Creation of interactive web sites - Design using HTML and authoring tools
2. Creation of simple PHP scripts - Dynamism in web sites
3. Handling multimedia content in web sites
4. Database applications using PHP and MySQL
5. Study of computer networking components
6. Creation of information retrieval system using web, PHP and MySQL
7. Study of Technologies associated with mobile devices
8. Creation of Personal Information System
9.
10.

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
IT1202A .1	2	3	3	3	2	3	3	-	-	-	-	1	3	3
IT1202A .2	1	3	2	1	2	3	3	-	-	-	-	1	3	3
IT1202A .3	2	2	3	3	2	-	1	-	-	-	-	-	3	3
IT1202A .4	2	2	2	2	2	2	2	-	-	-	-	-	3	3
IT1202A .5	2	1	1	2	1	2	2	-	-	-	-	-	3	3
AVERAGE	**1.80**	**2.20**	**2.20**	**2.20**	**1.80**	**2.50**	**2.20**	**-**	**-**	**-**	**-**	**1.00**	**3.00**	**3.00**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

CY1201A ENVIRONMENTAL SCIENCE AND ENGINEERING

L	T	P	C
2	0	0	0

COURSE OBJECTIVES:

- To understand nature and the facts about the environment.
- To find and implement 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

COURSE OUTCOMES:

- Infer the functions of eco systems and appreciate the bio diversity.
- Explain the measures to control environmental pollution.
- Illustrate the usage as well as the effects of over exploitation of natural resources.
- Analyze the technological, economic and political solutions to environmental problems with various Environmental Protection Act in mind.
- Outline the interrelationship between population explosion and the environment also role of IT in environment and human health.

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 major ecosystem – Introduction to biodiversity definition: genetic, species and ecosystem diversity – value of biodiversity – Biodiversity at global, national and local levels – India as a mega- diversity nation – hot-spots of biodiversity – threats to biodiversity – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.

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.

UNIT III NATURAL RESOURCES **10**

Forest resources: Use and over-exploitation, deforestation, case studies- dams and their effects on forests and tribal people – Water resources: Use and over- utilization of surface and ground water – Mineral resources: environmental effects of extracting and using mineral resources, case studies – Food resources: changes caused by agriculture and overgrazing, effects of modern agriculture, 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 – 12 Principles of Green chemistry, role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT

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, environmental ethics: Issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies – environment protection act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act –- central and state pollution control boards.

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.

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CY1201A.1	1	1	-	-	-	1	2	-	-	-	-	-	-	-
CY1201A.2	2	1	-	1	-	1	3	-	-	-	-	-	-	-
CY1201A.3	1	1	-	-	-	1	2	-	-	-	-	-	-	-
CY1201A.4	2	1	-	1	-	1	3	1	-	-	-	-	-	-
CY1201A.5	2	1	-	1	-	1	2	-	-	-	-	-	-	-
AVERAGE	**1.60**	**1.00**	**-**	**1.00**	**-**	**1.00**	**2.40**	**1.00**	**-**	**-**	**-**	**-**	-	-

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOKS:

1. **Environmental Science and Engineering by AnubhaKaushik and C.P.Kaushik-New Age International Publishers. New Delhi, 2017.**

REFERENCES:

1. Benny Joseph, Environmental Studies, Tata mcgraw-Hill Publishing Company, Ltd., New Delhi,2006.
2. Dr.B.S.Chauhan,. Environmental Studies, University Science Press, New Delhi, 2011.

MA1303A **DISCRETE MATHEMATICS**

L	T	P	C
3	1	0	4

(Common to second semester AIDS and third semester CSE/IT)

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

At the end of the course, students would:

- Describe the concepts needed to test the logic of a program.
- Explain the counting principles.
- Discuss Graph Theory that would help them to define new levels of networks which are implemented in AI and ANN.
- Demonstrate the properties of algebraic structures such as groups, rings and fields.
- Slove the Lattices and Boolean algebra used in Coding and Decoding theory of Cryptography.

UNIT I LOGIC AND PROOFS **12**

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

UNIT II SET THEORY **12**

Basic concepts – Notations – Subset – Algebra of sets – The power set – Ordered pairs and Cartesian product – Relations on sets –Types of relations and their properties – Relational matrix and the graph of a relation – Partitions – Equivalence relations – Partial ordering – Poset – Hasse diagram – Lattices and their properties – Sub lattices – Boolean algebra – Homomorphism.

UNIT III COMBINATORICS **12**

Mathematical induction – Strong induction and well ordering – The basics of counting – The pigeonhole principle – Permutations and combinations – Recurrence relations – Solving linear recurrence relations – Generating functions – Inclusion and exclusion principle and its applications

UNIT IV GRAPHS **12**

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

UNIT V ALGEBRAIC STRUCTURES **12**

Algebraic systems – Definitions-Examples-Properties-Semi groups and monoids–Homomorphism’s-Groups – Subgroups – Normal subgroup and cosets – Lagrange‘s theorem – Codes and group codes – Basic notions of error correction-Error recovery in group codes.

TOTAL: 60 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
MA1303A .1	3	2	2	1	-	-	-	-	-	-	-	-	2	-
MA1303A .2	3	2	2	1	-	-	-	-	-	-	-	-	1	-
MA1303A .3	3	2	1	2	-	-	-	-	-	-	-	-	2	-
MA1303A .4	3	2	1	1	-	-	-	-	-	-	-	-	2	-
MA1303A .5	3	2	2	1	-	-	-	-	-	-	-	-	1	-
AVERAGE	**3.00**	**2.00**	**1.60**	**1.20**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1.60**	**-**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXTBOOKS:

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

REFERENCES:

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

IT1301A **OBJECT ORIENTED PROGRAMMING** **L T P C**
3 0 0 3

COURSE OBJECTIVES:

- To understand Object Oriented Programming concepts and basic characteristics of Java
- To know the principles of packages, inheritance and interfaces
- To define exceptions and use I/O streams
- To develop a java application with threads and generics classes
- To design and build simple Graphical User Interfaces.

COURSE OUTCOMES:

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

- Demonstrate Java programs using OOP principles.
- Illustrate Java programs using inheritance, interfaces.
- Show Java applications using Exceptions and I/O streams.
- Describe the Java applications with Threads, generics classes and JDBC
- Apply interactive Desktop application using Swing and JDBC.

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 –Fundamental Programming Structures in Java – Defining classes in Java – constructors, methods -access specifiers - static members -Comments, Data Types, Variables, Operators, Control Flow, Arrays, Packages.

UNIT II INHERITANCE AND INTERFACES **9**

Inheritance–Superclasses-subclasses–Protectedmembers–constructors in subclasses-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-Object cloning-inner classes, Array Lists-Strings

UNIT III EXCEPTION HANDLING AND I/O **9**

Exceptions-exception hierarchy-throwing and catching exceptions –built-in 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 IV MULTITHREADING AND GENERIC PROGRAMMING **9**

Understanding Threads, Thread Priorities, Synchronizing Threads, Thread lifecycle, Inter-thread communication. Generic Programming–Generic classes–generic methods–Bounded Types–Restrictions and Limitations-Introduction to JDBC, JDBC Drivers and Architecture, Accessing Database with JDBC.

UNIT V EVENT DRIVEN PROGRAMMING **9**

Graphics programming - Frame – Components - working with 2D shapes - Using color, fonts, and images - Basics of event handling - event handlers - adapter classes -actions - mouse events - Introduction to Swing –Swing GUI Components – Text Fields , Text Areas – Buttons- Check Boxes – Radio Buttons – Lists- choices- Scrollbars – Windows –Menus – Dialog Boxes. Swing packages-Swing Control classes and Methods.

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

C

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 2
IT1301A.1	2	2	3	3	1	2	2	-	1	2	2	1	2
IT1301A.2	2	3	3	3	3	-	2	-	1	2	2	2	2
IT1301A.3	2	2	3	3	2	-	2	-	1	2	2	2	3
IT1301A.4	2	2	3	3	3	-	2	-	3	2	2	2	3
IT1301A.5	3	2	3	3	3	2	2	-	3	2	2	3	3
AVERAGE	**2.20**	**2.20**	**3.00**	**3.00**	**2.40**	**2.00**	**2.00**	**-**	**1.80**	**2.00**	**2.00**	**2.00**	**2.60**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOKS:

1. Herbert Schildt, Java The complete reference, 8th Edition, McGraw Hill Education, 2011.
2. CayS.Horstmann, Gary Cornell, Core Java Volume–I Fundamentals, 9th Edition, Prentice Hall, 2013.

REFERENCES:

1. Paul Deitel, Harvey Deitel, Java SE8 for programmers, 3rd Edition, Pearson, 2015.
2. Steven Holzner, Java2Blackbook, Dream tech press, 2011.
3. Timothy Budd, Understanding Object-oriented programming with Java Updated Edition, Pearson Education, 2000.

CS1301A DATA STRUCTURES

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To Study the concepts of ADTs
- To Acquire linear data structures – lists, stacks, and queues
- To learn non-linear data structures and apply Tree and Graph structures
- To understand sorting, searching and hashing algorithms

COURSE OUTCOMES:

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

- Apply the concept and operations of List ADT.
- Explain the concept and operations of Stack and Queue ADT
- Demonstrate the various Tree ADT and its Applications
- Apply Graph data structures and hashing concept in real-world scenarios
- Interpret the implementation of sorting and searching

UNIT I LINEAR DATA STRUCTURES – LIST 9

Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation — singly linked lists-doubly-linked lists – circularly-linked list-applications of lists –Polynomial Manipulation.

UNIT II LINEAR DATA STRUCTURES – STACKS, QUEUES 9

Stack ADT – Operations – Evaluating arithmetic expressions- Other Applications-Conversion of Infix to postfix expression – Queue ADT – Operations – Circular Queue –Double Ended Queues –applications of queues.

UNIT III NON LINEAR DATA STRUCTURES – TREES 9

Introduction to Tree ADT – Implementations of trees- Binary Tree ADT -tree traversals -expression trees — binary search tree ADT –Threaded Binary Trees- AVL Trees –Multi-way Search Trees-B-Tree – B+ Tree- Heap-Priority Queue.

UNIT IV GRAPHS AND HASHING 9

Graph and their representations-Graph Traversal Techniques: Breadth First Search (BFS) and Depth First Search (DFS)-Topological Sort- Hashing- Hash Functions – Collision in hashing-Separate Chaining – Open Addressing-Rehashing-Applications of Hashing.

UNIT V SEARCHING AND SORTING 9

Searching- Linear Search – Binary Search. Sorting – Bubble Sort – Selection Sort – Insertion Sort – Quick Sort-Merge Sort-Shell Sort – Radix Sort-Heap Sort.

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 2
CS1301A .1	3	2	2	-	-	-	-	-	-	-	-	2	2
CS1301A.2	3	2	2	-	-	-	-	-	-	-	-	2	2
CS1301A.3	3	2	2	-	-	-	-	-	-	-	-	2	2
CS1301A.4	3	2	2	-	-	-	-	-	-	-	-	2	2
CS1301A.5	3	2	2	-	-	-	-	-	-	-	-	2	2
AVERAGE	**3.00**	**2.00**	**2.00**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2.00**	**2.00**

1.
2.

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOKS:-

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

REFERENCES:-

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein, “Introduction to Algorithms", Second Edition, Mcgraw Hill, 2002.
2. Aho, Hopcroft and Ullman, “Data Structures and Algorithms”, Pearson Education, 1983.
3. Stephen G. Kochan, “Programming in C”, 3rd edition, Pearson Education.
4. Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, “Fundamentals of Data Structures in C”, Second Edition, University Press, 2008.

EC1306A **DIGITAL PRINCIPLES AND SYSTEM DESIGN**

L	T	P	C
3	0	0	3

(Common to second semester AIDS and third semester CSE/IT)

COURSE OBJECTIVES:

- To design digital circuits using simplified Boolean functions
- To analyze and design combinational circuits
- To analyze and design synchronous and asynchronous sequential circuits
- To understand Programmable Logic Devices
- To write HDL code for combinational and sequential circuits

COURSE OUTCOMES:

- At the end of the course, students would:
- Discuss Boolean functions using K-Map
- Describe the Combinational Circuits
- Explain the Sequential Circuits.
- Summarize the designs using Programmable Logic Devices
- Apply HDL code for combinational and Sequential Circuits

UNIT I BOOLEAN ALGEBRA AND LOGIC GATES **12**

Number Systems – Decimal, Binary, Octal, Hexadecimal, 1's and 2's complements, Arithmetic Operations – Binary Codes- Boolean Algebra and Logic Gates – Theorems and Properties of Boolean Algebra – Boolean Functions – Canonical and Standard Forms – Simplification of Boolean Functions using Karnaugh Map – Logic Gates – NAND and NOR Implementations.

UNIT II COMBINATIONAL LOGIC **12**

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

UNIT III SYNCHRONOUS SEQUENTIAL LOGIC **12**

Sequential Circuits – Storage Elements: Latches, Flip-Flops -SR, JK, T, D, – operation and excitation tables – Analysis of Clocked Sequential Circuits – Moore/Mealy models, State Reduction and Assignment – Design Procedure – Registers and Counters – HDL Models of Sequential Circuits.

UNIT IV ASYNCHRONOUS SEQUENTIAL LOGIC **12**

Analysis and Design of Asynchronous Sequential Circuits – cycles and races, Reduction of State and Flow Tables – Race-free State Assignment – Hazards, Essential Hazards, and Design of Hazard free circuits

UNIT V MEMORY AND PROGRAMMABLE LOGIC **12**

RAM – Memory Decoding – Error Detection and Correction – ROM – Programmable Logic Array – Programmable Array Logic – Sequential Programmable Devices. Field Programmable Gate Arrays (FPGA) – Implementation of combinational logic circuits using PLA, PAL

TOTAL: 60 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 2
EC1306A.1	3	3	1	-	1	-	2	-	-	-	-	2	2
EC1306A.2	3	3	3	2	2	-	2	-	-	-	-	2	2
EC1306A.3	3	3	3	2	2	1	2	-	-	-	-	2	2
EC1306A.4	3	3	2	2	1	1	1	-	-	-	-	2	1
EC1306A.5	3	3	3	2	3	2	1	-	1	2	-	2	3
AVERAGE	**3.00**	**3.00**	**2.40**	**2.00**	**1.80**	**1.33**	**1.60**	**-**	**1.00**	**2.00**	**-**	**2.00**	**2.00**

1.
2.

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOK:

1. M. Morris R. Mano, Michael D. Ciletti, ―Digital Design: With an Introduction to the Verilog HDL, VHDL, and SystemVerilog, 6th Edition, Pearson Education, 2017.

REFERENCES:

1. G. K. Kharate, Digital Electronics, Oxford University Press, 2010
2. John F. Wakerly, Digital Design Principles and Practices, Fifth Edition, Pearson Education, 2017.
3. Charles H. Roth Jr, Larry L. Kinney, Fundamentals of Logic Design, Sixth Edition, CENGAGE
4. Learning, 2013
5. Donald D. Givone, Digital Principles and Design‖, Tata Mc Graw Hill, 2003.

EC1307A ANALOG AND DIGITAL COMMUNICATION L T P C
3 0 0 3

COURSE OBJECTIVES:

The student should be made to:

- To learn about need of modulation techniques
- To understand various modulation techniques in communication systems
- To understand basic difference between analog and digital modulation systems
- To learn about multiplexing techniques used in communication systems

COURSE OUTCOMES:

At the end of the course, students would:

- Apply linear modulation techniques in the present contemporary world.
- Use angle modulation techniques.
- Able to use digitization techniques in computer networks.
- Apply digital modulation techniques.
- Be familiarized with source and Error control coding.

UNIT I LINEAR MODULATION 9

Need for Modulation-AM Signal and Spectra-DSB-Product Modulator- Square law and Balanced Modulator-Switching Modulator-DSBSC-SSBSC-VSB-TV signals-Envelope Detector, Coherent Detection-Costas Receiver-Quadrature Carrier Multiplexing- Frequency Translation**- Noise in AM.**

UNIT II ANGLE MODULATION 9

Frequency Modulation-Reactance Modulator-Phase Modulation- FM & PM Relation- Bandwidth- Narrow band & Wide band FM transmitters- PLL- Pre-emphasis & De-emphasis- FM Detectors –Phase discriminator- Slope detector- Ratio detector- Noise in FM.

UNIT III DIGITIZATION TECHNIQUES FOR COMPUTER NETWORKS 9

Sampling Theory – PAM – Quantization - Pulse Code Modulation - Noise in PCM – Differential PCM-Delta Modulation – Adaptive Delta Modulation – TDM-Voice band modems.

UNIT IV DIGITAL MODULATION 9

Phase shift keying – BPSK, DPSK, QPSK – Principles of M-ary signaling M-ary PSK & QAM – Comparison, ISI – Pulse shaping – Duo binary encoding — Eye pattern –Correlation Receiver- CDMA- Rake Receiver.

UNIT V CODING TECHNIQUES 9

Measure of information – Entropy – Source coding theorem – Shannon–Fano coding, Huffman Coding, LZ Coding – Channel capacity – Shannon-Hartley law – Shannon's limit – Error control codes – Cyclic codes, Syndrome calculation – Convolution Coding, Sequential and Viterbi decoding.

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 2
EC1307A.1	3	3	3	1	-	-	-	-	-	-	-	1	2
EC1307A .2	3	3	3	1	-	-	-	-	-	-	-	1	2
EC1307A.3	3	3	3	1	-	-	-	-	-	-	-	1	2
EC1307A.4	3	3	3	3	-	-	-	-	-	-	-	1	1
EC1307A.5	3	3	3	1	-	-	-	-	-	-	-	1	1
AVERAGE	**3.00**	**3.00**	**3.00**	**1.40**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1.00**	**1.60**

1.
2.

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOKS:

1. H Taub, D L Schilling, G Saha, “Principles of Communication Systems” 3/e, TMH 2007
2. Simon Haykin “Digital Communications” John Wiley 2005
3. Simon Haykin, “Communication Systems” 4th Edition John Wiley

REFERENCES:

1.Bruce A Carlson, “Communication Systems – An Introduction to Signals and Noise in Electrical Communication” 4th Edition. McGraw-Hill
2.John G. Proakis, “Digital Communication”, 2014, 5th Edition, McGraw-Hill, India
Sklar, Digital Communications: Fundamentals and Applications, 2009, 2nd Edition, Pearson Education

IT1302A OBJECT ORIENTED PROGRAMMING LABORATORY L T P C
0 0 4 2

COURSE OBJECTIVES:

- To build software development skills using java programming for real-world applications.
- To understand and apply the concepts of classes, packages, interfaces, array list, exception handling and file processing.
- To develop applications using generic programming and event handling

COURSE OUTCOMES:

- Illustrate and implement Java programs for simple applications that make use of classes, packages, inheritance and interfaces.
- Demonstrate and implement Java programs with array list and exception handling
- Illustrate the concept of Multithreading using java programs.
- Examine the applications using file processing, generic programming.
- Demonstrate the applications using event handling mechanism.

LIST OF EXPERIMENTS

1. Develop a java application using classes & objects
2. Develop a java application using packages.
3. Develop a java application using Inheritance.
4. Design a Java interface for ADT Stack. Provide necessary exception handling.
5. Write a program to perform string operations using Array List. Write functions for the following
    a) Append-add at end
    b) Insert–add at particular index
    c) Search
    d) List all string starts with given letter.
6. Write a Java Program to create an abstract class named and demonstrate polymorphism.
7. Write a Java program to implement user defined exception handling.
8. Write a Java program that reads a filename from the user, displays information about whether the file exists, whether the file is readable, or writable, the type of file and the length of the file in bytes.
9. Write a java program that implement multi-threading.
10. Write a java program to create generic function.
11. Design a calculator using event-driven programming paradigm of Java with the following options.
    a) Decimal manipulations
    b) Scientific manipulations
12. Develop a simple student database management system using event-driven and concurrent programming paradigms of Java. Use JDBC to connect a back-end database.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:
HARDWARE: 30 terminals SOFTWARE: Java

TOTAL: 60 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 2
IT1302A.1	2	2	3	3	1	-	-	-	-	1	1	-	3
IT1302A.2	2	3	3	3	2	-	-	-	-	-	1	-	3
IT1302A.3	2	2	2	3	2	-	-	-	-	1	2	1	3
IT1302A.4	2	3	3	3	3	-	-	-	-	2	2	1	3
IT1302A.5	3	3	3	3	3	-	-	-	-	2	2	2	3
AVERAGE	**2.20**	**2.60**	**2.80**	**3.00**	**2.20**	**-**	**-**	**-**	**-**	**1.50**	**1.60**	**1.33**	**3.00**

1.
2.

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

CS1303A DATA STRUCTURES LABORATORY

L	T	P	C
0	0	4	2

COURSE OBJECTIVES:

- To implement linear and non-linear data structures
- To understand the different operations of search trees
- To implement graph algorithms
- To get familiarized to sorting, searching and hashing algorithms

COURSE OUTCOMES:

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

- Demonstrate appropriate operations and applications of Linear datastructures(List, Stack and Queue) using array
- Examine functions to implement operations of Linear datastructures(List, Stack and Queue) using Linked List
- Determine the different operations of various Trees
- Demonstrate the application of graph traversal algorithms and techniques
- Examine various sorting, searching and hashing algorithms

LIST OF EXPERIMENTS:

1. Array implementation of List ADT
2. Implement the following data structures
   i. Singly Linked List
   ii. Doubly Linked List
3. Array implementation of Stack and Queue ADTs
4. Applications of List, Stack and Queue ADTs
5. Implementation of Binary Search Trees
6. Implementation of AVL Trees
7. Implementation of heaps using priority queues.
8. Programs for implementation of graph traversals
   (i) BFS and (ii) DFS
9. Implementation of searching algorithms.
10. Implementation of Insertion Sort, Merge Sort, Quick Sort and Heap Sort algorithms
11. Programs to implement hashing

(i) Separate Chaining and
(ii) Open Addressing

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

HARDWARE: 30 terminals
SOFTWARE:C compiler

TOTAL: 60 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 2
CS1303A.**1**	3	3	2	-	-	-	-	-	2	1	-	2	3
CS1303A.**2**	3	3	2	-	-	-	-	-	2	1	-	2	3
CS1303A.**3**	3	3	2	-	-	-	-	-	2	1	-	2	3
CS1303A.**4**	3	3	2	-	-	-	-	-	2	1	-	2	3
CS1303A.**5**	3	3	2	-	-	-	-	-	2	1	-	2	3
AVERAGE	**3.00**	**3.00**	**2.00**	**-**	**-**	**-**	**-**	**-**	**2.00**	**1.00**	**-**	**2.00**	**3.00**

1.
2.

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

HS1301A **INTERPERSONAL SKILLS LABORATORY**

L	T	P	C
0	0	2	1

OBJECTIVES: The Course will enable learners to:

- Equip students with the English language skills required for the successful undertaking ofacademic studies with primary emphasis on academic speaking and listening skills.
- Provide guidance and practice in basic general and classroom conversation and to engage inspecific academic speaking activities.
- Improve general and academic listening skills.
- Make effective presentation.

COURSE OUTCOMES:

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

- Explain the communication skills in articulating a complete idea with a clarity in pronunciation
- Describe the interpersonal skills with a willingness to work in team following the social work ethics
- Discuss the speaking ability to respond in any informal talk detailing the content of the information in any form
- Explain the role of active listening and reading skills in group discussions to effectively persuade the group to achieve the desired target.
- Explain the effective formal presentations and interactive communication in any academic and business contexts

UNIT I **COMMUNICATION** **6**

Listening As A Key Skill- Its Importance- Speaking- Give Personal Information- Ask For Personal Information- Improving Pronunciation- Pronunciation Basics- Taking Lecture Notes- Preparing To Listen To A Lecture- Listen to TED/INK Talks - Articulate A Complete Idea.

UNIT II **INTERPERSONAL SKILLS** **6**

Interpersonal Skills- Nurturing- Empathetic- Self-Control- Patient- Sociability- Warmth- Social Skills-Team Work-Work Ethic- Willing To Work- Initiative- Self-Motivated – Integrity.

UNIT III **SPEAKING NUANCES** **6**

Factors Influence Fluency- Deliver A Five-Minute Informal Talk- Greet- Respond To Greetings- Describe Health And Symptoms-Invite And Offer- Accept- Decline- Take Leave- Listen For And Follow The Gist- Listen For Detail – Book/ Movie/Newspaper Articles Review.

UNIT IV **GROUP DISCUSSION** **6**

Being An Active Listener: Giving Verbal And Non-Verbal Feedback- Participating In A Group Discussion- Asking And Getting Clarifications-Summarizing Academic Readings And Lectures- Conversational Speech- Listening To And Participating In Conversations- Persuade.

UNIT V **PRESENTATIONS** **6**

Formal And Informal Talk- Listen To Follow And Respond To Explanations, Directions And Instructions In Academic And Business Contexts- Strategies For Formal Presentations And Interactive Communication- Group/Pair Presentations.

TOTAL: 30 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 2
HS1301A.1	-	-	-	-	2	2	1	2	2	3	1	1	-
HS1301A.2	-	-	-	-	1	2	1	2	3	3	1	1	-
HS1301A.3	-	-	-	-	3	2	1	1	2	3	2	1	-
HS1301A.4	-	-	-	-	1	1	1	1	2	3	1	1	-
HS1301A.5	-	-	-	-	1	2	1	1	2	3	2	1	-
AVERAGE	**-**	**-**	**-**	**-**	**1.60**	**1.80**	**1.00**	**1.40**	**2.20**	**3.00**	**1.40**	**1.00**	**-**

1.
2.

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

CS1302A	SOFTWARE ENGINEERING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To understand the basic concepts of software engineering applied in developing various software development life cycle models and agile process models.
- Understand the software requirements and the SRS documents for software projects.
- Understand the software design engineering, user-interface design and component leveldesign.
- Learn various testing approaches applied in software development.
- Learn the methods of software project management: estimation, scheduling, planning and software risk management.

COURSE OUTCOMES:

- Describe the projects through the adoption of suitable lifecycle models
- Determine an appropriate process model depending on the user requirements
- Examine the suitable software design with appropriate user and component level design.
- Apply a suitable testing strategy for the designed software product.
- Illustrate appropriate project estimation techniques and manage the risk.

UNIT I SOFTWARE PROCESS AND AGILE DEVELOPMENT 9

Introduction: The Nature of Software, Software Engineering, The Software Process, Software Engineering practice, Software Myths, Process models: Prescriptive Process Perspective and Specialized Process Models, Agile development: Introduction to Agility - Agile Process Models: Scrum, Dynamic system development and Agile unified process-Tool Set for the Agile Process- Extreme programming-XP Process

UNIT II REQUIREMENT ENGINEERING PROCESS AND MODELING 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. Requirements Modeling: Behavior, patterns, and web/mobile apps, Case Study: SRS-LibraryManagement, Student Fee Registration Details.

UNIT III SOFTWARE DESIGN 9

Design engineering: Design Process, Design Concepts, Design Model. Architectural design: Software Architecture, Architectural Genres, Architectural Styles, Architectural Design, Architectural Mapping using Data Flow. User-Interface Design: The Golden Rules, User Interface Analysis and Design,Interface Analysis, Interface Design Steps. Component level Design: Designing Class based components-Component-Level Design for WebApps and Mobile Apps.

UNIT IV TESTING STRATEGIES 9

Software testing strategies: A Strategic Approach to Software Testing, Test Strategies for Conventional Software and Object Oriented Software, Validation Testing, White- Box Testing, Basis Path Testing, Black-Box Testing, System Testing. Software Implementation Techniques: Refactoring-Maintenance and Reengineering-BPR model-Reengineering process model-Reverse and Forward Engineering.

UNIT V PROJECT AND RISK 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, Risk management: Reactive versus Proactive Risk Strategies, Software Risks, Risk Identification, Risk Projection, Risk Refinement, RMMM, RMMM Plan-Case Study: Risk Management-Manufacturing Company, Banks.

TOTAL:45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 2
CS1302A.1	2	2	2	-	1	-	-	1	2	1	1	1	2
CS1302A.2	2	2	2	-	1	-	-	1	2	1	1	1	2
CS1302A.3	2	2	2	-	1	-	-	1	2	1	1	1	3
CS1302A .4	2	2	2	-	1	-	-	1	2	1	1	1	2
CS1302A.5	2	2	2	-	1	-	-	1	2	1	1	1	3
AVERAGE	**2.00**	**2.00**	**2.00**	**-**	**1.00**	**-**	**-**	**1.00**	**2.00**	**1.00**	**1.00**	**1.00**	**2.40**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOKS:

1. Roger S. Pressman, "Software Engineering - A Practitioner's Approach", 6thEdition, TMH,2010.
2. Sommerville, "Software Engineering", 9th Edition, Pearson Education, 2011.

REFERENCES:

1. K.K.Agarwal& Yogesh Singh, "Software Engineering", 3rd Edition, New Age InternationalPublishers, 2008.
2. Shely Cashman Rosenblatt, "System Analysis and Design", 2nd Edition, Thomson Publications,2011.
3. PankajJalote, "An Integrated Approach to Software Engineering", 3rd Edition, Narosa Publishing House, 2011.

MA1403A	PROBABILITY AND STATISTICS	L	T	P	C
		3	1	0	4

COURSE OBJECTIVES:

- This course aims at providing the required skill to apply the statistical tools in engineering problems.
- To introduce the basic concepts of probability and random variables.
- To introduce the basic concepts of two dimensional random variables.
- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
- To introduce the basic concepts of classifications of design of experiments which plays very important roles in the field of agriculture and statistical quality control.

COURSE OUTCOMES:

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

- Describe the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.
- Explain the basic concepts of one and two dimensional random variables and apply in engineering applications.
- Apply the concept of testing of hypothesis for small and large samples in real life problems.
- Slove the basic concepts of classifications of design of experiments in the field of agriculture and statistical quality control.
- Calculate the notion of sampling distributions and statistical techniques used in engineering

UNIT I PROBABILITY AND RANDOM VARIABLES 12

Probability – The axioms of probability – Conditional probability – Total probability – Baye‘s theorem – Discrete and continuous random variables – Probability mass function – Probability density function– Properties – Mathematical Expectations – Conditional Expectations – Moments – Moment generating functions – characteristic function –Chebyshev’s inequality.

UNIT II STANDARD DISTRIBUTION 12

Discrete distribution – Bernoulli’ trial – Binomial distribution – Poisson distribution – Geometric distribution – Negative Binomial distribution – Continuous distribution – Uniform distribution – Exponential distribution – Gamma distribution – Weibull distribution – Normal distribution.

UNIT III TWO – DIMENSIONAL RANDOM VARIABLES 12

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

UNIT IV TESTING OF HYPOTHESIS 12

Sampling distributions – Estimation of parameters – Statistical hypothesis – Large sample tests basedon Normal distribution for single mean and difference of means -Tests based on t, Chi-square and F distributions for mean, variance and proportion – Contingency table (test for independent) – Goodnessof fit.

UNIT V DESIGN OF EXPERIMENTS AND STATISTICAL QUALITY CONTROL 12

One way and Two way classifications – Completely randomized design – Randomized block design – Latin square design – 2^2 factorial design – Control charts for measurements (X and R charts) – Control charts for attributes (p, c and np charts) – Tolerance limits.

TOTAL: 60 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 2
MA1403A.1	3	2	3	3	-	-	-	-	-	-	-	-	2
MA1403A.2	2	2	2	2	-	-	-	-	-	-	-	-	2
MA1403A.3	2	3	2	1	-	-	-	-	-	-	-	-	2
MA1403A.4	3	3	1	1	-	-	-	-	-	-	-	-	2
MA1403A.5	3	3	1	1	-	-	-	-	-	-	-	-	2
AVERAGE	**2.60**	**2.60**	**1.80**	**1.60**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2.00**

1.
2.

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOKS:

1. Johnson, R.A., Miller, I and Freund J., "Miller and Freund‘s Probability and Statistics forEngineers", Pearson Education, Asia, 8th Edition, 2015.
2. Milton. J. S. and Arnold. J.C., "Introduction to Probability and Statistics", Tata McGraw Hill,4th Edition, 2007.
3. Kapoor, V.K. and Gupta, S.P. (1978): Fundamentals of applied statistics, Sultan Chand & Sons.

REFERENCES:

1. Devore. J.L., "Probability and Statistics for Engineering and the Sciences‖, Cengage Learning,New Delhi, 8th Edition, 2014.
2. Papoulis, A. and Unni krishnapillai, S., "Probability, Random Variables and StochasticProcesses", McGraw Hill Education India, 4th Edition, New Delhi, 2010.
3. Ross, S.M., "Introduction to Probability and Statistics for Engineers and Scientists", 3rd Edition, Elsevier, 2004.
4. Spiegel. M.R., Schiller. J. and Srinivasan, R.A., "Schaum‘s Outline of Theory and Problems of Probability and Statistics", Tata McGraw Hill Edition, 2004.
5. Walpole. R.E., Myers. R.H., Myers.S.L.andYe.K., "Probability and Statistics for Engineers and Scientists", Pearson Education, Asia, 8th Edition, 2007.
6. Grant, E,L. and Laven Worth, R.S.: Statistical Quality Control, McGraw Hill.

CS1401A	COMPUTER ARCHITECTURE	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To learn the basic structure and operations of a computer.
- To learn the arithmetic and logic unit and implementation of fixed-point and floating pointarithmetic unit.
- To learn the basics of pipelined execution.
- To understand parallelism and multi-core processors.
- To understand the memory hierarchies, cache memories and virtual memories.
- To learn the different ways of communication with I/O devices.

COURSE OUTCOMES:

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

- Examine the basic structure of computers, operations and instructions.
- Analyze the design of the arithmetic and logic unit.
- Demonstrate the pipelined execution and design of control unit
- Illustrate the parallel processing architectures
- Analyze the various memory systems and I/O communication.

UNIT I FUNDAMENTALS OF COMPUTER ARCHITECTURE 9

Overview- Eight great Ideas in Computer architecture-components of computer system- Instructions – Operations and Operands – Representing Instructions – Arithmetic & Logical operations – control operations – Performance - Needs and types of various addressing modes.

UNIT II ARCHITECTURE OF COMPUTERARITHMETIC OPERATION 9

Data Representation, Architecture of Hardware implementation of arithmetic unit for common arithmetic operations: addition, subtraction, multiplication, division (Fixed point and floating point)- Sub-word Parallelism

UNIT III ARCHITECTURE OF INSTRUCTION EXECUTION 9

Introduction- Building a data path for MIPS implementation – A simple Control Implementationscheme – An Overview of Pipelining – Pipelined data path and control – Handling Data hazards &Control Hazards-Exceptions.

UNIT IV PARALLELISIM 9

Parallel processing challenges – Flynn‘s classification – SISD, MIMD, SIMD, SPMD, and Vector Architectures - Symmetric Multiprocessor Organization -Multiprocessor Operating System Design Considerations -Hardware multithreading –Homogeneous and Heterogeneous Multi-core Architectures-Multi-core processors and other Shared Memory Multiprocessors -Introduction to Graphics and Graphics Processing Units(GPU).

UNIT V MEMORY SYSTEM &INPUT/ OUTPUT ORGANIZATION 9

Exploiting Memory Hierarchy-Memory Technologies-Basics of caches-Measuring and improving Cache Performance-Virtual Memory-Programmed I/O-Interrupt Driven I/O-Direct Memory Access-Bus Arbitration-Buses-synchronous Bus-Asynchronous Bus- Standard I/O Interfaces-Universal serial Bus(USB)-Introduction to Edge Devices.

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 2
CS1401A.1	3	2	1	-	2	-	-	-	-	-	-	1	3
CS1401A.2	3	2	2	-	2	-	-	-	-	-	-	-	3
CS1401A.3	3	2	2	-	2	-	-	-	-	-	-	1	3
CS1401A.4	3	2	3	-	2	-	-	-	-	-	-	1	3
CS1401A.5	3	2	3	-	2	-	-	-	-	-	-	1	3
AVERAGE	**3.00**	**2.00**	**2.20**	**-**	**2.00**	**-**	**-**	**-**	**-**	**-**	**-**	**1.00**	**3.00**

Correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOKS:

1. David A. Patterson and John L. Hennessy, Computer Organization and Design: TheHardware/Software Interface, Fifth Edition, Morgan Kaufmann / Elsevier, 2014.
2. Carl Hamacher, ZvonkoVranesic, SafwatZaky, Computer Organization, Fifth Edition, TataMcGraw Hill, 2012.
3. W. Stallings, Computer organization and architecture, Prentice-Hall, 2012 M. M. Mano,Computer System Architecture, 3rd Edition,1992,Prentice-Hall

REFERENCES:

1. John P. Hayes, Computer Architecture and Organization, Third Edition, Tata McGraw Hill,2012.
2. John L. Hennessey and David A. Patterson, Computer Architecture – A Quantitative Approach,Morgan Kaufmann / Elsevier Publishers, Fifth Edition, 2012.

IT1401A	DATABASE MANAGEMENT SYSTEMS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To learn the fundamentals of data models, conceptualize and depict a database system using ER diagram.
- To study the principles to be followed to create an effective relational database and write SQL queries to store/retrieve data to/from database systems.
- To know the fundamental concepts of transaction processing, concurrency control techniques and recovery procedure.
- To learn about the internal storage structures using different file and indexing techniques and the basics of query processing and optimization.
- To study the basics of distributed databases, semi-structured and un-structured data models.

COURSE OUTCOMES:

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

- Model an application's data requirements using conceptual modeling and design database schemas based on the conceptual model and Formulate solutions to a broad range of query
- Analyze the components of normalization and evaluate how different normal forms impact the structure and efficiency of a database.
- Develop transaction and estimate the procedure for controlling the consequences of concurrent data access.
- Compare and analyze the performance of different file storage models and indexing strategies assessing their influence on the efficiency of query processing and optimization processes.
- Explore the features of distributed, semi-structured, and unstructured database systems to evaluate how they address specific data storage and retrieval challenges.

UNIT I RELATIONAL DATABASES **9**

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 **9**

Entity-Relationship model – E-R Diagrams – Enhanced-ER Model – ER-to-Relational Mapping – Functional Dependencies – Non-loss Decomposition – First, Second, Third Normal Forms, DependencyPreservation – Boyce/Codd's 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 - SavePoints – Isolation Levels – SQL Facilities for Concurrency and Recovery.

UNIT IV IMPLEMENTATION TECHNIQUES **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 ADVANCED TOPICS **9**

Overview of Distributed Databases – Data Fragmentation – Replication — Introduction to Object-basedDatabases - Enhanced Data bases: Temporal Database –Spatial Database –Multimedia Database - XML

Databases: XML schema - NOSQL Database: Characteristics –Schema-less models– Applications –

Current Trends.

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 2
IT1401A.1	3	2	2	-	-	-	-	-	-	-	-	2	2
IT1401A.2	2	2	2	-	-	-	-	-	-	-	-	1	2
IT1401A.3	2	3	1	-	-	-	-	-	-	-	-	2	2
IT1401A.4	2	2	1	-	-	-	-	-	-	-	-	1	2
IT1401A.5	2	2	1	-	-	-	-	-	-	-	-	2	2
AVERAGE	**2.20**	**2.20**	**1.40**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1.60**	**2.00**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOKS:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, ―Database System Concepts, SixthEdition, Tata McGraw Hill, 2014.
2. RamezElmasri, Shamkant B. Navathe, ―Fundamentals of Database Systems, Sixth Edition, Pearson Education, 2017.
3. DavidLoshin,"Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools,Techniques,NoSQL,andGraph",Morgan Kaufmann/El Sevier Publishers,2013.

REFERENCES:

1. C.J.Date, A.Kannan, S.Swamynathan, ―An Introduction to Database Systems, Eighth Edition,Pearson Education, 2006.
2. Raghu Ramakrishnan, ―Database Management Systems, Fourth Edition, McGraw-Hill CollegePublications, 2015. 3. G.K.Gupta,"Database Management Systems, Tata McGraw Hill, 2011.
3. G. K. Gupta, "Database Management Systems", Tata McGraw Hill, 2011.
4. Carlos Coronel, Steven Morris, Peter Rob, "Database Systems: Design, Implementation andManagement", Ninth Edition, Cengage Learning, 2011.

CS1402A DESIGN AND ANALYSIS OF ALGORITHMS

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To construct algorithms that is efficient in space and time complexities.
- To understand different design technique like Brute force and Divide and Conquer
- To understand Greedy and Dynamic Programming design techniques
- To understand Backtracking and Branch & Bound design technique
- To understand the Tractability and Scalability problems.
- To know the best algorithm technique to solve problems.

COURSE OUTCOMES:

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

- Apply efficient algorithms for both recursive and non-recursive relations to compute space and time complexity
- Analyze the different algorithms using design techniques like Brute force and Divide and Conquer
- Demonstrate algorithms using design paradigms like Greedy and Dynamic Programming for a given problem.
- Examine algorithms using Backtracking and Branch & Bound design techniques.
- Categorize various algorithms and interpret solutions to evaluate NP Hard problems

UNIT I INTRODUCTION **9**

Notion of an Algorithm – Fundamentals of Algorithmic Problem Solving – Important Problem Types – Fundamentals of the Analysis of Algorithmic Efficiency –Asymptotic Notations and their properties. Analysis Framework – Empirical Analysis- Mathematical analysis for Recursive and Non-recursive algorithms- Visualization

UNIT II BRUTE FORCE AND DIVIDE-AND-CONQUER **9**

Brute Force: Closest-Pair - String Matching – Selection Sort – Bubble Sort- Divide and Conquer Methodology: Binary Search – Merge sort – Quick sort – Randomized version of Quick sort- Analysis of Quick sort–Multiplication of Large Integers

UNIT III DYNAMIC PROGRAMMING AND GREEDY TECHNIQUE **9**

Dynamic programming: Computing a Binomial Coefficient -Warshall'sandFloyd's algorithm for All Pairs shortest Path Problem- Single Source Shortest Path Problem-Bellman ford Problem-Multi Stage Graph– 0/1 Knapsack Problem and Memory functions.Greedy Technique: Prim's algorithm and Kruskal's Algorithm - Dijkstra's Algorithm - Fractional Knapsack problem, Huffman Trees.

UNIT IV BACKTRACKING AND BRANCH & BOUND **9**

Backtracking: n-Queen's problem -Hamiltonian Circuit Problem – Subset Sum Problem- Graph Colouring .Branch and Bound: Assignment problem – Knapsack Problem – Travelling Sales person Problem .

UNIT V TRACTABILITY & SOLVABILITY **9**

Lower – Bound Arguments – P, NP NP- Complete- Dominating Set Problem - NP Hard Problems – Clique Decision Problem – Node Cover Decision Problem – NP Hard Scheduling Problems –Job Shop Scheduling- Approximation Algorithm for NP Hard Problems – Travelling Salesperson Problem – Knapsack Problem.

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO 1. 2.	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 2
CS1402A.1	3	3	2	2	-	-	-	-	-	-	-	2	2
CS1402A.2	3	3	2	2	-	-	-	-	-	-	-	2	2
CS1402A.3	3	3	2	2	-	-	-	-	-	-	-	2	2
CS1402A.4	3	3	2	2	-	-	-	-	-	-	-	2	2
CS1402A.5	3	3	2	2	-	-	-	-	-	-	-	2	2
AVERAGE	**3.00**	**3.00**	**2.00**	**2.00**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2.00**	**2.00**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOKS:

1. AnanyLevitin, ―Introduction to the Design and Analysis of Algorithms‖, Third Edition, Pearson Education, 2012.
2. Ellis Horowitz, SartajSahni and SanguthevarRajasekaran, Computer Algorithms/ C++, Second Edition, Universities Press, 2007.
3. Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, ―Introduction to Algorithms, Third Edition, PHI Learning Private Limited, 2012.

REFERENCES:

1. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, ―The Design and Analysis ofComputer Algorithms‖, Pearson Education, Twelth impression, 2013.
2. Harsh Bhasin, ―Algorithms Design and Analysis‖, Oxford university press, 2016.
3. S. Sridhar, ―Design and Analysis of Algorithms‖, Oxford university press, 2014.

EC1503A MICROPROCESSORS AND MICROCONTROLLERS L T P C
3 0 0 3

COURSE OBJECTIVES:

- To study the architecture of 8086 and 8051
- To study the addressing modes and instruction set of 8086 and 8051
- To introduce the need and use of interrupt structure in 8086 and 8051.
- To develop skill in simple program writing for 8086 and 8051 applications.
- To introduce commonly used peripheral / interfacing ICs.

COURSE OUTCOMES:

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

- Apply and analyze the architecture, instruction set of microprocessor for developing assembly language program.
- Analyze the system bus structure and configurations of processors.
- Analyze all peripheral devices.
- To Apply and analyze the architecture, instruction sets of Microcontroller for developing assembly language programs.
- To Analyze the applications and interfacing of microcontroller.

UNIT I THE 8086 MICROPROCESSOR 9

Evolution of Microprocessors , Harvard and Von- Neumann architecture, RISC & CISC architectures, Introduction to 8086 – Microprocessor architecture – Addressing modes - Instruction set and assembler directives – Assembly language programming –- Byte and String Manipulation.-Stacks - Interrupts and interrupt service routines – Modular programming using Macros and Procedures.

UNIT II 8086 SYSTEM BUS STRUCTURE 9

8086 signals – Basic configurations – System bus timing –System design using 8086 – I/O programming – Introduction to Multiprogramming – System Bus Structure –Multiprocessor configurations – Coprocessor, Closely coupled and loosely Coupled configurations

UNIT III I/O INTERFACING 9

Memory Interfacing and I/O interfacing - Parallel communication interface – Serial communication interface – D/A and A/D Interface - Timer – Keyboard /display controller – Interrupt controller – DMA controller – Programming and applications Case studies: Traffic Light control, LED display , LCD display, Keyboard display interface and Alarm Controller.

UNIT IV MICROCONTROLLER 9

Architecture of 8051 – Special Function Registers(SFRs) - I/O Pins Ports and Circuits - Instruction set - Addressing modes - Assembly language programming- Introduction to PIC Microcontroller.

UNIT V INTERFACING MICROCONTROLLER 9

Programming 8051 Timers - Serial Port Programming - Interrupts Programming – LCD & Keyboard Interfacing - ADC, DAC & Sensor Interfacing - External Memory Interface- Stepper Motor and Waveform generation.

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 2
EC1503A .1	3	2	-	-	-	-	-	-	-	-	-	-	3
EC1503A .2	3	2	-	-	-	-	-	-	-	-	-	-	3
EC1503A .3	2	2	1	-	-	-	-	-	-	-	-	-	3
EC1503A .4	3	2	-	-	-	-	-	-	-	-	-	-	2
EC1503A .5	3	2	-	-	-	-	-	-	-	-	-	-	3
AVERAGE	**2.80**	**2.00**	**1.00**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2.80**

correlation levels as 1, 2, 3
1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOKS:

1.Yu-Cheng Liu, Glenn A.Gibson, ―Microcomputer Systems: The 8086 / 8088 Family - Architecture, Programming and Design‖, Second Edition, Prentice Hall of India, 2007. (UNIT I- III)
2.Muhammad Ali Mazidi, Rolin D. Mckinlay, Danny Causey ' PIC Microcontroller and Embedded Systems using Assembly and C for PIC18', Pearson Education 2008(UNIT-IV)
3. Peatman,J.B., "Design with PIC Micro Controllers"PearsonEducation,3rdEdition, 2004.(UNIT-IV)
4.Mohamed Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, ―The 8051 Microcontroller and Embedded Systems: Using Assembly and C‖, Second Edition, Pearson education, 2011. (UNIT IV-V)

REFERENCES:

1.Doughlas V.Hall, ―Microprocessors and Interfacing, Programming and Hardware,TMH,2012
2.A.K.Ray,K.M.Bhurchandi, "Advanced Microprocessors and Peripherals" 3rd edition, Tata McGrawHill, 2012

HV1401A **UNIVERSAL HUMAN VALUES**

L	T	P	C
2	1	0	3

Universal Human Values : Understanding Harmony

COURSE OBJECTIVE:

The objective of the course is four fold:

- Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
- Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
- Strengthening of self-reflection.
- Development of commitment and courage to act.

COURSE OUTCOMES:

- Summarize the essentials of human values and skills, self-exploration, happiness and prosperity.
- Examine harmony in human being.
- Illustrate the role of harmony in family, society and universal order.
- Describe the holistic perception of harmony across all levels of existence.
- Explain the appropriate technologies and management patterns that help create harmony between professional and personal life.

COURSE TOPICS:

Module 1: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education 9

1. Purpose and motivation for the course, recapitulation from Universal Human Values-I
2. Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration
3. Continuous Happiness and Prosperity- A look at basic Human Aspirations
4. Right understanding, Relationship and Physical Facility- the basic requirements for fulfillment of aspirations of every human being with their correct priority
5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
6. Method to fulfill the above human aspirations: understanding and living in harmony at various levels. Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking

Module 2: Understanding Harmony in the Human Being - Harmony in Myself! 9

7. Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
8. Understanding the needs of Self ('I') and 'Body' - happiness and physical facility
9. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
10. Understanding the characteristics and activities of 'I' and harmony in 'I'
11. Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail
12. Programs to ensure Sanyam and Health. Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease.

Module 3: Understanding Harmony in the Family and Society- Harmony in Human Relationship **9**

13. Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfillment to ensure mutual happiness; Trust and Respect as the foundational values of relationship

14. Understanding the meaning of Trust; Difference between intention and competence
15. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
16. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals

17. Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family. Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc.
18.Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives.

Module 4: Understanding Harmony in the Nature and Existence - Whole existence as Coexistence **9**

19. Understanding the harmony in the Nature
20. Interconnectedness and mutual fulfilment among the four orders of nature recyclability and self-regulation in nature
21. Understanding Existence as Co-existence of mutually interacting units in all pervasive space
22. Holistic perception of harmony at all levels of existence. Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

Module 5: Implications of the above Holistic Understanding of Harmony on Professional Ethics **9**

23. Natural acceptance of human values
24. Definitiveness of Ethical Human Conduct
25. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order25. Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c.Ability to identify and develop appropriate technologies and management patterns for above production systems.
26. Case studies of typical holistic technologies, management models and production systems
27. Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations
28. Sum up. Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions e.g. discuss the conduct as an engineer or scientist etc.

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 2
HV1401A.1	2	-	-	-	-	3	3	3	3	1	-	2	-
HV1401A .2	2	-	-	-	-	3	3	3	3	1	-	2	-
HV1401A .1	2	-	-	-	-	3	3	3	3	1	-	2	-
HV1401A .4	2	-	-	-	-	3	3	3	3	1	-	2	2
HV1401A .5	2	-	-	-	-	3	3	3	3	1	-	2	2
AVERAGE	**2.00**	**-**	**-**	**-**	**-**	**3.00**	**3.00**	**3.00**	**3.00**	**1.00**	**-**	**2.00**	**2.00**

correlation levels as 1, 2, 3
1.Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOK:

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria,Excel Books, NewDelhi, 2010

REFERENCE BOOKS:

1. JeevanVidya: EkParichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak,1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj - PanditSunderlal
9. Rediscovering India - by Dharampal
10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda - Romain Rolland (English)13. Gandhi - Romain Rolland (English)

IT1402A DATABASE MANAGEMENT SYSTEMS LABORATORY

L	T	P	C
0	0	4	2

COURSE OBJECTIVES:

- To learn and implement important commands in SQL.
- To learn the usage of nested and joint queries.
- To understand functions, procedures and procedural extensions of databases.
- To understand design and implementation of typical database applications.
- To be familiar with the use of a front end tool for GUI based application development

COURSE OUTCOMES:

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

- Demonstrate the use of typical data definitions and manipulation commands.
- Illustrate the applications to test Nested and Join Queries
- **Demonstrate simple applications that use Views, Sequences, Synonyms, Cursors and critically analyze the use of Tables, Functions, Procedures, Triggers and Exception Handling using PL/SQL**
- Modify and manipulate the data using NOSQL database.
- Model database using ER modeling, Normalize and Implement a GUI application that require a Front-end and Back end Tool

EXPERIMENTS:

1. Data Definition Commands, Data Manipulation Commands for inserting, deleting, updating andretrieving Tables and Transaction Control statements
2. Database Querying – Simple queries, Nested queries, Sub queries and Joins
3. Views, Sequences, Synonyms
4. Database Programming: Implicit and Explicit Cursors
5. Procedures and Functions
6. Triggers
7. Exception Handling
8. Database Design using ER modeling, normalization and Implementation for any application
9. Create Document, column and graph based data using NOSQL database tools.
10. Develop a simple GUI based database application

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

HARDWARE: 30 Terminals.

SOFTWARE: Front end: VB/VC ++/JAVA or Equivalent Back end: Oracle / SQL / MySQL/ PostGress / DB2 or Equivalent.

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 2
IT1402A.1	3	3	3	-	-	-	-	-	2	1	-	-	3
IT1402A.2	3	3	3	-	-	-	-	-	2	1	-	-	3
IT1402A.3	3	3	3	-	-	-	-	-	2	1	-	-	3
IT1402A.4	3	3	3	-	2	-	-	-	3	2	-	-	3
IT1402A.5	3	3	3	-	2	-	-	-	3	3	-	-	3
AVERAGE	**3.00**	**3.00**	**3.00**	**-**	**2.00**	**-**	**-**	**-**	**2.40**	**1.60**	**-**	**-**	**3.00**

correlation levels as 1, 2, 3

1.Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

CS1404A DESIGN AND ANALYSIS OF ALGORITHMS LABORATORY

L	T	P	C
0	0	4	2

COURSE OBJECTIVES:

- To study algorithm for solving the problem and represent its Asymptotic notation
- To acquire knowledge about different approach to solve same problems.
- To Design and implement efficient algorithms to get optimal solution for the problem.
- Strengthen the ability to identify and apply the suitable algorithm for the real world problem.
- To understand and analyse the Approximation algorithms.
- To understand the best algorithm for solving the problem.

COURSE OUTCOMES:

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

- Interpret algorithms for given problem and trace its complexity.
- Summarize the importance of different algorithm for solving same problem
- Analyze efficient algorithms to get optimal solution for the problem
- Apply the suitable algorithm for the given problem using backtracking method.
- Associate the approximation algorithms

LIST OF EXPERIMENTS

1. To find the factorial of a given number using recursive algorithm
2. To find the number of bits in integer
3. Create Diamond Pattern Printing
4. Sort a given set of elements using the quick sort method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the 1st to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.
5. Implement merge sort algorithm to sort a given set of elements and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.
6. Implement 0/1 Knapsack problem using Dynamic Programming.
7. Compute the transitive closure of a given graph using Warshall's algorithm
8. Implement All-Pairs Shortest Paths Problem using Floyd's algorithm. Parallelize this algorithm, implement it using OpenMP and determine the speed-up achieved.
9. Find Minimum Cost Spanning Tree of a given graph using Prim’s andKruskal’s algorithm
10. Implement the Single source Shortest path algorithm
11. Implement any scheme to find the optimal solution for the Traveling Sales Person problem and then solve the same problem instance using any approximation algorithm and determine the error in the approximation.
12. Implement N Queen's problem using Back Tracking.

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 2
CS1404A .1	3	3	2	2	-	-	-	-	-	-	-	2	2
CS1404A .2	3	3	2	2	-	-	-	-	-	-	-	2	2
CS1404A .3	3	3	2	2	-	-	-	-	-	-	-	2	2
CS1404A .4	3	-	2	2	-	-	-	-	-	-	-	2	2
CS1404A.5	-	-	2	2	1	-	-	-	-	-	-	-	2
AVERAGE	**3.00**	**3.00**	**2.00**	**2.00**	**1.00**	**-**	**-**	**-**	**-**	**-**	**-**	**2.00**	**2.00**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High

REFERENCES:

1. Levitin A, "Introduction to the Design And Analysis of Algorithms", Pearson Education, 2008.
2. Goodrich M.T.,RTomassia, "Algorithm Design foundations Analysis and Internet Examples",John Wileyn and Sons, 2006.
3. Base Sara, Allen Van Gelder ," Computer Algorithms Introduction to Design and Analysis", Pearson, 3 rd Edition, 1999
4. LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:
5. HARDWARE: 30 terminalsSOFTWARE:C compiler

HS1401A EMPLOYABILITY AND SOFT SKILLS LAB

L	T	P	C
0	0	2	1

COURSE OBJECTIVES:

- Strengthen the Employability skills of students and develop their personality towards placementand career advancement.
- Improve the listening, speaking, reading and writing skills for comprehending and respondingin academic, general and professional contexts.
- Develop students' critical thinking skills.
- Provide more opportunities to develop their project and proposal writing skills.
- Enrich the Soft Skills of the students to interact with others harmoniously.

COURSE OUTCOMES:

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

- Summarize the articulating ideas clearly in both general and technical communication skills in terms of clarity and pronunciation.
- Discuss best practices for crafting and presenting formal job applications.
- Describe Excel in Verbal aptitude, read and evaluate texts logically to solve the puzzles.
- Demonstrate the ability to prepare and present formal job applications effectively.
- Illustrate the use of analytical reasoning in addressing professional problems.

UNIT I SOFT SKILLS **6**

Soft Skills- Interpersonal Skills - Professionalism- Courtesy-Manners - Workplace Etiquette- Business Etiquette-Flexibility- Positive Attitude- Responsibility-Teamwork- Time Management.

UNIT II EMPLOYABILITY SKILLS **6**

Communication- Oral Presentation Practice.- Writing Skill Development- Presentation Skills - Listening Practice– Listening To Longer Technical Talks And Completing Exercises Based On Them- Enhancing Elements of Effective Communication- Motivation and Initiative- Leadership- Reliability/Dependability- Adaptability- Patience- Problem Solving- Negotiation and Persuasion.

UNIT III WRITING **6**

Writing-Plan before writing-Develop a paragraph: Topic sentence, Supporting Sentences, Concluding sentence- Coherence Markers-Writing Narrative, Descriptive, Expository, and Persuasive Paragraphs.

UNIT IV READING **6**

Reading- Reading different Genres -Collection and Organization of Ideas- Review of Books/ Newspaper Articles, Reading General and Technical Passages Writing: Email, Resume, Job Application, Technical Articles, Projects and Proposals.

UNIT V VERBAL APTITUDE & LOGICAL REASONING **6**

Aptitude- Verbal Analogy- Error Spotting, Sentence Completion for Preparation for Higher Studies and Placement- Logical Reasoning- Critical Reading and Thinking- Understanding How The Text Positions The Reader- **Writing-** Statement of Purpose- Letter of Recommendation- Vision Statement.

TOTAL: 30 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 2
HS1401A.1	-	-	-	-	1	1	1	-	1	3	-	1	_
HS1401A.2	-	-	-	-	1	1	2	1	1	2	1	1	_
HS1401A.3	-	-	-	-	1	2	1	-	1	2	1	1	_
HS1401A.4	-	-	-	-	1	1	1	1	1	3	1	1	_
HS1401A.5	-	-	-	-	1	1	1	1	1	3	1	1	-
AVERAGE	**-**	**-**	**-**	**-**	**1.00**	**1.20**	**1.20**	**1.00**	**1.00**	**2.60**	**1.00**	**1.00**	**-**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High

TEXTBOOK:

1. Gramer F. Margot and Colin S. Ward Reading and Writing (Level 3) Oxford University Press: Oxford, 2011
2. Debra Daise, CharlNorloff, and Paul Carne Reading and Writing (Level 4) Oxford UniversityPress: Oxford, 2011

SOFTWARE: Globearena (English Language Lab & Career Lab Software)

REFERENCES:

1. Davis, Jason and Rhonda LIss.Effective Academic Writing (Level 3) Oxford University Press: Oxford, 2006
2. E. Suresh Kumar and et al. Enriching Speaking and Writing Skills. Second Edition. Orient Black swan: Hyderabad, 2012
3. Withrow, Jeans and et al. Inspired to Write. Readings and Tasks to develop writing skills.Cambridge University Press: Cambridge, 2004
4. Goatly, Andrew. Critical Reading and Writing. Routledge: United States of America, 2000
5. Petelin, Roslyn and Marsh Durham. The Professional Writing Guide: Knowing Well andKnowing Why. Business & Professional Publishing: Australia, 2004

WEBSITES:(Any three/ four may be listed out)https://placement.freshersworld.com https://www.examenglish.com https://www.faceprep.in https://www.fresherslive.com/online-test

MA1501A **ALGEBRA AND NUMBER THEORY**

L	T	P	C
3	1	0	4

COURSE OBJECTIVES:

- To introduce the basic notions of groups, rings, fields which will then be used to solve related problems.
- To introduce and apply the concepts of rings, finite fields and polynomials.
- To understand the basic concepts in number theory
- To examine the key questions in the Theory of Numbers.
- To give an integrated approach to number theory and abstract algebra, and provide a firm basis for further reading and study in the COURSE.

COURSE OUTCOMES:

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

- Describe the basic notions of groups, rings, fields which will then be used to solve related problems
- Explain the fundamental concepts of advanced algebra and their role in modern mathematics and applied contexts.
- Discuss accurate and efficient use of advanced algebraic techniques.
- Discuss their mastery by solving non – trivial problems related to the concepts, and by proving simple theorems about the, statements proven by the text.
- Apply integrated approach to number theory and abstract algebra, and provide a firm basis for further reading and study in the subject.

UNIT I GROUPS AND RINGS **9**

Groups : Definition – Properties – Homomorphism – Isomorphism – Cyclic groups – Cosets Lagrange's theorem. Rings: Definition – Sub rings – Integral domain – Field – Integer modulo n – Ring homomorphism.

UNIT II FINITE FIELDS AND POLYNOMIALS **9**

Rings – Polynomial rings – Irreducible polynomials over finite fields – Factorization of polynomialsover finite fields.

UNIT III DIVISIBILITY THEORY AND CANONICAL DECOMPOSITIONS **9**

Division algorithm – Prime and composite numbers – GCD – Euclidean algorithm –Fundamental theorem of arithmetic – LCM.- Linear Diophantine equations

UNIT IV CONGRUENCES AND CLASSICAL THEOREMS **9**

Congruence's – Linear Congruence's – Applications: Divisibility tests – Modular exponentiation Chinese remainder theorem– 2 x 2 linear systems-Wilson's theorem Fermat's little theorem–Euler's theorem

UNIT V MULTIPLICATIVE FUNCTIONS AND PRIMITIVE ROOTS **9**

Euler's Phi functions – Tau and Sigma functions-The order of a Positive Integer-Primality test-Primitive Roots for Primes-Composite with Primitive Roots-Quadratic Residues.

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
MA1501A.1	3	3	2	-	-	-	-	-	-	-	-	-	2	-
MA1501A.2	3	3	2	-	-	-	-	-	-	-	-	-	2	-
MA1501A.3	3	3	2	-	-	-	-	-	-	-	-	-	2	-
MA1501A.4	3	3	2	-	-	-	-	-	-	-	-	-	2	-
MA1501A.5	3	3	2	-	-	-	-	-	-	-	-	-	2	-
AVERAGE	**3.00**	**3.00**	**2.00**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2.00**	**-**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOKS:

1. Grimaldi, R.P and Ramana, B.V., "Discrete and Combinatorial Mathematics", PearsonEducation, 5th Edition, New Delhi, 2007.
2. Koshy, T., ―Elementary Number Theory with Applications‖, Elsevier Publications, New Delhi, 2002.

REFERENCES:

1. Davis, Jason and Rhonda Liss. Effective Academic Writing (Level 3) Oxford University Press: Oxford, 2006
2. E. Suresh Kumar and et al. Enriching Speaking and Writing Skills. Second Edition. Orient Black swan: Hyderabad, 2012
3. Withrow, Jeans and et al. Inspired to Write. Readings and Tasks to develop writing skills. Cambridge University Press: Cambridge, 2004
4. Goatly, Andrew. Critical Reading and Writing. Routledge: United States of America, 2000
5. Petelin, Roslyn and Marsh Durham. The Professional Writing Guide: Knowing Well andKnowing Why. Business & Professional Publishing: Australia, 2004

IT1501A **COMPUTER NETWORKS** **L T P C**

3 0 0 3

COURSE OBJECTIVES:

- To understand the protocol layering and physical level communication.
- To analyze the performance of a network.
- To understand the various components required to build different networks.
- To learn the functions of network layer and the various routing protocols.
- To familiarize the functions and protocols of the Transport Layer.

COURSE OUTCOMES:

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

- Describe the basics of the network and discuss the functions of the physical layer.
- Summarize the basics of data flow from one node to another.
- Explain the various services and protocols of the network layer.
- Determine the services of different transport layer protocols.

UNIT I INTRODUCTION AND PHYSICAL LAYER 9

Motivation-Goals of networking-Need for a layered architecture, Network hardware-Network software - Reference models - Network standardization, RS-232 over serial line - Guided Transmission media - Wireless transmission media

UNIT II THE DATA LINK LAYER 9

The Data Link Layer: Data link layer design issues – services provided to the network layer, Framing – Flow and error control :Error detection and correction - Elementary data link protocols – A simplex stopand wait protocol –stop and wait ARQ-Sliding window protocols, piggy backing - Wired LANs: Ethernet - Wireless LANs – IEEE 802.11, Bluetooth – Connecting Devices.

UNIT III THE NETWORK LAYER 9

Network layer design issues –Switching techniques, IP addressing modes- IPV4, IPV6 subnetting, Routing algorithms: Flooding, Distance vector and Link state routing, Hierarchical routing, Multicasting and broadcasting - Congestion control algorithms –Internetworking

UNIT IV THE TRANSPORT LAYER 9

Duties of Transport layer– Services – Port Numbers -Multiplexing -Demultiplexing-Congestion control, Internet transport protocols UDP, TCP, SCTP, Case Study: ATM protocols.

UNIT V THE APPLICATION LAYER 9

WWW and HTTP–FTP–Email–Telnet–SSH–DNS–SNMP.

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
IT1501A.1	1	1	1	2	2	-	-	-	2	-	2	2	2	2
IT1501A.2	2	2	3	3	3	-	-	-	3	1	3	2	2	3
IT1501A.3	2	2	3	3	3	-	1	-	3	-	3	2	3	3
IT1501A.4	2	2	3	3	3	-	1	-	3	1	3	2	3	3
IT1501A.5	2	3	3	3	3	-	1	-	3	2	3	2	3	3
AVERAGE	**1.80**	**2.00**	**2.60**	**2.80**	**2.80**	**-**	**1.00**	**-**	**2.80**	**1.33**	**2.80**	**2.00**	**2.60**	**2.80**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXTBOOK:

1. Behrouz A. Forouzan, Data Communications and Networking, Fifth Edition TMH,2013.

REFERENCES:

1. Larry L. Peterson, Bruce S.Davie ,Computer Networks: A Systems Approach, Fifth Edition
2. ,Morgan Kaufmann Publishers Inc.,2012.
3. William Stallings, Data and Computer Communications, Tenth Edition, Pearson Education,2013.
4. Nader F. Mir, Computer and Communication Networks, Second Edition, Prentice Hall,2014.
5. Ying-DarLin , Ren-Hung Hwang and Fred Baker, Computer Networks: An Open SourceApproach ,McGraw Hill Publisher.
6. James F. Kurose, Keith W.Ross, Computer Networking, ATop-Down Approach Featuring the Internet, Sixth Edition, Pearson Education,2013.

CS1501A	OPERATING SYSTEMS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To understand the basic concepts, functions, processes and threads of operating systems.
- To analyse Scheduling algorithms and understand the concept of Deadlocks.
- To analyse various memory management schemes.
- To understand I/O management and File systems.
- To be familiar with the basics of Linux system and Mobile OS like iOS and Android.
- To study the distributed operating systems and its applications.

COURSE OUTCOMES:

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

- Summarize the basic concepts, functions, processes and threads of operating systems.
- Apply various scheduling algorithms, **Understand deadlock,** prevention and avoidance algorithms.
- Examine various memory management schemes.
- Illustrate the functionality of file systems.
- Interpret the administrative tasks on Linux Servers and compare iOS and Android Operating Systems.

.

UNIT I OPERATING SYSTEM OVERVIEW 7

Operating system overview-objectives and functions, Evolution of Operating System - Computer System Organization-Virtualization-Operating System Structure and Operations- System Calls, OS Generations, Process Concept, Threads- Overview, Multithreading Models, Threading issues

UNIT II PROCESS MANAGEMENT 11

Processes-Process Scheduling, Operations on Processes, Inter-process Communication; ; CPU Scheduling - Scheduling criteria, CPU Scheduling Algorithms, Process Synchronization - Critical Section Problem, Mutex Locks, Semaphores, Classic problems of synchronization, Critical regions, Monitors; Deadlock - Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock.

UNIT III MEMORY MANAGEMENT 9

Main Memory-Non Contiguous Memory Allocation - Contiguous Memory Allocation, Paging, Segmentation, Examples; Virtual Memory- Demand Paging, Page Placement and Replacement policies - FIFO Page Replacement, Optimal Page Replacement, LRU Page Replacement, Allocation, Thrashing;

UNIT IV FILE SYSTEMS AND I/O SYSTEMS 9

Mass Storage system – Overview of Mass Storage Structure, Disk Structure, Disk Scheduling and Management; swap space management;Fileconcept, Access methods,Directory Structure, File Sharing and Protection, File System Structure, Directory Implementation, Allocation Methods, Free-Space Management, I/O Systems - I/O Hardware, Application I/O interface, Kernel I/O subsystem, Streams, Performance.

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 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CS1501A.1	3	-	-	-	-	-	-	-	-	-	-	2	1	3
CS1501A.2	3	3	2	-	-	-	-	-	-	-	-	2	2	3
CS1501A.3	3	3	-	-	-	-	-	-	-	-	-	2	2	3
CS1501A.4	3	2	-	-	-	-	-	-	-	-	-	2	1	3
CS1501A.5	3	2	-	-	-	-	-	-	-	-	-	2	1	3
AVERAGE	**3.00**	**2.50**	**2.00**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2.00**	**1.40**	**3.00**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOK :

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", 9th Edition, John Wiley and Sons Inc., 2012.

REFERENCES :

1. RamazElmasri, A. Gil Carrick, David Levine, "Operating Systems – A Spiral Approach", Tata McGraw Hill Edition, 2010.
2. AchyutS.Godbole, AtulKahate, "Operating Systems", McGraw Hill Education, 2016.
3. Andrew S. Tanenbaum, "Modern Operating Systems", Second Edition, Pearson Education, 2004.
4. Gary Nutt, "Operating Systems", Third Edition, Pearson Education, 2004.
5. Harvey M. Deitel, "Operating Systems", Third Edition, Pearson Education, 2004.
6. Daniel P Bovet and Marco Cesati, "Understanding the Linux kernel", 3rd edition,O'Reilly, 2005.
7. Neil Smyth, "iPhone iOS 4 Development Essentials – Xcode", Fourth Edition, Payload media, 2011.

CS1603A	ARTIFICIAL INTELLIGENCE	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To understand the various characteristics of Intelligent agents
- To learn the different search strategies in AI
- To apply logical and probabilistic reasoning in solving AI problems
- To know about the various applications of AI.

COURSE OUTCOMES:

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

- Illustrate the intelligent agent frameworks and its environments.
- Analyze real life problems and solve those using searching algorithms and AI techniques.
- Infer and apply logical reasoning in solving AI problems using first order and predicate logic.
- Demonstrate the applications of Probabilistic Reasoning in Bayesian Networks.
- Examine the various applications of AI and types of Learning.

UNIT I INTRODUCTION **9**

Introduction–Definition – Future of Artificial Intelligence- Production systems, Types of Production systems –Typical Intelligent Agents – Agents and Environments – concept of rationality – nature of environments – Structure of agents.

UNIT II PROBLEM SOLVING METHODS **9**

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

UNIT III LOGICAL REASONING **9**

Knowledge-based agents – propositional logic – propositional theorem proving – propositional model checking – agents based on propositional logic. First-order logic – syntax and semantics – knowledge representation and engineering – inferences in first-order logic – forward chaining – backward chaining – resolution.

UNIT IV PROBABILISTIC REASONING **9**

Acting under uncertainty – Bayesian inference – naïve Bayes models. Probabilistic reasoning –Bayesian networks – exact inference in BN – approximate inference in BN – causal networks

UNIT V APPLICATIONS AND LEARNING **9**

Information Retrieval- Information Extraction – Natural Language Processing - Machine Translation – Speech Recognition –Introduction to Machine Learning-Types of Machine Learning

TOTAL :45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CS1603A.1	2	2	1	1	-	-	-	-	-	2	2	2	2	1
CS1603A.2	3	3	2	2	-	-	-	-	-	2	2	2	1	1
CS1603A.3	3	3	2	2	-	-	-	-	-	2	3	2	1	1
CS1603A.4	3	3	2	2	-	-	-	-	-	1	2	2	1	1
CS1603A.5	2	1	2	2	-	-	-	-	-	1	2	2	1	2
AVERAGE	**2.60**	**2.40**	**1.80**	**1.80**	**-**	**-**	**-**	**-**	**-**	**1.60**	**2.20**	**2.00**	**1.20**	**1.20**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOKS:

1 S. Russell and P. Norvig, "Artificial Intelligence: A Modern Approach‖, Prentice Hall, Third Edition, 2009.

2 I. Bratko, ―Prolog: Programming for Artificial Intelligence‖, Fourth edition, Addison-Wesley Educational Publishers Inc., 2011.

REFERENCES:

1. M. Tim Jones, ―Artificial Intelligence: A Systems Approach(Computer Science)‖, Jones and Bartlett Publishers, Inc.; First Edition, 2008
2. Nils J. Nilsson, ―The Quest for Artificial Intelligence‖, Cambridge University Press, 2009.
3. Stephen Marsland, ―Machine Learning – An Algorithmic Perspective‖, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.
4. William F. Clocksin and Christopher S. Mellish,‖ Programming in Prolog: Using the ISO Standard‖, Fifth Edition, Springer, 2003.
5. Gerhard Weiss, ―Multi Agent Systems‖, Second Edition, MIT Press, 2013.
6. David L. Poole and Alan K. Mackworth, ―Artificial Intelligence: Foundations of Computational Agents‖, Cambridge University Press, 2010.

IT1502A **WEB TECHNOLOGY** **L T P C**
3 0 0 3

COURSE OBJECTIVES:

- To understand about client-server communication and protocols used during communication.
- To design interactive web pages using Scripting languages.
- To learn server side programming using servlets and JSP.
- To develop web pages using XML/XSLT.
- To develop web services using recent technologies.

COURSE OUTCOMES:

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

- Critically analyze and evaluate the diverse web services and emerging technologies employed in modern IT solutions.
- Create dynamic web pages using DHTML and java script that is easy to navigate and use.
- Construct server-side web pages to process and respond to client-side requests.
- Analyze web data structures for XML representation and examine XML integration in JSP for dynamic web page development.
- Explore the categorization of various web services and emerging technologies.

UNIT 1 WEB SITE BASICS AND HTML **9**

Web Essentials: Clients, Servers, and Communication. The Internet-Basic Internet Protocols -The World Wide Web-HTTP request message-response message-Web Clients Web Servers. Markup Languages: XHTML. An Introduction to HTML History-Versions-Basic XHTML Syntax and Semantics-Some Fundamental HTML Elements-Relative URLs-Lists-tables-Frames-Forms-HTML 5.0.

UNIT II CSS AND CLIENT SIDE SCRIPTING **9**

Style Sheets: CSS-Introduction to Cascading Style Sheets-Features-Core Syntax-Style Sheets and HTML- Style Rule Cascading and Inheritance-Text Properties-Box Model Normal Flow Box Layout-Beyond the Normal Flow-CSS3.0. Client-Side Programming: The JavaScript Language-History and Versions Introduction JavaScript in Perspective-Syntax-Variables and Data Types-Statements-Operators-Literals-Functions-Objects-Arrays-Built-in Objects-JavaScript Debuggers.

UNIT III SERVER SIDE SCRIPTING **9**

Host Objects: Browsers and the DOM-Introduction to the Document Object Model DOM History and Levels-Intrinsic Event Handling-Modifying Element Style-The Document Tree-DOM Event Handling-Accommodating Noncompliant Browsers Properties of window. Server-Side Programming: Java Servlets-Architecture -Overview-A Servlet-Generating Dynamic Content-Life Cycle- Parameter Data-Sessions-Cookies-URL Rewriting-Other Capabilities-Data Storage Servlets and Concurrency- Databases and Java Servlets.

UNIT IV JSP AND XML **9**

Separating Programming and Presentation: JSP Technology Introduction-JSP and Servlets-Running JSP Applications Basic JSP-JavaBeans Classes and JSP-Tag Libraries and Files-Support for the Model-View-Controller Paradigm- Databases and JSP. Representing Web Data: XML-Documents and Vocabularies-Versions and Declaration-Namespaces- DOM based XML processing Event-oriented Parsing: SAX-Transforming XML Documents-Selecting XML Data: XPATH-Template based Transformations: XSLT-Displaying XML Documents in Browsers.

UNIT V AJAX AND WEB SERVICES **9**

AJAX: Ajax Client Server Architecture-XML Http Request Object-Call Back Methods. Web Services: JAX-RPC-Concepts-Writing a Java Web Service-Writing a Java Web Service Client-Describing Web Services: WSDL- Representing Data Types: XML Schema-Communicating Object Data: SOAP, Introduction to technologies: JSON, AngularJS, React, Node.JS, JQuery, and MongoDB.

TOTAL 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
IT1502A.1	2	3	2	3	2	-	-	-	-	-	-	2	3	3
IT1502A.2	2	3	2	3	3	-	-	-	-	-	-	1	3	2
IT1502A.3	2	3	2	3	3	-	-	-	-	-	-	-	3	3
IT1502A.4	2	3	3	3	3	-	-	-	-	-	-	-	3	2
IT1502A.5	2	2	3	3	3	-	-	-	-	-	-	1	3	3
AVERAGE	**2.00**	**2.80**	**2.40**	**3.00**	**2.80**	**-**	**-**	**-**	**-**	**-**	**-**	**1.33**	**3.00**	**2.60**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOK:

1. Jeffrey C. Jackson, "Web Technologies-A Computer Science Perspective", Pearson Education, 2006.
2. Brown, Ethan, “Web Development with Node and Express: Leveraging the JavaScript Stack”, O'Reilly Media, 2019.
3. Anthony, Accomazzo, Murray Nathaniel, Lerner Ari, “Fullstack React: The Complete Guide to React JS and Friends”, Fullstack.io, 2017.
4. Kozlowski, Pawel, “Mastering Web Application Development with Angular JS”, Packt Publishing Ltd., 2013.

REFERENCES

1. Robert. W. Sebesta, "Programming the World Wide Web", Fourth Edition,Pearson Education, 2007.
2. Deitel, Deitel, Goldberg, "Internet & World Wide Web How To Program", Third Edition, Pearson Education, 2006.
3. Marty Hall and Larry Brown,‖ Core Web Programming‖ Second Edition, Volume I and II, Pearson Education, 2001.
4. Bates, ―Developing Web Applications‖, Wiley, 2006
5. Dayley B., “Node.js, MongoDB, and AngularJS Web Development”, Addison-Wesley Professional, 2014.
6. Vainikka J., “Full-Stack Web Development using Django REST Framework and React”, 2018.

0 0 4 2

COURSE OBJECTIVES:

- To design interactive web pages using Scripting languages.
- To learn server side programming using servlets and JSP.
- To develop web pages using XML/XSLT.
- To develop web services using recent technologies.

COURSE OUTCOMES:

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

- Design simple web pages using markup languages like HTML and XHTML
- Create dynamic web pages using DHTML and java script that is easy to navigate and use
- Develop a program for server side web pages that have to process request from client side web pages
- Transform web data using XML and develop web pages using JSP
- Develop various web services and examine how these web services interact with each other

LIST OF EXPERIMENTS

1. Create a web page with the following using HTML.
2. To embed an image map in a web page.
3. To fix the hot spots.
4. Show all the related information when the hot spots are clicked.
5. Create a web page with all types of Cascading style sheets.
6. Client Side Scripts for Validating Web Form Controls using DHTML.
7. Installation of Apache Tomcat web server.
8. Write programs in Java using Servlets:

9. To invoke servlets from HTML forms.
10. Session Tracking.
11. Write programs in Java to create three-tier applications using JSP and Databases
12. For conducting on-line examination. For displaying student mark list. Assume that student information is available in a database which has been stored in a database server.
13. Programs using XML – Schema – XSLT/XSL.
14. Programs using DOM and SAX parsers.
15. Programs using AJAX.
16. Consider a case where we have two web Services- an airline service and a travel agent and the travel agent is searching for an airline. Implement this scenario using Web Services and Data base.
17. Write a client side scripting to demonstrate AngularJS.
18. Write a client side scripting to demonstrate ReactJS.

TOTAL: 60PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
IT1504 A .1	1	2	1	1	-	-	-	-	-	-	-	-	3	2
IT1504 A .2	2	3	2	1	1	-	-	-	-	-	-	2	3	3
IT1504 A .3	2	2	2	3	-	-	-	-	-	-	-	2	3	3
IT1504 A .4	2	2	1	2	-	-	-	-	-	-	-	2	3	3
IT1504 A .5	2	3	2	3	1	-	-	-	-	-	-	-	3	3
AVERAGE	**1.80**	**2.40**	**1.60**	**2.00**	**1.00**	**-**	**-**	**-**	**-**	**-**	**-**	**2.00**	**3.00**	**2.80**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

SOFTWARE REQUIRED:

Dream Weaver or Equivalent, MySQL or Equivalent, Apache Server, WAMP/XAMPP, JQuery, AngularJS, ReactJS, Node JS.

IT1503A	NETWORKS LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES:

The student should be made to:

- To learn and use network commands.
- To learn socket programming.
- To implement and analyze various network protocols.
- To learn and use simulation tools.
- To use simulation tools to analyze the performance of various network protocols.
- To learn error detection and correction techniques

COURSE OUTCOMES

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

- Illustrate the use of TCP and UDP protocols.
- Examine the performance of different transport layer protocols.
- Use simulation tools to determine the performance of various network protocols.
- Apply various routing algorithms.
- Demonstrate the use of simulation tools

LIST OF EXPERIMENTS

1. Learn to use commands like tcpdump, netstat, ifconfig, nslookup and traceroute. Capture ping and traceroute PDUs using a network protocol analyzer and examine.
2. Write a HTTP web client program to download a web page using TCP sockets.
3. Applications using TCP sockets like:
4. Echo client and echo server, Chat , File Transfer
5. Simulation of DNS using UDP sockets.
6. Write a code simulating ARP /RARP protocols.
7. Study of Network simulator (NS) and Simulation of Congestion Control Algorithms
8. Study of TCP/UDP performance using Simulation tool.
9. Simulation of Distance Vector/ Link State Routing algorithm.
10. Performance evaluation of Routing protocols using Simulation tool.
11. Simulation of error correction code (like CRC).
12. Configuring Network Operating Systems and network devices

TOTAL: 60 PERIODS

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

LABORATORY REQUIREMENT FOR BATCH OF 30 STUDENTS:

HARDWARE: 30 Terminals.

SOFTWARE: 1. C / C++ / Java / Python / Equivalent Compiler 30.2. Network simulator likeNS2/Glomosim/OPNET/ Packet Tracer / Equivalent

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
IT1503A 1	1	1	1	1	-	-	-	-	2	-	2	2	2	2
IT1503A.2	2	2	3	2	3	-	-	-	3	1	3	2	2	3
IT1503A.3	2	2	3	-	2	-	1	-	3	-	3	2	3	3
IT1503A.4	2	2	3	-	2	-	1	-	3	1	3	2	3	3
IT1503A.5	2	3	3	-	2	-	1	-	3	2	3	2	3	3
AVERAGE														

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

CS1503A OPERATING SYSTEMS LABORATORY

L	T	P	C
0	0	4	2

COURSE OBJECTIVES

- To learn UNIX commands and shell programming.
- To implement Process Creation, Inter Process Communication and various CPU Scheduling Algorithms.
- To implement Deadlock Avoidance and Deadlock Detection Algorithms.
- To implement Page Replacement Algorithms.
- To implement File Allocation Strategies.

COURSE OUTCOMES:

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

- Illustrate the various UNIX commands, shell programming
- Demonstrate inter-process communication (IPC) and semaphores, and analyze the performance of various CPU scheduling algorithms.
- Demonstrate Deadlock avoidance and Detection Algorithms
- Illustrate the performance of the various Page Replacement Algorithms
- Examine File Organization and File Allocation Strategies

LIST OF EXPERIMENTS

1. Installation of LINUX using Virtual Machine
2. Basics of UNIX and LINUX commands
3. Write programs using the following system calls of UNIX operating system fork, exec, getpid, exit, wait, close, stat, opendir, readdir
4. Write C programs to simulate UNIX commands like cp, ls, grep, etc.
5. Shell Programming
6. Write C programs to implement the various CPU Scheduling Algorithms
7. Implementation of Semaphores
8. Implementation of Shared memory and IPC
9. Bankers Algorithm for Deadlock Avoidance
10. Implementation of Deadlock Detection Algorithm
11. Write C program to implement Threading & Synchronization Applications
12. Implementation of the following Memory Allocation Methods for fixed partition a) First Fit b) Worst Fit c) Best Fit
13. Implementation of Paging Technique of Memory Management
14. Implementation of the following Page Replacement Algorithms a) FIFO b) LRU c) LFU
15. Implementation of the various file organization techniques and the following File Allocation Strategies a) Sequential b) Indexed c) Linked

TOTAL: 60 PERIODS

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:
HARDWARE: 30 terminals SOFTWARE: C / C++ / Java

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CS1503A.1	3	-	-	-	-	-	-	-	1	2	-	1	3	3
CS1503A.2	3	2	1	-	-	-	-	-	1	2	-	1	2	2
CS1503A.3	3	2	1	-	-	-	-	-	1	2	-	1	2	3
CS1503A.4	3	2	1	-	-	-	-	-	1	2	-	1	2	2
CS1503A.5	3	2	1	-	-	-	-	-	1	2	-	1	2	2
AVERAGE	**3.00**	**2.00**	**1.00**	**-**	**-**	**-**	**-**	**-**	**1.00**	**2.00**	**-**	**1.00**	**2.20**	**2.40**

correlation levels as 1, 2, 3
1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

CS1604A CRYPTOGRAPHY AND NETWORK SECURITY

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To understand Cryptography Theories, Algorithms and Systems.
- To understand necessary Approaches and Techniques to build protection mechanisms inorder to secure computer networks

COURSE OUTCOMES:

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

- Summarize the fundamentals of network security, security architecture, threats, and vulnerabilities
- Apply symmetric cryptographic algorithms to perform encryption and decryption
- Demonstrate public-key cryptographic operations for secure communication
- Illustrate and analyze authentication mechanisms to ensure secure access control in information systems.
- Examine the advanced encryption methods, including identity-based encryption and quantum cryptography techniques

UNIT I INTRODUCTION **9**

Model of network security – Security attacks, services and mechanisms – OSI security architecture – Classical encryption techniques: substitution techniques, transposition techniques, steganography- Cyber threats and their defense (Phishing Defensive measures, web based attacks, SQL injection & Defense techniques

UNIT II BLOCK CIPHER AND SYMMETRIC KEY CRYPTOGRAPHY **9**

Algebraic structures, Modular arithmetic-Euclid‟s algorithm- Congruence and matrices SYMMETRIC KEY CIPHERS: SDES – Block cipher Principles of DES – Strength of DES – Differential and linear cryptanalysis - Block cipher design principles – Block cipher mode of operation – Evaluation criteria for AES – Advanced Encryption Standard - RC4 – Key distribution

UNIT III NUMBER THEORY & ASYMETRIC KEY CRYPTOGRAPHY **9**

Primes – Primality Testing – Factorization – Euler’s totient function, Fermat’s and Euler’s Theorem - Chinese Remainder Theorem – Exponentiation and logarithm - ASYMMETRIC KEY CIPHERS: RSA cryptosystem – Key distribution – Key management – Diffie Hellman key exchange -Elliptic curve cryptography

UNIT IV MESSAGE AUTHENTICATION AND INTEGRITY **9**

Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC – SHA –Digital signatures – DSS- Entity Authentication applications - Kerberos, X.509.

UNIT V WEB, EMAIL SECURITY AND ADVANCED ENCRYPTION **9**

Web Security: SSL, TLS – EMAIL Security: PGP - Advanced Encryption: Shamir's secret sharing and BE, Identity-based Encryption (IBE), Attribute-based Encryption (ABE) – Functional Encryption - Introduction to Quantum Cryptography

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CS1604A.1	2	2	2	2	2	-	-	-	-	-	-	2	3	2
CS1604A.2	3	2	2	2	3	-	-	-	-	-	-	2	3	2
CS1604A.3	3	2	3	3	2	-	-	-	-	-	-	2	2	3
CS1604A.4	3	1	2	2	2	-	-	-	-	-	-	2	2	3
CS1604A.5	2	2	2	3	3	-	-	-	_	_	-	2	2	3
AVERAGE	**2.60**	**1.80**	**2.20**	**2.40**	**2.40**	**-**	**-**	**-**	**-**	**-**	**-**	**2.00**	**2.40**	**2.60**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOKS:

1. William Stallings, Cryptography and Network Security, 6th Edition, Pearson Education,March 2013.
2. Douglas R Stinson "Cryptography – Theory and practice", First Edition, CRC Press, 1995.

REFERENCES:

1. Charlie Kaufman, Radia Perlman and Mike Speciner, "Network Security", Prentice Hall of India, 2002.
2. Behrouz A. Ferouzan, "Cryptography & Network Security", Tata McGraw Hill, 2007.
3. Man Young Rhee, "Internet Security: Cryptographic Principles", "Algorithms and Protocols", Wiley Publications, 2003.
4. Charles Pfleeger, "Security in Computing", 4th Edition, Prentice Hall of India, 2006.
5. Ulysess Black, "Internet Security Protocols", Pearson Education Asia, 2000.
6. Nptel.ac.in
7. "Cryptography Theory and Practice" by Douglas.R. Stinson and Maura.B. Paterson, CRC Press, Fourth Edition
8. " Attribute based Encryption and Access Control" by Dijiang Huang and Qiuxiang Dong, CRC Press
9. Functional Encryption, by Khairol Amali Bin Ahmad, Khaleel Ahmad,Uma N. Dulhare,Springer Publication
10. "Quantum Cryptography" by YoannPeitri ,Imperial College, London (Research Paper)

IT1601A **MOBILE COMMUNICATION** **L T P C**
3 0 0 3

COURSE OBJECTIVES:

The student should be made to:

- Understand the basic concepts of mobile computing
- Understand Wireless LAN, Bluetooth and WiFi Technologies
- Be familiar with the network protocol stack
- Learn the basics of mobile telecommunication system
- Be exposed to Ad-Hoc networks

COURSE OUTCOMES:

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

- Explain the basics of mobile telecommunication system
- Illustrate the generations of telecommunication systems in wireless network
- Understand the architecture of Wireless LAN technologies
- Determine the functionality of network layer and Identify a routing protocol for a given Ad hoc networks
- Explain the functionality of Transport and Application layer.

UNIT I INTRODUCTION **9**

Introduction to Mobile Computing & its Applications- Introduction to Generations of Mobile Communication Technologies-MAC Protocols – Wireless MAC Issues-SDMA- TDMA- FDMA- CDMA.

UNIT II MOBILE TELECOMMUNICATION SYSTEM **9**

GSM – Architecture – Protocols – Connection Establishment – Frequency Allocation – Routing – Mobility Management – Security –GPRS- UMTS- Architecture.

UNIT III WIRELESS NETWORKS **9**

Wireless LANs and PANs – IEEE 802.11 Standard – Architecture –Physical Layer- MAC sublayer- Services – Blue Tooth- Wi-Fi – WiMAX.

UNIT IV MOBILE NETWORK & TRANSPORT LAYER **9**

Mobile IP –DHCP – AdHoc– Proactive and Reactive Routing Protocols – Multicast Routing-Vehicular Ad Hoc networks (VANET) –MANET Vs VANET – Security-Mobile TCP.

UNIT V MOBILE APPLICATION LAYER **9**

WAP – Architecture – WDP – WTLS – WTP –WSP – WAE – WTA Architecture – WML.

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
IT1601A.1	1	2	2	-	-	-	-	-	-	-	-	1	2	3
IT1601A.2	1	2	2	-	-	-	-	-	-	-	-	1	2	3
IT1601A.3	1	2	2	-	-	-	-	-	-	-	-	-	2	3
IT1601A.4	1	1	2	-	-	-	-	-	-	-	-	-	2	2
IT1601A.5	1	2	2	-	-	-	-	-	-	-	-	-	2	2
AVERAGE	**1.00**	**1.80**	**2.00**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1.00**	**2.00**	**2.60**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOKS:

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

REFERENCES:

1. Dharma Prakash Agarval, Qing and An Zeng, "Introduction to Wireless and Mobile systems",Thomson Asia Pvt Ltd, 2005.
2. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, ―Principles of Mobile Computing‖, Springer, 2003.
3. William.C.Y.Lee,―Mobile Cellular Telecommunications-Analog and Digital Systems‖, Second Edition,Tata Mc Graw Hill Edition ,2006.
4. C.K.Toh, ―AdHoc Mobile Wireless Networks‖, First Edition, Pearson Education, 2002.
5. Android Developers : http://developer.android.com/index.html
6. Apple Developer : https://developer.apple.com/
7. Windows Phone Dev Center : http://developer.windowsphone.com
8. BlackBerry Developer : http://developer.blackberry.com

IT1602A	BIG DATA ANALYTICS	L	T	P	C
		3	0	2	4

COURSE OBJECTIVES:

- To know the fundamental concepts of big data and analytics.
- To explore tools and practices for working with big data
- To learn about stream computing.
- To know about the research that requires the integration of large amounts of data.

COURSE OUTCOMES:

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

- Understand the Big Data concept and related terminologies like security, characteristics, analytics, tools & techniques.
- Analyze Hadoop Ecosystem and apply MapReduce programming on Hadoop framework
- Classify various data streams and mining techniques to implement data analytics
- Analyze the data processing and monitoring using Pig, Hive and HBase on Hadoop Ecosystem
- Implement simple to complex data modeling in NoSQL databases, basic concepts of NLP in machine learning techniques

UNIT I INTRODUCTION TO BIG DATA **9**

Evolution of Big data–Best Practices for Big data Analytics- Big data characteristics - Big Data Use Cases-Characteristics of Big Data Applications -Big Data Analytics:Classification of Analytics – Challenges-Big Data Analytics important - Data Science - Data Scientist - Terminologies used in Big Data Environments - Top Analytics Tools

UNIT II HADOOP AND MAP REDUCE **9**

Introduction to Hadoop - Distributed Computing Challenges - History of Hadoop, Hadoop Eco System. Hadoop Overview – Use case of Hadoop – Hadoop Distributors – HDFS – Processing Data with Hadoop – Map Reduce - Managing Resources and Applications with Hadoop YARN – Interacting with Hadoop Ecosystem.

UNIT III CLUSTERING AND CLASSIFICATION **9**

Advanced Analytical Theory and Methods: Overview of Clustering - K-means - Use Cases - Overview of the Method - Determining the Number of Clusters - Diagnostics - Reasons to Choose and Cautions - 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 IV MINING DATA STREAMS **9**

Introduction to Streams Concepts – Stream Data Model and Architecture - Stream Computing, Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating moments – Counting oneness in a Window – Decaying Window – Real time Analytics Platform(RTAP) applications - Case Studies - Real Time Sentiment Analysis, Stock Market Predictions.

UNIT V NOSQL DATABASES **9**

NoSQL - Introduction to Pig, Hive, HBase, MongoDB, Cassandra. Features of Hive- Comparison with Traditional Databases- User Defined Functions, Data Processing operators - Hive Shell, Hive Services, Hive Metastore, HiveQL, Tables, Querying –Needs-Terms-Data Types- Query Language –Querying Commands.

TOTAL: 30 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
IT1602A.1	3	3	3	3	3	-	-	-	2	1	2	2	3	3
IT1602A.2	3	3	3	3	3	-	-	-	1	1	3	3	3	3
IT1602A.3	2	2	3	2	2	-	1	-	1	1	3	2	3	2
IT1602A.4	2	2	3	2	2	-	1	-	3	1	3	2	2	3
IT1602A.5	2	3	3	2	2	-	1	-	3	2	3	2	3	2
AVERAGE	**2.40**	**2.60**	**3.00**	**2.40**	**2.40**	**-**	**1.00**	**-**	**2.00**	**1.20**	**2.80**	**2.20**	**2.80**	**2.60**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOK:

1) Seema Acharya, Subhashini Chellappan, "Big Data and Analytics" Wiley India; Second Edition, ISBN:978- 8126579518
2) V.K. Jain, “Big Data & Hadoop”, Khanna Book Publishing, 2017, ISBN: 978-9382609131
3) Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.
4) David Loshin, "Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph", Morgan Kaufmann/El sevier Publishers, 2013.

REFERENCES:

1. EMC Education Services, "Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", Wiley publishers, 2015.
2. Bart Baesens, "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications", Wiley Publishers, 2015.
3. Kim H. Pries and Robert Dunnigan, "Big Data Analytics: A Practical Guide for Managers " CRC Press, 2015.

DATA ANALYTICS LABORATORY

COURSE OBJECTIVES:

- To provide hands-on experience to cloud and data analytics frameworks and tools.
- To use the Python packages for performing analytics.
- To learn using analytical tools for real world problems.
- To familiarize the usage of distributed frameworks for handling voluminous data.
- To write and deploy analytical algorithms as MapReduce tasks.

COURSE OUTCOME:

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

- Install analytical tools and configure distributed file system.
- Have skills in developing and executing analytical procedures in various distributedframeworks and databases.
- Develop, implement and deploy simple applications on very large datasets
- Implement simple to complex data modeling in NoSQL databases.

LIST OF EXPERIMEMTS:

Analytics Using Python:

1. Download, install and explore the features of NumPy, SciPy, Jupyter, Statsmodelsand Pandas packages.
2. Reading data from text file, Excel and the web.
3. Exploring various commands for doing descriptive analytics on Iris data set.
4. Use the diabetes data set from UCI and Pima Indians Diabetes data set forperforming the following:
5. Univariate analysis: Frequency, Mean, Median, Mode, Variance, StandardDeviation, Skewness and Kurtosis.
6. Bivariate analysis: Linear and logistic regression modeling
7. Multiple Regression analysis
8. Also compare the results of the above analysis for the two data sets.
9. Apply Bayesian and SVM techniques on Iris and Diabetes data set.
10. Apply and explore various plotting functions on UCI data sets.
11. Hadoop, MapReduce, HDFS, Hive:
12. Install and configure Hadoop in its two operating modes: Pseudo distributed and fully distributed.
13. Implement the following file management tasks in Hadoop: Adding files and directories, retrieving files and deleting files.
14. Create a retail data base with the following tables: Product, Customer, Manufacturer, Shipping and Time using MongoDB and perform data replication using sharding techniques.
15. Install HIVE and implement the above retail schema definition and perform CRUD operations.

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

IT1603A MOBILE APPLICATION AND DEVELOPMENT LABORATORY

L	T	P	C
0	0	4	2

COURSE OBJECTIVES:

To understand the components and structure of mobile application development frameworks for Android and windows OS based mobiles.

- To understand how to work with various mobile application development frameworks.
- To learn the basic and important design concepts and issues of development of mobile applications.
- To understand the capabilities and limitations of mobile devices.

COURSE OUTCOMES:

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

- Review the knowledge of basic mobile communication systems and its principles.
- Design an application using Android development environment
- Explore the method of storing, sharing and retrieving the data in Android Applications
- Examine responsive user interface across wide range of devices
- Create a mobile Application by using various components like activity, views, services, content providers and receivers.

LIST OF EXPERIMENTS

1. Develop an application that uses GUI components, Font and Colours.
2. Develop an application that uses Layout Managers and event listeners.
3. Write an application that draws basic graphical primitives on the screen.
4. Develop an application that makes use of databases.
5. Develop an application that creates alarm clock.
6. Implement an application that uses Multi-threading.
7. Develop a native application that uses GPS location information.
8. Implement an application that writes data to the SD card.
9. Implement an application that creates an alert upon receiving a message.
10. Write a mobile application that makes use of RSS feed.
11. Develop a mobile application to send an email.
12. Develop a Mobile application for simple needs (Mini Project).

LIST OF EQUIPMENTS FOR A BATCH OF 30 STUDENTS:

Stand alone desktops with windows or Android or iOS or Equivalent Mobile Application Development. Tools with appropriate emulators and debuggers

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
IT1603A.1	1	2	2	2	-	-	-	-	-	-	-	-	3	3
IT1603A.2	2	2	3	3	2	-	-	-	-	-	-	2	3	3
IT1603A.3	2	2	1	2	-	-	-	-	-	-	-	-	3	3
IT1603A.4	-	2	3	2	-	-	-	-	-	-	-	-	2	3
IT1603A.5	1	3	2	2	-	-	-	-	-	-	-	-	2	3
AVERAGE	**1.50**	**2.20**	**2.20**	**2.20**	**2.00**	**-**	**-**	**-**	**-**	**-**	**-**	**2.00**	**2.60**	**3.00**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

HS1601A PROFESSIONAL COMMUNICATION LABORATORY

L	T	P	C
0	0	2	1

COURSE OBJECTIVES:

The course aims to:

- Enhance the employability and career skills of students
- Orient the students towards grooming as a professional
- Enable them to become employable, industry ready graduates
- Build their self-esteem and guide them in achieving success in interviews
- Aid them to fit into any professional working environment

COURSE OUTCOMES:

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

- Summarize active listening with passive listening in communication scenarios.
- Interpret verbal and non-verbal cues to engage effectively in group discussion.
- Discuss strategies to plan, design, and deliver impactful presentations.
- Demonstrate confidence and clarity while interacting for both formal and informal contexts.
- Apply persuasive communication techniques in different conversational contexts.

UNIT I

Introduction to Employability Skills – Hard Skills & Soft Skills - Career Skills - Professional Grooming with Values - Emotional Intelligence- General Awareness of Current Affairs

UNIT II

Presentation Skills -Topic Selection – Organizing the Material – Introducing Oneself to the Audience – Introducing the Topic – Answering Questions - Presenting the Visuals/Graphics Effectively – Mini Presentation (General and Technical – 5 Minutes)

UNIT III

Group Discussion (GD) Strategies – Introduction to GD Activities – Preparation Tips for GDs - Participating in GDs on Current Issues -Understanding Group Dynamics- Brainstorming the Topic – Questioning and Clarifying – Mock GDs

UNIT IV

Job Interview Tips - Etiquette – Dress Code – Non-Verbal Communication during GDs and Interviews – Tips and Practice for Attending Interviews –Telephone/Skype Interview – One-to-one interview & Panel Interview – Self-Introduction Practice- FAQs related to Job interviews –Mock Interview

UNIT V

Recognizing Differences between Group and Teamwork – Multitasking – Stress Management – Networking professionally- Importance of Team Spirit – Respecting Social Protocols- Work Ethics - Developing a Long-term Career plans – Making career changes

TOTAL: 30 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
HS1601A.1	-	-	-	-	1	-	1	1	2	3	1	1	-	-
HS1601A.2	-	-	-	-	2	1	1	1	3	3	1	1	-	-
HS1601A.3	-	-	-	-	1	1	1	1	3	3	1	1	-	-
HS1601A.4	-	-	-	-	1	1	1	1	1	3	1	1	-	-
HS1601A.5	-	-	-	-	1	1	1	3	2	3	1	1	-	-
AVERAGE	**-**	**-**	**-**	**-**	**1.20**	**1.00**	**1.00**	**1.40**	**2.20**	**3.00**	**1.00**	**1.00**	-	-

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

RECOMMENDED SOFTWARE

1. Globearena
2. https://placement.freshersworld.com/
3. Related Online Repositories for Soft Skill Development
4. Videos from TED and YouTube

REFERENCES:

1. Butterfield, Jeff Soft Skills for Everyone. Cengage Learning: New Delhi, 2015
2. E. Suresh Kumar et al. Communication for Professional Success. Orient Blackswan: Hyderabad, 2015
3. Interact English Lab Manual for Undergraduate Students. Orient BalckSwan: Hyderabad, 2016.
4. Raman, Meenakshi and Sangeeta Sharma. Professional Communication. Oxford University Press: Oxford, 2014
5. S. Hariharan et al. Soft Skills. MJP Publishers: Chennai, 2010.
6. Singh, Prachi, Professional Communication JBC Press: Daryaganj, 2015.
7. Eric H. Glendinning, Oxford English for Careers Technology for Engineering and Applied Sciences:Student Book, Oxford University Press, Oxford, 2013.

MG1701A	PRINCIPLES OF MANAGEMENT	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

To enable the students to study the evolution of Management.

To study the functions and principles of management and to learn the application of the principles in an organization.

COURSE OUTCOMES :

Be familiar with management evolution and different types of business.

- Summarize the planning and decision making process of management.
- Describe the organization structure, HR planning and control.
- Apply functions of management like motivation, leadership and communication.
- Analyze the performance controlling process, techniques of control and reporting management.
- Illustrate principles of management in order to execute the role as a manager in IT industry.

UNIT I INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS 9

Definition of Management – Science or Art – Manager Vs. Entrepreneur – types of managers –managerial roles and skills – Evolution of Management – Scientific, human relations , system and contingency approaches – Types of Business organization – Sole proprietorship, partnership, company- public and private sector enterprises – Organization culture and Environment – Current trends and issues in Management.

UNIT II PLANNING 9

Nature and purpose of planning – planning process – types of planning – objectives – setting objectives– policies – Planning premises – Strategic Management – Planning Tools and Techniques – Decisionmaking steps and process.

UNIT III ORGANISING 9

Nature and purpose – Formal and informal organization – organization chart – organization structure – types – Line and staff authority – departmentalization – delegation of authority – centralization and decentralization – Job Design – Human Resource Management – HR Planning, Recruitment, selection, Training and Development, Performance Management , Career planning and management.

UNIT IV DIRECTING 9

Foundations of individual and group behaviour – motivation – motivation theories – motivational techniques – job satisfaction – job enrichment – leadership – types and theories of leadership – communication – process of communication – barrier in communication – effective communication – communication and IT.

UNIT V CONTROLLING 9

System and process of controlling – budgetary and non-budgetary control techniques – use of computers and IT in Management control – Productivity problems and management – control and performance – direct and preventive control – reporting.

TOTAL:45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
MG1701A.1	-	-	-	-	-	2	-	2	2	1	3	1	1	3
MG1701A.2	-	-	-	-	-	2	-	2	2	-	2	1	-	2
MG1701A.3	-	-	-	-	-	2	-	2	2	-	-	1	1	2
MG1701A.4	-	-	-	-	-	2	-	2	2	3	2	1	-	2
MG1701A.5	-	-	-	-	-	2	-	2	2	-	-	1	1	2
AVERAGE	**-**	**-**	**-**	**-**	**-**	**2.00**	**-**	**2.00**	**2.00**	**2.00**	**2.33**	**1.00**	**1.00**	**2.20**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXTBOOKS:

1. Stephen P. Robbins & Mary Coulter, “Management”, 10th Edition, Prentice Hall (India) Pvt. Ltd.,2009.
2. JAF Stoner, Freeman R.E and Daniel R Gilbert “Management”, 6th Edition, Pearson Education,2004.

REFERENCES:

1. Stephen A. Robbins & David A. Decenzo& Mary Coulter, “Fundamentals of Management” 7thEdition, Pearson Education, 2011.
2. Robert Kreitner & Mamata Mohapatra, “Management”, Biztantra, 2008.
3. Harold Koontz & Heinz Weihrich “Essentials of management” Tata Mc Graw Hill, 1998.
4. Tripathy PC & Reddy PN, “Principles of Management”, Tata McGraw Hill, 1999.

CS1701A **MACHINE LEARNING** **L T P C**
3 0 0 3

COURSEOBJECTIVES:

- To understand the concepts of machine learning and types of problems tackled by machine learning.
- To explore the different supervised learning techniques.
- To learn different aspects of unsupervised learning and reinforcement learning.
- To learn the role of probabilistic methods for machine learning.
- To understand the basic concepts of neural networks and deep learning.

COURSE OUTCOMES:

Upon the completion of course, students will be able to

- Illustrate problems for each type of machine learning
- Analyze the supervised learning algorithms for various applications
- Apply the clustering algorithms for real time applications.
- Apply the various Reinforcement algorithms
- Illustrate probabilistic methods for an application and analyze the results

UNIT I INTRODUCTION TO MACHINE LEARNING 7

Types of Machine Learning, Supervised learning: Classification, Regression, Unsupervised learning, Generative and Discriminative Models, Some basic concepts in machine learning, The Machine Learning Process, Reinforcement Learning.

UNIT II SUPERVISED LEARNING 11

Supervised Learning, learning a Class from Examples, Noise, Learning Multiple Classes, Regression, Model Selection and Generalization, Classification, Decision trees – Support vector machines -Neural networks (Gradient Descent and Back Propagation), Naïve Bayes Algorithm, Linear Regression and Logistic Regression, Random Forest, Ensemble Learning.

UNIT III UNSUPERVISED LEARNING 9

Introduction - Clustering Algorithms -K – Means – Hierarchical Clustering - Cluster Validity - Dimensionality Reduction –Principal Component Analysis — EM algorithm.

UNIT IV REINFORCEMENT LEARNING 9

Reinforcement Learning – Elements –Uses- Model based Learning – Temporal Difference Learning - Generalization - Markov Decision Processes- Partially Observable States Example: Getting Lost- Values: Q-Learning and Sarsa Algorithm - Back on Holiday: Using Reinforcement Learning, The Tiger Problem.

UNIT V PROBABILISTIC METHODS FOR LEARNING 9

Introduction-Maximum Likelihood -MaximumApriori-Bayesian BeliefNetworks -Probabilistic Modelling
of Problems -Inference in Bayesian Belief Networks – Probability Density Estimation - SequenceModels – Markov Models – Generative Models :Hidden Markov Models.

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CS1701A.1	2	1	1	1	-	-	-	-	-	-	-	1	1	2
CS1701A.2	2	2	2	2	1	-	-	-	-	-	-	1	1	2
CS1701A.3	2	2	2	2	1	-	-	-	-	-	-	1	1	2
CS1701A.4	2	2	2	2	1	-	-	-	-	-	-	1	1	2
CS1701A.5	2	2	2	2	1	-	-	-	-	-	-	1	1	2
AVERAGE	**2.00**	**1.80**	**1.80**	**1.80**	**1.00**	**-**	**-**	**-**	**-**	**-**	**-**	**1.00**	**1.00**	**2.00**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOKS:

1. Ethem Alpaydin, “Introduction to Machine Learning”, Third Edition, Adaptive Computation and Machine Learning Series, MIT Press, 2014
2. Stephen Marsland, “Machine Learning: An Algorithmic erspective”, Chapman & Hall/CRC, 2nd Edition, 2014.

REFERENCES:

1. Kevin Murphy, “Machine Learning: A Probabilistic Perspective”, MIT Press, 20122.
2. Tom M Mitchell, “Machine Learning”, McGraw Hill Education, 2013.
3. Christopher M.Bishop ,Pattern Recognition and Machine Learning, Springer Publications, Peter Flach, “Machine Learning: The Art and Science of Algorithms that Make Sense of Data”, First Edition, Cambridge University Press, 2012.
4. Ameet V Joshi, Machine Learning and Artificial Intelligence, Springer Publications, 2020.

S1702A **MACHINE LEARNING LABORATORY** **L T P C**
3 0 0 3

COURSE OUTCOMES:

Understand the implementation procedures for the machine learning algorithms.

- Illustrate supervised learning algorithms for real world dataset
- Apply the concept of unsupervised learning algorithms for suitable application.
- Use appropriate probabilistic methods for real time application
- Apply various tools Weka/MATLAB etc for implementing machine learning algorithms
- Demonstrate Machine Learning algorithms to solve real world problems

LIST OF EXPERIMENTS:

1. Implement the concept of decision trees with suitable data set from real world problem and classify the data set to produce new sample.
2. Detecting Spam mails using Support vector machine
3. Implement facial recognition application with artificial neural network
4. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.
5. Implement character recognition using Multilayer Perceptron
6. Implement the kmeans algorithm
7. Implement the Dimensionality Reduction techniques
8. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.
9. Study and implement amazon toolkit: Sagemaker
10. Using Weka Tool Perform a). Data preprocessing by selecting or filtering attributes b). Data preprocessing for handling missing value
11. Mini-project: students work in team on any socially relevant problem that needs a machine learning based solution, and evaluate the model performance.

TOTAL: 45 PERIODS

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

SOFTWARE: Python/Java with ML Package/R
HARDWARE: 30 terminals.

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1
CS1702A .1	2	2	2	1	1	-	-	-	-	1	-	1	3
CS1702A .2	2	2	2	1	1	-	-	-	-	1	-	1	3
CS1702A .3	2	2	2	1	1	-	-	-	-	1	-	1	3
CS1702A .4	2	2	2	1	1	-	-	-	-	1	-	1	3
CS1702A .5	2	2	2	1	1	-	-	-	-	1	-	1	3
AVERAGE	**2.00**	**2.00**	**2.00**	**1.00**	**1.00**	**-**	**-**	**-**	**-**	**1.00**	**-**	**1.00**	**3.00**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

IT1702A **CLOUD COMPUTING LAB** **L T P C**
0 0 4 2

COURSE OBJECTIVES:

- To learn the fundamentals of Cloud Computing and designing Private Cloud and Public Cloud Environment.
- To learn the basic ideas and principles of Virtualization Technology.
- To learn the dynamic programming models for Cloud.
- To gain knowledge on various cloud components mechanism for data center design and management.

COURSE OUTCOMES:

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

- Demonstrate the cloud, its characteristics, various delivery and deployment models
- Examine fundamental cloud components mechanism with which cloud data centers are managed and administered.
- Infer and deploy a web application in a PaaS & SaaS environment.
- Outline the strength of virtualization and its role in enabling the cloud computing model
- Illustrate Hadoop single node cluster and run applications with map reduce commands

LIST OF EXPERIMENTS

1. Virtualization

a. Find procedure to run the virtual machine of different configuration using virt-manager.

b. Virtualize a machine and check how many virtual machine can be utilized at a particular time.

c. Create a VM clone and attach virtual block to the cloned virtual machine and check whether it holds the data even after the release of the virtual machine.

2. Public Cloud

a. Develop a simple application to understand the concept of PAAS using GAE/Amazon Elastic Beanstalk/IBM Blue Mix/GCC and launch it.

b. Test how a SaaS applications scales in response to demand.

c. Find the procedure to launch a Cloud instance using a Public IaaS cloud like AWS/GCP.

3. Private Cloud

a. Setup a Private Cloud by performing the procedure using a Single node Openstack/Opennebula implementation.

b. Perform Creation, Management and Termination of a CentOS instance in Openstack/Opennebula.

c. Show the virtual machine migration based on certain conditions from one node to the other.

TOTAL : 45 PERIODS

LIST OF EQUIPMENT OF A BATCH OF 30 STUDENTS:

SOFTWARE: Windows OS, VMWareworkstation, CentOS, OpenNebula, C, java

HARDWARE: 30 Terminals

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
IT1702A.1	1	2	3	3	2	-	-	-	-	-	-	1	2	3
IT1702A.2	2	3	2	3	3	-	-	-	-	-	-	1	2	3
IT1702A.3	1	3	2	2	3	-	-	-	-	-	-	1	2	3
IT1702A.4	2	2	2	3	2	-	-	-	-	-	-	-	2	3
IT1702A.5	1	2	2	3	3	-	-	-	-	-	-	1	2	3
AVERAGE	**1.40**	**2.40**	**2.20**	**2.80**	**2.60**	**-**	**-**	**-**	**-**	**-**	**-**	**1.00**	**2.00**	**3.00**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

IT1703A DESIGN THINKING AND PROTOTYPING LABORATORY L T P C
0 0 2 1

COURSE OBJECTIVE:

- To apply design thinking principles in arriving at innovative engineering solutions for problems relevant to society.

COURSE OUTCOMES:

- Investigate the requirements of a proiblem by conducting surveys.
- Analyze the possible solutions to meet the requirements of the problem solving.
- Expose the creative design process through the integration and application of diverse technical knowledge.
- Develop relevant products or services by choosing good design and applying empathy tools for expericing user requirements.
- Validate the designed solution to ensure impactfulness towards the selected problem

SYLLABUS:

The course will use a combination of lectures and hands-on project work. The project will give an opportunity to come up with an innovative engineering solution to problems or challenges particular to our society.

1. Concepts of design thinking and human centered design thinking.
2. Identifying societal problems using indirect and qualitative research.
3. Forming teams and assignments of major societal problems and arriving at sound concept hypotheses, and solution using brainstorming sessions. Societal problems such as water management, energy sources, basic amenities (health, education, food, clean water, sanitation, connectivity etc), organic farming, livelihood etc. will be assigned as projects.
4. Developing a prototype that allows for meaningful feedback in a real-world environment.
5. Presenting the developed prototype in front of a technically qualified audience.

Evaluation will be done as per following details.

<table>
<tr><td rowspan="3">Project Work</td><td colspan="3">Internal (60 Marks)</td><td colspan="3">End Semester Examination (40 Marks)</td></tr>
<tr><td rowspan="2">Review I</td><td rowspan="2">Review II</td><td rowspan="2">Review III</td><td>Project Report (20)</td><td colspan="2">Viva - Voce (20)</td></tr>
<tr><td>Supervisor</td><td>Internal</td><td>Supervisor</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
IT1703A.1	3	2	2	2	2	2	2	2	3	3	3	3	3	3
IT1703A.2	3	3	3	3	2	2	2	2	3	3	3	3	3	3
IT1703A.3	3	3	3	3	3	2	2	2	3	3	3	3	3	3
IT1703A.4	3	3	3	3	3	2	2	2	3	3	3	3	3	3
IT1703A.5	3	3	3	3	3	2	2	2	3	3	3	3	3	3
AVERAGE	**3.00**	**2.80**	**2.80**	**2.80**	**2.60**	**2.00**	**2.00**	**2.00**	**3.00**	**3.00**	**3.00**	**3.00**	**3.00**	**3.00**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

IT1704A **SUMMER INTERNSHIP**

L	T	P	C
0	0	0	2

COURSE OBJECTIVES:

To enable the students to

- Get connected with reputed industry/ laboratory/academia / research institute
- Get practical knowledge on Product Development / Services and operations / Software Design and Development / Testing / Analytics/ research/ startups/ professionalism / business processes and insights / domain knowledge/ Industry Practices/ and other related aspects and develop skills to solve related problems
- Develop technical, soft, team skills to cater to the needs of the industry / academia / businesses / research / organizations in the core aspects of Automation, Digitalization

The students individually undergo training in reputed firms/ research institutes / laboratories for the specified duration. After the completion of training, a detailed report should be submitted within ten days from the commencement of next semester. The students will be evaluated as per the Regulations.

No. of Weeks: 04

COURSE OUTCOMES:

At the end of the course, students would:

- Summarize the basic concepts related to the assigned project work during industrial training/certification course.
- Analyze the assigned problem by considering its impact on society and environment
- Justify and discuss the design solution for the problem.
- Demonstrate the ability to work effectively in team with commitments to professional ethics.
- Conclude the project work through proper documentation in the form of project report.

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
IT1704A.1	3	2	2	1	-	-	-	-	-	-	-	-	3	2
IT1704A.2	-	2	3	2	-	2	3	-	-	-	-	2	2	2
IT1704A.3	2	3	3	2	-	-	-	1	-	-	-	2	3	2
IT1704A.4	-	-	-	-	-	-	-	2	3	2	-	-	2	2
IT1704A.5	2	-	2	1	-	-	-	-	2	2	2	-	2	1
AVERAGE	**3.00**	**1.00**	**2.00**	**1.67**	**2.67**	**1.00**	**1.33**	**2.33**	**1.50**	**2.00**	**2.67**	**2.00**	**1**	**2**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

PROFESSIONAL ELECTIVE – I

CS1607A	CYBER SECURITY	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To understand the basics of Cyber security.
- To know about the security aspects of operating systems and networks.
- To explore Cryptography, IDS and IPS
- To study the privacy principles and policies.
- To know about the Security management and incidents.

COURSE OUTCOMES:

After the completion of this course, students will be able to:

- Understand the basic concepts of Cyber Security
- Overview of the methods for Security in operating system &networks
- Compare the various security countermeasures.
- Understand the various applicable Privacy principles and policies
- How to manage the Cyberspace effectively

UNIT I INTRODUCTION TO CYBERSECURITY 9

Introduction-Computer Security-Threats-Harm-Vulnerabilities-Controls–Authentication-Access Control and Cryptography-Web-User Side-Browser Attacks-Web Attacks-Targeting -Users – Obtaining User or Website Data-Email Attacks.

UNIT II SECURITY APPLICATIONS FOR OPERATING SYSTEM & NETWORKS 9

Security in Operating Systems - Security in the Design of Operating Systems -Rootkit – Network security attack- Threats to Network Communications - Wireless Network Security - Denial of Service- Distributed Denial-of-Service.

UNIT III SECURITY DETECTION AND COUNTERMEASURES 9

Cryptography in Network Security - Firewalls - Intrusion Detection and Prevention Systems –Network Management-Databases-Security Requirements of Databases-Reliability and Integrity-Database Disclosure-Data Mining and Big Data.

UNIT IV CYBERSPACE AND PRIVACY POLICIES 9

Privacy Concepts-Privacy Principles and Policies-Authentication and Privacy-Data Mining-Privacy onthe Web –Email Security-Privacy Impacts of Emerging Technologies.

UNIT V MANAGEMENT OF CYBER SECURITY 9

Security Planning - Business Continuity Planning - Handling Incidents - Risk Analysis – Dealing with Disaster –Emerging Technologies –The Internet of Things-Economics-Electronic Voting-Cyber Warfare-the Law-International Laws-Cybercrime-Cyber Warfare and Home Land Security.

TOTAL:45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
AVERAGE	**3.00**	**1.00**	**2.00**	**1.67**	**2.67**	**1.00**	**1.33**	**2.33**	**1.50**	**2.00**	**2.67**	**2.00**	**1**	**2**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXTBOOKS:

1. Jan L.Harrington, ”NetworkSecurity– A Practical Approach”, MorganKaufmann Publishers–An Imprint of Elsevier,2005.
2. William Stallings,“Cryptography and NetworkSecurity–Principles and Practice”, PearsonEducation Asia,FourthEdition,2005.

REFERENCES:

1. Edward Amoroso,“Cyber Security”, SiliconPress, 2006
2. Charles P. Pfleeger Shari Lawrence Pfleeger Jonathan Margulies, Security inComputing,5thEdition ,PearsonEducation,2015
3. George K.Kostopoulous, Cyber Space and Cyber Security, CRC Press,2013.
4. MarttiLehto,PekkaNeittaanmäki,CyberSecurity:Analytics,TechnologyandAutomationedited,Spr ingerInternationalPublishingSwitzerland2015
5. Nelson Phillips and Enfinger Steuart,"Computer Forensics and Investigations",CengageLearning, New Delhi,2009.
6. Introduction to Cyber Security available at http://uou.ac.in/foundation-course
7. Fundamentals of Information Security http://uou.ac.in/progdetail?pid=CEGCS-17
8. Cyber Security Techniques http://uou.ac.in/progdetail?pid=CEGCS-17
9. Cyber Attacks and Counter Measures: User Perspective http://uou.ac.in/progdetail?pid=CEGCS-17
10. Information System http://uou.ac.in/progdetail?pid=CEGCS-17

CS1608A SOFTWARE TESTING

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To expose the criteria for test cases.
- To learn the design of test cases.
- To understand the various levels of testing.
- To become familiar with test managing.
- To become familiar with test automation techniques, test metrics and measurement.
- To develop and validate a test plan.

COURSE OUTCOMES:

- Summarize the fundamentals of software testing
- Describe and design test cases suitable for a software development for different domains
- Explain the various test cases and document test plans.
- Apply a wide variety of testing techniques in an effective and efficient manner
- Illustrate automatic testing tools in different domains

UNIT I INTRODUCTION 9

Testing as an Engineering Activity – Testing as a Process – Testing Maturity Model- Testing axioms – Basic definitions – Software Testing Principles – The Tester‘s Role in a Software Development Organization – Origins of Defects – Cost of defects – Defect Classes – The Defect Repository and Test Design –Defect Examples- Developer/Tester Support of Developing a Defect Repository.

UNIT II TEST CASEDESIGN STRATEGIES 9

Test case Design Strategies – Using Black Box Approach to Test Case Design – Boundary Value Analysis – Equivalence Class Partitioning – State based testing – Cause-effect graphing – Compatibility testing – user documentation testing – domain testing - Random Testing – Requirements based testing – Using White Box Approach to Test design – Test Adequacy Criteria static testing vs. structural testing – code functional testing – Coverage and Control Flow Graphs – Covering Code Logic – Paths – code complexity testing – Additional White box testing approaches- Evaluating Test Adequacy Criteria.

UNIT III LEVELS OF TESTING 9

The need for Levels of Testing – Unit Test – Unit Test Planning – Designing the Unit Tests – The Test Harness – Running the Unit tests and Recording results – Integration tests – Designing Integration Tests – Integration Test Planning – Scenario testing – Defect bash elimination System Testing – Acceptance testing – Performance testing – Regression Testing – Internationalization testing – Ad-hoc testing – Alpha, Beta Tests – Testing OO systems – Usability and Accessibility testing – Configuration testing –Compatibility testing – Testing the documentation – Website testing.

UNIT IV TEST MANAGEMENT 9

People and organizational issues in testing – Organization structures for testing teams – testing services – Test Planning – Test Plan Components – Test Plan Attachments – Locating Test Items – test management – test process – Reporting Test Results – Introducing the test specialist – Skills needed by a test specialist – Building a Testing Group- The Structure of Testing Group- .The Technical Training Program.

UNIT V TEST AUTOMATION 9

Software test automation – skills needed for automation – scope of automation – design and architecture for automation – requirements for a test tool – challenges in automation – Test metrics and measurements – project, progress and productivity metrics.

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
AVERAGE	**3.00**	**1.00**	**2.00**	**1.67**	**2.67**	**1.00**	**1.33**	**2.33**	**1.50**	**2.00**	**2.67**	**2.00**	**1**	**2**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOKS:

1. SrinivasanDesikanandGopalaswamyRamesh,―SoftwareTesting–PrinciplesandPractices‖, Pearson Education,2006.
2. Ron Patton,―Software Testing‖,Second Edition, Sams Publishing, Pearson Education, 2007. AULibrary.com

REFERENCES:

1. Ilene Burnstein,―Practical Software Testing‖, Springer International Edition,2003.
2. Edward Kit, ‖Software Testingin the RealWorld–Improving the Process‖, PearsonEducation,1995.
3. Boris Beizer,‖Software Testing Techniques‖ –2nd Edition, Van Nostrand Reinhold, NewYork,1990.
4. Aditya P.Mathur,―Foundations of Software Testing_ Fundamental Algorithmsand Techniques‖,DorlingKindersley(India)Pvt.Ltd.,PearsonEducation,2008.

CS1610A	AGILE METHODOLOGIES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

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

COURSE OUTCOMES:

- Realize the importance of interacting with business stakeholders in determining the requirements for a software system
- Perform iterative software development processes: how to plan them, how to execute them.
- Point out the impact of social aspects on software development success.
- Develop techniques and tools for improving team collaboration and software quality.
- Perform Software process improvement as an ongoing task for development teams.Show how agile approaches can be scaled up to the enterprise level.

UNIT I AGILEMETHODOLOGY 9

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

UNIT II AGILEPROCESSES 9

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

UNIT III AGILITY AND KNOWLEDGEMANAGEMENT 9

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

UNIT IV AGILITY AND REQUIREMENTSENGINEERING 9

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

UNIT V AGILITY AND REQUIREMENTSENGINEERING 9

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

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
AVERAGE	**3.00**	**1.00**	**2.00**	**1.67**	**2.67**	**1.00**	**1.33**	**2.33**	**1.50**	**2.00**	**2.67**	**2.00**	**1**	**2**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOKS:

1. David J.Anderson and Eli Schragenheim,— AgileManagement for Software Engineering:
2. Applying the Theory of Constraints for Business Results‖, Prentice Hall, 2003.
3. Hazza and Dubinsky, —Agile Software Engineering, Series: Undergraduate Topics in Computer Science‖, Springer, 2009.

REFERENCES:

1. Craig Larman, —Agile and Iterative Development: A Manager‗s Guide‖, Addison-Wesley, 2004.
2. Kevin C.Desouza,— Agile Information Systems: Conceptualization, Construction, and Management‖,Butterworth-Heinemann,2007.

CS1611A **GRAPH THEORY AND APPLICATIONS** **L T P C**

3 0 0 3

COURSE OBJECTIVES:

- To understand fundamentals of graph theory.
- To study proof techniques related to various concepts in graphs.
- To explore modern applications of graph theory.

COURSE OUTCOMES:

- Understand the basic concepts of graphs, and different types of graphs
- Understand the properties, theorems and be able to prove theorems.
- Apply suitable graph model and algorithm for solving applications.

9

UNIT I

Introduction - Graph Terminologies - Types of Graphs - Sub Graph- Multi Graph - Regular Graph - Isomorphism - Isomorphic Graphs - Sub-graph - Euler graph - Hamiltonian Graph - Related Theorems.

9

UNIT II

Trees -Properties- Distance and Centres - Types - Rooted Tree -- Tree Enumeration- Labeled Tree - Unlabeled Tree - Spanning Tree - Fundamental Circuits- Cut Sets - Properties - Fundamental Circuit and Cut-set- Connectivity- Separability -Related Theorems.

9

UNIT III

Network Flows - Planar Graph - Representation - Detection - Dual Graph - Geometric andCombinatorial Dual - Related Theorems - Digraph - Properties - Euler Digraph.

UNIT IV **9**

Matrix Representation - Adjacency matrix- Incidence matrix- Circuit matrix - Cut-set matrix - Path Matrix- Properties - Related Theorems - Correlations. Graph Coloring - Chromatic Polynomial - Chromatic Partitioning - Matching - Covering - Related Theorems.

UNIT V **9**

Graph Algorithms- Connectedness and Components- Spanning Tree - Fundamental Circuits- CutVertices- Directed Circuits- Shortest Path – Applications overview.

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
AVERAGE	3.00	1.00	2.00	1.67	2.67	1.00	1.33	2.33	1.50	2.00	2.67	2.00	1	2

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOKS:

1. NarsinghDeo, "Graph Theory with Application to Engineering and Computer
2. Science", Prentice-Hall of India Pvt.Ltd, 2003.
3. L.R.Foulds , "Graph Theory Applications", Springer ,2016.

REFERENCES:

1. Bondy, J. A. and Murty, U.S.R., "Graph Theory with Applications", North Holland Publication,2008.
2. West,D.B.,―Introduction to GraphTheory‖, PearsonEducation,2011.
3. John Clark, Derek Allan Holton, ―A First Look at Graph Theory‖, World Scientific PublishingCompany, 1991.
4. Diestel, R, "Graph Theory", Springer, 3rd Edition, 2006.
5. Kenneth H.Rosen, "Discrete Mathematics and Its Applications", McGrawHill, 2007.

CS1612A DATA WAREHOUSING AND DATAMINING L T P C
3 0 0 3

COURSE OBJECTIVES:

- To understand data warehouse concepts, architecture, business analysis and tools
- To understand data pre-processing and data visualization techniques
- To study algorithms for finding hidden and interesting patterns in data
- To understand and apply various classification and clustering techniques using tools.

COURSE OUTCOMES:

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

UNIT I DATA WAREHOUSING, BUSINESS ANALYSIS AND ON-LINE ANALYTICAL PROCESSING(OLAP) 9

Basic Concepts - Data Warehousing Components – Building a Data Warehouse – Database Architectures for Parallel Processing – Parallel DBMS Vendors - Multidimensional Data Model – Data Warehouse Schemas for Decision Support, Concept Hierarchies -Characteristics of OLAP Systems – Typical OLAP Operations, OLAP and OLTP.

UNIT II DATA MINING–INTRODUCTION 9

Introduction to Data Mining Systems – Knowledge Discovery Process – Data Mining Techniques Issues – applications- Data Objects and attribute types, Statistical description of data, DataPreprocessing – Cleaning, Integration, Reduction, Transformation and discretization, Data Visualization, Data similarity and dissimilarity measures.

UNIT III DATA MINING - FREQUENTPATTERN ANALYSIS 9

Mining Frequent Patterns, Associations and Correlations – Mining Methods- Pattern Evaluation Method – Pattern Mining in Multilevel, Multi-Dimensional Space – Constraint Based Frequent Pattern Mining, Classification using Frequent Patterns

UNIT IV CLASSIFICATION AND CLUSTERING 9

Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Support Vector Machines — Lazy Learners – Model Evaluation and Selection- Techniques to improve Classification Accuracy.

Clustering Techniques – Cluster analysis-Partitioning Methods - Hierarchical Methods – Density Based Methods - Grid Based Methods – Evaluation of clustering – Clustering high dimensional data- Clustering with constraints, Outlier analysis-outlier detection methods.

UNIT V WEKATOOL 9

Datasets – Introduction, Iris plants database, Breast cancer database, Auto imports database - Introduction to WEKA, The Explorer – Getting started, Exploring the explorer, Learning algorithms, Clustering algorithms, Association–rule learners.

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
AVERAGE	**3.00**	**1.00**	**2.00**	**1.67**	**2.67**	**1.00**	**1.33**	**2.33**	**1.50**	**2.00**	**2.67**	**2.00**	**1**	**2**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOK:

1. JiaweiHan and MichelineKamber, ―Data Mining Concepts and Techniques‖, Third Edition,Elsevier, 2012.

REFERENCES:

1. Alex Bersonand Stephen J.Smith, ―Data Warehousing, Data Mining &OLAP‖, Tata McGraw –Hill Edition, 35th Reprint2016.
2. K.P.Soman, Shyam DiwakarandV.Ajay,―Insightin to Data Mining Theory and Practice‖,Eastern Economy Edition, Prentice Hall of India,2006.
3. Ian H.WittenandEibeFrank, ―Data Mining: Practical Machine Learning Tools and Techniques‖, Elsevier, Second Edition.

PROFESSIONAL ELECTIVE-II

CS1704A	SERVICE ORIENTED ARCHITECTURE	L T P C 3 0 0 3

COURSE OBJECTIVES:

- To learn fundamentals of XML
- To provide an overview of Service Oriented Architecture and Web services and their importance
- To learn web services standards and technologies
- To learn service oriented analysis and design for developing SOA based applications

COURSE OUTCOMES:

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

- Understand XML technologies
- Apply SOA principles to solve problems and analyze its benefits in practical scenarios
- Apply web services concepts and WS standards to develop and integrate solutions
- Use web services extensions to develop solutions
- Understand and apply service modeling, service oriented analysis and design for application development

UNIT I XML **9**

XML document structure–Well-formed and valid documents– DTD – XML Schema –Parsing XML using DOM,SAX–XPath-XML Transformation and XSL–Xquery

UNIT II SERVICEORIENTEDARCHITECTURE(SOA)BASICS **9**

Characteristics of SOA, Benefits of SOA, Comparing SOA with Client-Server and Distributedarchitectures–--Principles of Service Orientation–Service layers

UNIT III WEBSERVICES (WS)ANDSTANDARDS **8**

Web Services Platform – Service descriptions – WSDL – Messaging with SOAP –Servicediscovery– UDDI–Service - Level Interaction Patterns – and Choreography.

UNIT IV WEBSERVICES EXTENSIONS **8**

WS-Addressing-WS-Reliable Messaging-WS-Policy–WS-Coordination–WS-Transactions-WS-Security-Examples

UNIT V SERVICE ORIENTEDANALYSISANDDESIGN **11**

SOA delivery strategies–Service oriented analysis–Service Modelling–Service oriented design - Standards and composition guidelines—Service design–Business process design–Case Study

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
AVERAGE	**3.00**	**1.00**	**2.00**	**1.67**	**2.67**	**1.00**	**1.33**	**2.33**	**1.50**	**2.00**	**2.67**	**2.00**	**1**	**2**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

CS1705A	TOTAL QUALITY MANAGEMENT	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:
To facilitate the understanding of Quality Management principles and process.

COURSE OUTCOME:
The student would be able to apply the tools and techniques of quality management tomanufacturing and services processes.

UNIT I INTRODUCTION 9
Introduction - Need for quality -Evolution of quality - Definitions of quality - Dimensions of product and service quality - Basic concepts of TQM - TQM Framework - Contributions of Deming, Juran and Crosby - Barriers to TQM - Customer focus - Customer orientation, Customer satisfaction, Customer complaints, and Customer retention.

UNIT II TQM PRINCIPLES 9
Leadership-Quality Statements, Strategic quality planning, Quality Councils-Employee involvement Motivation, Empowerment, Team and Team work, Recognition and Reward, Performance appraisal - Continuous process improvement - PDCA cycle, 5S, Kaizen – Supplier partnership-Partnering, Supplier selection, Supplier Rating.

UNIT III TQM TOOLS AND TECHNIQUES I 9
The seven traditional tools of quality – New management tools –Six sigma: Concepts, Methodology, applications to manufacturing, service sector including IT - Bench marking – Reason to bench mark, Bench marking process-FMEA-Stages, Types.

UNIT IV TQM TOOLS AND TECHNIQUES II 9
Quality Circles - Cost of Quality - Quality Function Deployment (QFD)- Taguchi quality loss function - TPM -Concepts, improvement needs- Performance measures.

UNIT V QUALITY MANAGEMENT SYSTEM 9
Introduction—Benefits of ISO Registration—ISO9000 Series of Standards—SectorSpecific Standards—AS9100, TS16949 and TL9000--ISO9001Requirements—Implementation—Documentation—Internal Audits—Registration-**ENVIRONMENTAL MANAGEMENT SYSTEM:**Introduction—ISO14000 Series Standards— Concepts of ISO14001—Requirements of ISO14001—Benefits of EMS.

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
AVERAGE	**3.00**	**1.00**	**2.00**	**1.67**	**2.67**	**1.00**	**1.33**	**2.33**	**1.50**	**2.00**	**2.67**	**2.00**	**1**	**2**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

CS1706A **MULTI-CORE ARCHITECTURES AND PROGRAMMING**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To understand the need for multi-core processors, and their architecture.
- To understand the challenges in parallel and multi-threaded programming.
- To learn about the various parallel programming paradigms,
- To develop multicore programs and design parallel solutions.

COURSE OUTCOMES:

- At the end of the course, the students should be able to:
- Describe multicore architectures and identify their characteristics and challenges.
- Identify the issues in programming Parallel Processors.
- Write programs using OpenMP and MPI.
- Design parallel programming solutions to common problems.
- Compare and contrast programming for serial processors and programmingfor parallel processors.

UNIT I MULTI-CORE PROCESSORS **9**

Single core to Multi-core architectures – SIMD and MIMD systems – Interconnection networks -Symmetric and Distributed Shared Memory Architectures – Cache coherence –Performance Issues–Parallel program design.

UNIT II PARALLEL PROGRAMCHALLENGES **9**

Performance – Scalability – Synchronization and data sharing – Data races – Synchronizationprimitives (mutexes, locks, semaphores, barriers) – deadlocks and live locks – communication between threads (condition variables, signals, message queues and pipes).

UNIT III SHARED MEMORY PROGRAMMING WITH OpenMP **9**

OpenMP Execution Model – Memory Model – OpenMP Directives – Work-sharingConstructs -Library functions – Handling Data and Functional Parallelism – Handling Loops – Performance Considerations.

UNIT IV DISTRIBUTED MEMORY PROGRAMMING WITH MPI **9**

MPI program execution – MPI constructs – libraries – MPI send and receive – Point-to-point andCollectivecommunication–MPIderiveddatatypes–Performanceevaluation

UNIT V PARALLEL PROGRAM DEVELOPMENT **9**

Case studies - n-Body solvers – Tree Search – OpenMP and MPI implementations andcomparison.

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
AVERAGE	**3.00**	**1.00**	**2.00**	**1.67**	**2.67**	**1.00**	**1.33**	**2.33**	**1.50**	**2.00**	**2.67**	**2.00**	**1**	**2**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXTBOOKS:

1. Peter S. Pacheco, an Introduction to Parallel Programming‖, Morgan-Kauffman/Elsevier,2011.
2. DarrylGove,―MulticoreApplicationProgrammingforWindows,Linux,andOracl eSolaris‖,Pearson,2011 (unit2)

REFERENCES:

1. Michael J Quinn, Parallel programming in C with MPI and OpenMP‖, Tata Mc GrawHill,2003.
2. Victor Alessandrini, Shared Memory Application Programming, 1st Edition, Concepts and Strategies in Multicore Application Programming, Morgan Kaufmann, 2015.
3. Yan Solihin, Fundamentals of Parallel Multicore Architecture, CRC Press, 2015

CS1707A HUMAN COMPUTER INTERACTION L T P C
3 0 0 3

OBJECTIVES:

- To learn the foundations of Human Computer Interaction.
- To become familiar with the design technologies for individuals and persons withdisabilities.
- To be aware of mobile HCI.
- To learn the guide lines for user interface.

COURSE OUTCOMES:

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

- Design effective dialog for HCI
- Design effective HCI for individuals and persons with disabilities.
- Assess the importance of user feedback.
- Explain the HCIimplicationsfordesigningmultimedia/ecommerce/e-learningWebsites.
- Develop meaningful user interface.

UNIT I FOUNDATIONS OF HCI 9

The Human: I/O channels–Memory–Reasoning and problem solving; The Computer: Devices - Memory – processing and networks; Interaction: Models – frameworks – Ergonomics – styles – elements–interactivity- Paradigms.-Case Studies

UNIT II DESIGN & SOFTWARE PROCESS 9

Interactive Design: Basics – process – scenarios – navigation – screen design – Iteration andprototyping. HCI in software process: Software life cycle–usability engineering–Prototyping inpractice – design rationale. Design rules: principles, standards, guidelines, rules. Evaluation Techniques–Universal Design

UNIT III MODELS AND THEORIES 9

HCI Models: Cognitive models: Socio-Organizational issues and stakeholder requirements – Communication and collaboration models - Hypertext, Multimedia and WWW.

UNIT IV MOBILE HCI 9

Mobile Ecosystem: Platforms, Application frameworks- Types of Mobile Applications: Widgets, Applications, Games- Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools.-Case Studies

UNIT V WEB INTERFACE DESIGN 9

Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays andVirtual Pages, Process Flow – Case Studies

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
AVERAGE	**3.00**	**1.00**	**2.00**	**1.67**	**2.67**	**1.00**	**1.33**	**2.33**	**1.50**	**2.00**	**2.67**	**2.00**	**1**	**2**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXTBOOKS:

1. AlanDix,JanetFinlay,GregoryAbowd,RussellBeale,―HumanComputerInteracti on‖,3rdEdition,Pearson Education,2004 (UNITI,II& III)
2. Brian Fling, ―Mobile Design and Development‖, First Edition, O'Reilly MediaInc., 2009 (UNIT – IV)
3. BillScottandTheresaNeil,―DesigningWebInterfaces‖,FirstEdition,O'Reilly,2009.(UNIT-V)

CS1708A C#AND.NETPROGRAMMING L T P C
3 0 0 3

COURSE OBJECTIVES:

- To learn basic programming in C# and the object oriented programming concepts.
- To update and enhance skills in writing Windows applications, ADO.NET and ASP .NET.
- To study the advanced concept sin data connectivity, WPF, WCF and WWF with C# and .NET4.5.
- To implement mobile applications using .Net compact framework
- To understand the working of base class libraries, their operations and manipulation of datausing XML.

COURSE OUTCOMES:

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

- Demonstrate a simple applications using C# and describe the .Net framework
- Illustrate the various applications using C# advanced features in .Net Framework.
- Determine distributed applications by implementing base class libraries and database connectivity using ADO.Net.
- Show window based applications using .Net Framework.
- Examine mobile application using .NET compact framework.

UNIT I C# LANGUAGE BASICS 9

.Net Architecture-Core C#-Variables-Data Types-Flow control-Objects and Types- Classes and Structs - Inheritance- Generics – Arrays and Tuples – Operators and Casts-Indexers

UNIT II C# ADVANCED FEATURES 9

Delegates – Lambdas – Lambda Expressions – Events – Event Publisher – Event Listener – Strings and Regular Expressions – Generics – Collections – Memory Management and Pointers-Errors and Exceptions-Reflection

UNIT III BASE CLASS LIBRARIESAND DATAMANIPULATION 9

Diagnostics-Tasks,ThreadsandSynchronization-.NetSecurity-Localization-Manipulating XML- SAX and DOM - Manipulating files and the Registry- Transactions -ADO.NET- Peer-to-Peer Networking -PNRP - Building P2P Applications – Windows Presentation Foundation (WPF).

UNIT IV WINDOW BASED APPLICATIONS,WCFAND WWF 9

Window based applications-Core ASP.NET - ASP.NET Web forms-Windows Communication Foundation (WCF)- Introduction to Web Services - .Net Remoting –Windows Service-Windows Workflow Foundation(WWF)-Activities– Workflows

UNIT V NETFRAMEWORK AND COMPACT FRAMEWORK 9

Assemblies-Sharedassemblies-CustomHostingwithCLRObjects-Appdomains-Core XAML-Bubbling and Tunneling Events- Reading and Writing XAML - .Net Compact Framework - Compact Edition Data Stores – Errors, Testing and Debugging –Optimizing performance –Packaging and Deployment – Networking and Mobile Devices

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
AVERAGE	**3.00**	**1.00**	**2.00**	**1.67**	**2.67**	**1.00**	**1.33**	**2.33**	**1.50**	**2.00**	**2.67**	**2.00**	**1**	**2**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXTBOOKS:

1. Christian Nagel, Bill Evjen, JayGlynn, Karli Watson, Morgan Skinner ―Professional C# 2012and .NET 4.5 ‖,Wiley,2012
2. Harsh Bhasin, ―Programming in C# ‖, Oxford University Press, 2014.

REFERENCES:

1. Ian Gariffiths, Mathew Adams, Jesse Liberty, ―Programming C# 4.0‖,O_Reilly, Fourth Edition, 2010.
2. Andrew Troelsen, Pro C# 5.0 and the .NET4.5 Framework, A press publication, 2012.
3. Andy Wigley, Daniel Moth, Peter Foot, ― Mobile Development Handbook ‖, Microsoft Press, 2011.

CS1709A WIRELESS ADHOC AND SENSOR NETWORKS L T P C
3 0 0 3

COURSE OBJECTIVES:

- To learn about the issues and challenges in the design of wireless adhoc networks.
- To understand the working of MAC and Routing Protocols for adhoc and sensor networks
- To learn about theTransport Layer protocols and their QoS for adhoc and sensornetworks.
- To understand various security issues in adhoc and sensor networks and the corresponding solution.

COURSE OUTCOMES:

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

- Identify different issues in wireless adhoc and sensor networks.
- To analyze protocols developed for adhoc and sensor networks.

To identify and understand security issues in adhoc and sensor networks.

UNIT I MAC &ROUTING IN ADHOC NETWORKS 9

Introduction–Issues and challenges in adhoc networks–MAC Layer Protocols for wireless adhoc networks – Contention - Based MAC protocols – MAC Protocols Using Directional Antennas – Multiple – Channel MAC Protocols – Power –Aware MAC Protocols – Routing in Adhoc Networks – Design Issues –Proactive, Reactive and Hybrid Routing Protocols

UNIT II TRANSPORT & QOS INAD HOC NETWORKS 9

TCP‟s challenges and Design Issues in Ad Hoc Networks – Transport protocols for adhoc networks – Issues and Challenges in providing QoS – MAC Layer QoS solutions – Network Layer QoS solutions– QoSModel

UNIT III MAC& ROUTING IN WIRELESS SENSOR NETWORKS 9

Introduction – Applications – Challenges – Sensor network architecture – MAC Protocols for wireless sensor networks – Low duty cycle protocols and wakeup concepts – Contention-Based protocols– Schedule-Based protocols IEEE 802.15.4 Zigbee –Topology Control–Routing Protocols

UNIT IV TRANSPORT& QOSINWIRELESS SENSOR NETWORKS 9

Data-Centric and Contention-Based Networking – Transport Layer and QoS in Wireless Sensor Networks – Congestion Control in network processing – Operating systems for wireless sensor networks–Examples

UNIT V SECURITYINADHOCAND SENSORNETWORKS 9

Security Attacks–Key Distribution and Management–Intrusion Detection Software based Anti- tamper techniques – Water marking techniques – Defense against routing attacks –Secure Adhoc routing protocols–Broad cast authentication WSN protocols – TESLA –Biba–Sensor Network Security Protocols –SPINS

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
AVERAGE	**3.00**	**1.00**	**2.00**	**1.67**	**2.67**	**1.00**	**1.33**	**2.33**	**1.50**	**2.00**	**2.67**	**2.00**	**1**	**2**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXTBOOKS:

1. C.SivaRam Murthy and B.S.Manoj,―AdHoc Wireless Networks–Architectures andProtocols‖, Pearson Education, 2006.
2. Holger Karl, Andreas Willing, ―Protocols and Architectures for Wireless SensorNetworks‖, John Wiley &Sons, Inc.,2005.

REFERENCES:

1. Subir Kumar Sarkar, TG Basavaraju, C Puttamadappa, ―AdHoc Mobile WirelessNetworks‖, Auerbach Publications, 2008.
2. Carlos De Morais Cordeiro, Dharma Prakash Agrawal, ―AdHoc and Sensor Networks:Theory and Applications (2nd Edition)‖,World Scientific Publishing, 2011.
3. Waltenegus Dargie, Christian Poellabauer,―Fundamentals of Wireless Sensor NetworksTheory and Practice ‖,John Wiley and Sons,2010
4. Xiang- YangLi, "Wireless Ad Hoc and Sensor Networks: Theory and Applications‖, 1227the edition, Cambridge university Press, 2008.

CS1710A	ADVANCED TOPICS ON DATABASES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To learn the modeling and design of databases.
- To acquire knowledge on parallel and distributed databases and their applications.
- To study the usage and applications of Object Oriented and Intelligent databases.
- To understand the usage of advanced data models.
- To learn emerging databases such as XML, Cloud and Big Data.
- To acquire inquisitive attitude towards research topics in databases.

COURSE OUTCOMES:

Upon Completion of the course, the students will be able**,**

- To develop in-depth understanding of relational databases and skills to optimize database performance in practice.
- To understand and critique on each type of databases.
- To design faster algorithms in solving practical database problems.
- To implement intelligent databases and various data models.

UNIT I PARALLEL AND DISTRIBUTED DATABASES 9

Database System Architectures: Centralized and Client-Server Architectures – Server System Architectures – Parallel Systems- Distributed Systems – Parallel Databases: I/O Parallelism – Inter and Intra Query Parallelism – Inter and Intra operation Parallelism – Design of Parallel Systems- DistributedDatabase Concepts - Distributed Data Storage – Distributed Transactions – Commit Protocols – Concurrency Control – Distributed Query Processing – Case Studies

UNIT II OBJECT AND OBJECT RELATIONAL DATABASES 9

Concepts for Object Databases: Object Identity – Object structure – Type Constructors – Encapsulation of Operations – Methods – Persistence – Type and Class Hierarchies – Inheritance - Complex Objects – Object Database Standards, Languages and Design: ODMG Model – ODL – OQL – Object Relational and Extended – Relational Systems: Object Relational features in SQL/Oracle – Case Studies.

UNIT III INTELLIGENT DATABASES 9

Active Databases: Syntax and Semantics (Starburst, Oracle, DB2)- Taxonomy- Applications- Design Principles for Active Rules- Temporal Databases: Overview of Temporal Databases- TSQL2- Deductive Databases: Logic of Query Languages – Datalog- Recursive Rules-Syntax and Semantics of Datalog Languages- Implementation of Rules and Recursion- Recursive Queries in SQL- Spatial Databases- Spatial Data Types- Spatial Relationships- Spatial Data Structures- Spatial Access Methods- Spatial DB Implementation.

UNIT IV ADVANCED DATA MODELS 9

Mobile Databases: Location and Handoff Management - Effect of Mobility on Data Management - Location Dependent Data Distribution - Mobile Transaction Models -Concurrency Control - Transaction Commit Protocols- Multimedia Databases- Information Retrieval- Data Warehousing- DataMining- Text Mining.

UNIT V EMERGING TECHNOLOGIES 9

XML Databases: XML-Related Technologies-XML Schema- XML Query Languages- Storing XML in Databases-XML and SQL- Native XML Databases- Web Databases- Geographic Information Systems- Biological Data Management- Cloud Based Databases: Data Storage Systems on the Cloud- Cloud Storage Architectures-Cloud Data Models- Query Languages- Introduction to Big Data-Storage-Analysis.

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
AVERAGE	**3.00**	**1.00**	**2.00**	**1.67**	**2.67**	**1.00**	**1.33**	**2.33**	**1.50**	**2.00**	**2.67**	**2.00**	**1**	**2**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOKS:

1. Ramez Elmasri, Shamkant B. Navathe, ―Fundamentals of Database Systems‖, SixthEdition, Pearson, 2011.
2. Thomas Cannolly and Carolyn Begg, ―Database Systems, A Practical Approach toDesign, Implementation and Management‖, Fourth Edition, Pearson Education, 2008.

REFERENCES:

1. Henry F Korth, Abraham Silberschatz, S. Sudharshan, ―Database System Concepts‖,Sixth Edition, McGraw Hill, 2011.
2. C.J.Date, A.Kannan, S.Swamynathan, an Introduction to Database Systems‖, Eighth Edition,Pearson Education, 2006.
3. Carlo Zaniolo, Stefano Ceri, Christos Faloutsos, Richard T. Snodgrass, V.S. Subrahmanian,Roberto Zicari, ―Advanced Database Systems‖, Morgan Kaufmann publishers, 2006.

CS1711 A	FULL STACK WEB DEVELOPMENT	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To understand the fundamentals of web programming and client side scripting.
- To learn client side development using ReactJS.
- To understand and architect databases using NoSQL and SQL databases.
- To understand API development with Express Framework
- To learn the deployment of web application in Cloud

COURSE OUTCOMES:

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

- Write client side scripting CSS and JS.
- Implement and architect the client side of the web application.
- Implement Web Application using NodeJS.
- Architect NoSQL databases with MongoDB.

Implement a full-stack Single Page Application using React, NodeJS and MongoDB anddeploy on Cloud.

UNIT I ADVANCED CSS &JAVASCRIPT CONCEPTS 9

Introduction to bootstrap- BS Grid- Images- Buttons- pagination- Icons-Dropdowns- Forms-Input- Carousel-Navigation bar and Tabs- Modal components - Objects – Promises – ES6 Let and Const – this keyword – Hoisting – type of - type Conversion – Template literals – Arrow function – Default parameter – Async Await – JSON

UNIT II ADVANCED CLIENT SIDE PROGRAMMING 9

React JS: ReactDOM - JSX - Components - Properties – Fetch API - State and Lifecycle - -JS Localstorage - Events - Lifting State Up - Composition and Inheritance

UNIT III ADVANCED NODE JS AND DATABASE 9

Introduction to No SQL databases – MongoDB system overview - Basic querying with MongoDB shell – Request body parsing in Express – NodeJS Mongo DB connection – Adding and retrievingdata to MongoDB from NodeJS – Handling SQL databases from NodeJS – Handling Cookies in NodeJS – Handling User Authentication with NodeJS

UNIT IV SERVER SIDE PROGRAMMING WITH NODE JS 9

Introduction to Web Servers – Javascript in the Desktop with NodeJS – NPM – Serving files with the http module – Introduction to the Express framework – Server-side rendering with TemplatingEngines Static Files - async/await - Fetching JSON from Express

UNIT V APP IMPLEMENTATION IN CLOUD 9

Cloud providers Overview – Virtual Private Cloud – Scaling (Horizontal and Vertical) –Virtual Machines, Ethernet and Switches – Docker Container – Kubernetes

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
AVERAGE	**3.00**	**1.00**	**2.00**	**1.67**	**2.67**	**1.00**	**1.33**	**2.33**	**1.50**	**2.00**	**2.67**	**2.00**	**1**	**2**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

REFERENCES:

1. David Flanagan, “Java Script: The Definitive Guide”, O’Reilly Media, Inc, 7th Edition, 2020
2. Matt Frisbie, "Professional JavaScript for Web Developers", Wiley Publishing, Inc, 4thEdition, ISBN: 978-1-119-36656-0, 2019
3. Alex Banks, Eve Porcello, "Learning React", O’Reilly Media, Inc, 2nd Edition, 2020
4. Marc Wandschneider, “Learning Node”, Addison-Wesley Professional, 2nd Edition, 2016
5. Joe Beda, Kelsey Hightower, Brendan Burns, “Kubernetes: Up and Running”, O’Reilly Media,1 st edition, 2017
6. Paul Zikopoulos, Christopher Bienko, Chris Backer, Chris Konarski, SaiVennam, “CloudWithout Compromise”, O’Reilly Media, 1st edition, 2021

CS1712A	HUMAN RIGHTS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE

To sensitize the Engineering students to various aspects of Human Rights.

COURSE OUTCOME:

Engineering students will acquire the basic knowledge of human rights.

UNIT I **9**

Human Rights – Meaning, origin and Development. Notion and classification of Rights – Natural, Moral and Legal Rights. Civil and Political Rights, Economic, Social and Cultural Rights; collective / Solidarity Rights.

UNIT II **9**

Evolution of the concept of Human Rights Magana carta – Geneva convention of 1864. Universal Declaration of Human Rights, 1948. Theories of Human Rights.

UNIT III **9**

Theories and perspectives of UN Laws – UN Agencies to monitor and compliance.

UNIT IV **9**

Human Rights in India – Constitutional Provisions / Guarantees.

UNIT V **9**

Human Rights of Disadvantaged People – Women, Children, Displaced persons and Disabled persons, including Aged and HIV Infected People. Implementation of Human Rights – National and State Human Rights Commission – Judiciary – Role of NGO‘s, Media, Educational Institutions, Social Movements.

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
AVERAGE	**3.00**	**1.00**	**2.00**	**1.67**	**2.67**	**1.00**	**1.33**	**2.33**	**1.50**	**2.00**	**2.67**	**2.00**	**1**	**2**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

REFERENCES:

1. Kapoor S.K., ―Human Rights under International law and Indian Laws‖, Central LawAgency, Allahabad, 2014.
2. Chandra U., ―Human Rights‖, Allahabad Law Agency, Allahabad, 2014. Upendra Baxi, The Future of Human Rights, Oxford University Press, New Delhi

CS1713A	BLOCKCHAIN TECHNOLOGIES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- Understand how blockchain systems (mainly Bitcoin and Ethereum) work,
- To securely interact with them
- Design, build, and deploy smart contracts and distributed applications,
- Integrate ideas from blockchain technology into their own projects.

COURSE OUTCOMES:

Upon the successful completion of the Course, the Student would be able to

- Outline the design principles of Bitcoin and Ethereum.
- Appraise the Satoshi Nakamoto consensus.
- Explain the Simplified Payment Verification protocol.
- List and describe differences between proof-of-work and proof-of-stake consensus.
- Interact with a blockchain system by sending and reading transactions.
- Design, build, and deploy a distributed application.
- Evaluate security, privacy, and efficiency of a given blockchain system.

UNIT I BASICS **9**

Distributed Database, Two General Problem, Byzantine General problem and Fault Tolerance,Hadoop Distributed File System, Distributed Hash Table, ASIC resistance, Turing Complete.
Cryptography: Hash function, Digital Signature - ECDSA, Memory Hard Algorithm, Zero KnowledgeProof.

UNIT II BLOCKCHAIN **9**

Introduction, Advantage over conventional distributed database, Blockchain Network, MiningMechanism, Distributed Consensus, Merkle Patricia Tree, Gas Limit, Transactions and Fee, Anonymity, Reward, Chain Policy, Life of Blockchain application, Soft & Hard Fork, Privateand Public blockchain.

UNIT III DISTRIBUTED CONSENSUS **9**

Nakamoto consensus, Proof of Work, Proof of Stake, Proof of Burn, Difficulty Level, Sybil Attack, Energy utilization and alternate.

UNIT IV CRYPTOCURRENCY **9**

History, Distributed Ledger, Bitcoin protocols - Mining strategy and rewards, Ethereum - Construction,DAO, Smart Contract, GHOST, Vulnerability, Attacks, Sidechain, Namecoin

UNIT V CRYPTOCURRENCY REGULATION **9**

Stakeholders, Roots of Bit coin, Legal Aspects-Crypto currency Exchange, Black Market and Global Economy. Applications: Internet of Things, Medical Record Management System, DomainName Service and future of Block chain.

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
AVERAGE	**3.00**	**1.00**	**2.00**	**1.67**	**2.67**	**1.00**	**1.33**	**2.33**	**1.50**	**2.00**	**2.67**	**2.00**	**1**	**2**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOK:

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder,Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press (July 19, 2016).

REFERENCE BOOKS:

1. Antonopoulos, Mastering Bitcoin: Unlocking Digital Crypto currencies
2. Satoshi Nakamoto, Bitcoin: A Peer-to-Peer Electronic Cash System
3. DR. Gavin Wood, “ETHEREUM: A Secure Decentralized Transaction Ledger, ”Yellowpaper. 2014.
4. Nicola Atzei, Massimo Bartoletti, and Tiziana Cimoli, A survey of attacks on Ethereumsmart contracts

PROFESSIONAL ELECTIVE-III

CS1811A	SOFTWARE DEFINED NETWORKS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

To understand the need for SDN and its data plane operations
To understand the functions of control plane
To comprehend the migration of networking functions to SDN environment
To explore various techniques of network function virtualization
To comprehend the concepts behind network virtualization

COURSE OUTCOMES:

At the end of the course, students would:

- Describe the motivation behind SDN
- Identify the functions of the data plane and control plane
- Design and develop network applications using SDN
- Orchestrate network services using NFV
- Explain various use cases of SDN and NFV

UNIT I SDN: INTRODUCTION **9**

Evolving Network Requirements – The SDN Approach – SDN architecture - SDN Data Plane , Control plane and Application Plane.

UNIT II SDN DATA PLANE AND CONTROL PLANE **9**

Data Plane functions and protocols - OpenFLow Protocol - Flow Table - Control Plane Functions - Southbound Interface, Northbound Interface – SDN Controllers - Ryu, OpenDaylight, ONOS - Distributed Controllers.

UNIT III SDN APPLICATIONS **9**

SDN Application Plane Architecture – Network Services Abstraction Layer – Traffic Engineering –Measurement and Monitoring – Security – Data Center Networking.

UNIT IV NETWORK FUNCTION VIRTUALIZATION **9**

Network Virtualization - Virtual LANs – OpenFlow VLAN Support - NFV Concepts – Benefits and Requirements – Reference Architecture.

UNIT V NFV FUNCTIONALITY **9**

NFV Infrastructure – Virtualized Network Functions – NFV Management and Orchestration – NFV Use cases – SDN and NFV.

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
AVERAGE	**3.00**	**1.00**	**2.00**	**1.67**	**2.67**	**1.00**	**1.33**	**2.33**	**1.50**	**2.00**	**2.67**	**2.00**	**1**	**2**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXTBOOKS:

1. William Stallings, "Foundations of Modern Networking: SDN, NFV, QoE, IoT andCloud", Pearson Education, 1st Edition, 2015.

REFERENCES:

1. Ken Gray, Thomas D. Nadeau, "Network Function Virtualization", MorganKauffman, 2016.
2. Thomas D Nadeau, Ken Gray, "SDN: Software Defined Networks", O'Reilly Media,2013.
3. Fei Hu, "Network Innovation through OpenFlow and SDN: Principles andDesign", 1st Edition, CRC Press, 2014.

GE1801A PROFESSIONAL ETHICS IN ENGINEERING L T P C
3 0 0 3

COURSE OBJECTIVES:
To enable the students to create an awareness on Engineering Ethics and HumanValues, to instill Moral and Social Values and Loyalty and to appreciate the rights of others.

COURSE OUTCOMES:
At the end of the course, students would:

- Summarize the human values with regard to the individual life style for the society
- Examine the role of ethics to the engineering field
- Categorize how engineering is applied in association with ethics based on engineering experimentation
- Illustrate the engineering ethics-based safety, responsibilities and rights
- Classify the global issues of professional ethics in engineering.

UNIT I HUMAN VALUES 9
Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respectfor others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.

UNIT II ENGINEERING ETHICS 9
Senses of _Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Models of professional roles - Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories.

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION 9
Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law

UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS 9
Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk - Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights
(IPR) Discrimination

UNIT V GLOBAL ISSUES 9
Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership – Code of Conduct – Corporate Social Responsibility.

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
AVERAGE	**3.00**	**1.00**	**2.00**	**1.67**	**2.67**	**1.00**	**1.33**	**2.33**	**1.50**	**2.00**	**2.67**	**2.00**	**1**	**2**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXTBOOKS:

1. Mike W. Martin and Roland Schinzinger, ―Ethics in Engineering‖, Tata McGraw Hill, New Delhi, 2003
2. PaulGoransson,ChuckBlackTimothy Culver,"SoftwareDefinedNetworks: AComprehensive Approach", 2nd Edition, Morgan Kaufmann Press, 2016.
3. Oswald Coker, Siamak Azodolmolky, "Software-Defined Networking withOpenFlow", 2nd Edition, O'Reilly Media, 2017.
4. Govindarajan M, Natarajan S, Senthil Kumar V. S, ―Engineering Ethics‖, Prentice Hall ofIndia, New Delhi, 2004.

REFERENCES:

1. Charles B. Fleddermann, ―Engineering Ethics‖, Pearson Prentice Hall, New Jersey, 2004.
2. Charles E.Harris, Michael S. Pritchard and Michael J. Rabins, ―EngineeringEthics – Concepts and Cases‖, Cengage Learning, 2009.
3. John R Boatright, ―Ethics and the Conduct of Business‖, Pearson Education, New Delhi,2003
4. Edmund GSeebauer and Robert L Barry, ―Fundamentals of Ethics forScientists and Engineers‖, Oxford University Press, Oxford, 2001.
5. Laura P.Hartman and Joe Desjardins, ―Business Ethics: Decision Making forPersonal Integrity and Social Responsibility‖ Mc Graw Hill education, India Pvt. Ltd.,New Delhi, 2013.
6. World Community Service Centre, _ Value Education', Vethathiri publications, Erode, 2011.

Web sources:

1. www.onlineethics.org
2. www.nspe.org
3. www.globalethics.org
4. www.ethics.org

CS1810A **MOBILE AND PERVASIVE COMPUTING** **L T P C**
3 0 0 3

COURSE OBJECTIVES:

- To learn the basic architecture and concepts till Third Generation Communication systems.
- To understand the latest 4G Telecommunication System Principles.
- To introduce the broad perspective of pervasive concepts and management
- To explore the HCI in Pervasive environment
- To apply the pervasive concepts in mobile environment

COURSE OUTCOMES:

At the end of the course, students would:

- Obtain a through understanding of Basic architecture and concepts of till Third Generation Communication systems.
- Explain the latest 4G Telecommunication System Principles.
- Incorporate the pervasive concepts.
- Implement the HCI in Pervasive environment.
- Work on the pervasive concepts in mobile environment.

UNIT I INTRODUCTION **9**

History – Wireless communications: GSM – DECT – TETRA – UMTS – IMT – 2000 – Blue tooth, WiFi, WiMAX, 3G ,WATM.- Mobile IP protocols -WAP push architecture-Wml scripts and applications. Data networks – SMS – GPRS – EDGE – Hybrid Wireless100 Networks – ATM – Wireless ATM.

UNIT II OVERVIEW OF A MODERN 4G TELECOMMUNICATIONS SYSTEM **9**

Introduction. LTE-A System Architecture. LTE RAN. OFDM Air Interface. Evolved Packet Core. LTE Requirements. LTE-Advanced. LTE-A in Release. OFDMA – Introduction. OFDM Principles. LTE Uplink—SC-FDMA. Summary of OFDMA.

UNIT III PERVASIVE CONCEPTS AND ELEMENTS **9**

Technology Trend Overview - Pervasive Computing: Concepts - Challenges - Middleware - Context Awareness - Resource Management - Human–Computer Interaction - Pervasive Transaction Processing - Infrastructure and Devices - Wireless Networks - Middleware for Pervasive Computing Systems - Resource Management - User Tracking- Context Management -Service Management - Data Management - Security Management – Pervasive Computing Environments - Smart Car Space - Intelligent Campus

UNIT IV HCI IN PERVASIVE COMPUTING **9**

Prototype for Application Migration - Prototype for Multimodalities - Human–Computer Interface in Pervasive Environments - HCI Service and Interaction Migration - Context- Driven HCI Service Selection - Interaction Service Selection Overview - User Devices - Service-Oriented Middleware Support - User History and Preference - Context Manager - Local Service Matching - Global Combination - Effective Region - User Active Scope - Service Combination Selection Algorithm

UNIT V PERVASIVE MOBILE TRANSACTIONS 9

Pervasive Mobile Transactions - Introduction to Pervasive Transactions - Mobile Transaction Framework - Unavailable Transaction Service - Pervasive Transaction Processing Framework - Context-Aware Pervasive Transaction Model - Context Model for Pervasive Transaction Processing - Context-Aware Pervasive Transaction Model - A Case of Pervasive Transactions - Dynamic Transaction Management - Context-Aware Transaction Coordination Mechanism - Coordination Algorithm for Pervasive Transactions - Participant Discovery - Formal Transaction Verification - Petri Net with Selective Transition.

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
AVERAGE	**3.00**	**1.00**	**2.00**	**1.67**	**2.67**	**1.00**	**1.33**	**2.33**	**1.50**	**2.00**	**2.67**	**2.00**	**1**	**2**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

REFERENCES:

1.Alan Colman, Jun Han, and Muhammad Ashad Kabir, Pervasive Social Computing Socially-Aware Pervasive Systems and Mobile Applications, Springer, 2016.

2. J.Schiller, ―Mobile Communication‖, Addison Wesley, 2000.

3.Juha Korhonen, ―Introduction to 4G Mobile Communications‖ , Artech HousePublishers, 2014

4.Kolomvatsos, Kostas, Intelligent Technologies and Techniques for Pervasive

5.Computing, IGI Global, 2013.

6.M. Bala Krishna, Jaime Lloret Mauri, ―Advances in Mobile Computing andCommunications: Perspectives and Emerging Trends in 5G Networks‖, CRC 2016.

7.Minyi Guo, Jingyu Zhou, Feilong Tang, Yao Shen, ― Pervasive Computing: Concepts,Technologies and Applications CRC Press, 2016.

CS1809A **GREEN CLOUD COMPUTING** **L T P C**
3 0 0 3

COURSE OBJECTIVES:

- 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.

COURSE OUTCOMES:

At the end of the course, students would:

- Acquire knowledge to adopt green computing practices to minimize negativeimpacts on the environment.
- Enhance the skill in energy saving practices in their use of hardware.
- Evaluate technology tools that can reduce paper waste and carbon footprint by thestakeholders.
- Understand the ways to minimize equipment disposal requirements

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 – EnvironmentalIntelligence – Green Supply Chains – Green Information Systems: Design and Development Models

UNIT III GRID FRAMEWORK **9**

Virtualization of IT systems – Role of electric utilities, Telecommuting, teleconferencing and teleporting – Materials recycling – Best ways for Green PC – Green Data center – Green Grid framework.

UNIT IV GREEN COMPLIANCE **9**

Socio-cultural aspects of Green IT – Green Enterprise Transformation Roadmap – Green Compliance: Protocols, Standards, and Audits – Emergent Carbon Issues: Technologies and Future.

UNIT V CASE STUDIES **9**

The Environmentally Responsible Business Strategies (ERBS) – Case Study Scenarios for Trial Runs – Case Studies – Applying Green IT Strategies and Applications to a Home, Hospital, Packaging Industry and Telecom Sector

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
AVERAGE	**3.00**	**1.00**	**2.00**	**1.67**	**2.67**	**1.00**	**1.33**	**2.33**	**1.50**	**2.00**	**2.67**	**2.00**	**1**	**2**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXTBOOKS:

1. Bhuvan Unhelkar, ―Green IT Strategies and Applications-Using EnvironmentalIntelligence, CRC Press, June 2014.
2. Woody Leonhard, Katherine Murray, ―Green Home computing for dummies, August 2012.

REFERENCES:

1. Alin Gales, Michael Schaefer, Mike Ebbers, ―Green Data Center: steps for the Journey,Shroff/IBM rebook, 2011.
2. John Lamb, ―The Greening of IT, Pearson Education, 2009.
3. Jason Harris, ―Green Computing and Green IT- Best Practices on regulations &
4. industry, Lulu.com, 2008
5. Carl speshocky, ―Empowering Green Initiatives with IT, John Wiley & Sons, 2010
6. Wu Chun Feng (editor), ―Green computing: Large Scale energy efficiency, CRC Press.

IT1802A **ELECTRONIC COMMERCE** **L T P C**
3 0 0 3

COURSE OBJECTIVES:

- 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

COURSE OUTCOMES:

On Successful completion of the course ,Students will be

- Develop Website using HTML CSS and JS
- Derive Responsive Sites Management, Maintain and Support Web Apps
- Classify security environment and Support management policies
- Acquire the knowledge of infrastructure and Business in E-Commerce
- Correlate Business Models in E-Commerce with real time applications

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 **9**

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 **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:45PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
AVERAGE	**3.00**	**1.00**	**2.00**	**1.67**	**2.67**	**1.00**	**1.33**	**2.33**	**1.50**	**2.00**	**2.67**	**2.00**	**1**	**2**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOK:

1. Kenneth C.Laudon, Carol Guercio Traver ―E-Commerce‖, Pearson, 10th Edition, 2016

REFERENCES:

1. http://devdocs.magento.com/
2. http://doc.prestashop.com/display/PS15/Developer+tutorials
3. Robbert Ravensbergen, ―Building E-Commerce Solutions with WooCommerce‖, PACKT, 2nd Edition.

CS1802A	NEURAL NETWORKS AND DEEP LEARNING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To understand the basics in deep neural networks
- To understand the basics of associative memory and unsupervised learning networks
- To apply CNN architectures of deep neural networks
- To analyze the key computations underlying deep learning, then use them to buildand train deep neural networks for various tasks.
- To apply autoencoders and generative models for suitable applications

COURSE OUTCOMES:

At the end of the course, students would:

- Apply Convolution Neural Network forimage processing.
- Understand the basics of associative memory and unsupervised learning networks.
- Apply CNN and its variants for suitable applications.
- Analyze the key computations underlying deep learning and use them to build and traindeep neural networks for various tasks.
- Apply autoencoders and generative models for suitable applications

UNIT I INTRODUCTION **9**

Neural Networks-Application Scope of Neural Networks-Artificial Neural Network: An Introduction-Evolution of Neural Networks-Basic Models of Artificial Neural Network- Important Terminologies of ANNs-Supervised Learning Network

UNIT II ASSOCIATIVE MEMORY AND UNSUPERVISED LEARNING NETWORKS **9**

Training Algorithms for Pattern Association-Autoassociative Memory Network-Heteroassociative Memory Network-Bidirectional Associative Memory (BAM)-Hopfield Networks-Iterative Autoassociative Memory Networks-Temporal Associative Memory Network-Fixed Weight CompetitiveNets-Kohonen Self-Organizing Feature Maps-Learning Vector Quantization-Counter propagation Networks-Adaptive Resonance Theory Network

UNIT III THIRD-GENERATION NEURAL NETWORKS **9**

Spiking Neural Networks-Convolutional Neural Networks-Deep Learning Neural Networks-Extreme Learning Machine Model-Convolutional Neural Networks: The Convolution Operation – Motivation – Pooling – Variants of the basic Convolution Function – Structured Outputs – Data Types – Efficient Convolution Algorithms – Neuroscientific Basis – Applications: Computer Vision, Image Generation, Image Compression

UNIT IV DEEP FEEDFORWARD NETWORKS **9**

History of Deep Learning- A Probabilistic Theory of Deep Learning- Gradient Learning – Chain Rule and Backpropagation - Regularization: Dataset Augmentation – Noise Robustness -Early Stopping, Bagging and Dropout - batch normalization- VC Dimension and Neural Nets

UNIT V RECURRENT NEURAL NETWORKS **9**

Recurrent Neural Networks: Introduction – Recursive Neural Networks – Bidirectional RNNs – Deep Recurrent Networks – Applications: Image Generation, Image Compression, Natural Language Processing. Complete Auto encoder, Regularized Autoencoder, Stochastic Encodersand Decoders, Contractive Encoders. **TOTAL:45 PERIODS**

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
AVERAGE	**3.00**	**1.00**	**2.00**	**1.67**	**2.67**	**1.00**	**1.33**	**2.33**	**1.50**	**2.00**	**2.67**	**2.00**	**1**	**2**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOKS:

1. Ian Goodfellow, Yoshua Bengio, Aaron Courville, "Deep Learning", MIT Press, 2016.
2. Francois Chollet, "Deep Learning with Python", Second Edition, ManningPublications, 2021.

REFERENCES:

1. Aurélien Géron, "Hands-On Machine Learning with Scikit-Learn and TensorFlow",Oreilly, 2018.
2. Josh Patterson, Adam Gibson, "Deep Learning: A Practitioner's Approach", O'ReillyMedia, 2017.
3. Charu C. Aggarwal, "Neural Networks and Deep Learning: A Textbook", Springer International Publishing, 1st Edition, 2018.
4. Learn Keras for Deep Neural Networks, JojoMoolayil, Apress,2018
5. Deep Learning Projects Using TensorFlow 2, Vinita Silaparasetty, Apress, 2020
6. Deep Learning with Python, FRANÇOIS CHOLLET, MANNING SHELTER ISLAND,2017.
7. S Rajasekaran, G A Vijayalakshmi Pai, "Neural Networks, FuzzyLogic and GeneticAlgorithm, Synthesis and Applications", PHI Learning, 2017.
8. Pro Deep Learning with TensorFlow, Santanu Pattanayak, Apress,2017
9. James A Freeman, David M S Kapura, "Neural Networks Algorithms, Applications,and Programming Techniques", Addison Wesley, 2003.

EC1811A DIGITAL IMAGE PROCESSING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To become familiar with digital image fundamentals
- To get exposed to simple image enhancement techniques in Spatial and Frequency domain.
- To learn concepts of degradation function and restoration techniques.
- To study the image segmentation and representation techniques.
- To become familiar with image compression and recognition methods

COURSE OUTCOMES:

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

- Know and understand the basics and fundamentals of digital image processing, such as digitization, sampling, quantization, and 2D-transforms.
- Operate on images using the techniques of smoothing, sharpening and enhancement.
- Understand the restoration concepts and filtering techniques.
- Learn the basics of segmentation, features extraction, compression and recognition methods for color models.

UNIT I DIGITAL IMAGE FUNDAMENTALS **9**

steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels - Color image fundamentals - RGB, HSI models, Two-dimensional mathematical preliminaries, 2D transforms - DFT, DCT

UNIT IIIMAGE 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, Homomorphic filtering, Color image enhancement.

UNIT III IMAGE RESTORATION **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

UNIT IV IMAGE SEGMENTATION **9**

Edge detection, Edge linking via Hough transform – 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 VIMAGE 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, Regional Descriptors — Topological feature, Texture - Patterns and Pattern classes - Recognition based on matching.

TOTAL 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO2
AVERAGE	**3.00**	**1.00**	**2.00**	**1.67**	**2.67**	**1.00**	**1.33**	**2.33**	**1.50**	**2.00**	**2.67**	**2.00**	**1**	**2**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOKS:

1. Rafael C. Gonzalez, Richard E. Woods, _Digital Image Processing‘, Pearson, Third Edition, 2010.
   Anil K. Jain, _Fundamentals of Digital Image Processing‘, Pearson, 2002.

REFERENCES:

1. Kenneth R. Castleman, _Digital Image Processing‘, Pearson, 2006.
2. Rafael C. Gonzalez, Richard E. Woods, Steven Eddins, _Digital Image Processing using MAT
   AB‘, Pearson Education, Inc., 2011.
3. D,E. Dudgeon and RM. Mersereau, _Multidimensional Digital Signal Processing‘, Prentice Hall Professional Technical Reference, 1990.
4. William K. Pratt, _Digital Image Processing‘, John Wiley, New York, 2002
5. Milan Sonka et al _Image processing, analysis and machine vision‘, Brookes/Cole, Vikas Publishing House, 2nd edition, 1999

IT1805A INFORMATION RETRIEVAL TECHNIQUES

L	T	P	C
3	0	0	3

OBJECTIVES:

- 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 OUTCOMES:

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

- Use an open source search engine framework and explore its capabilities
- Apply appropriate method of classification or clustering.
- Design and implement innovative features in a search engine.
- Design and implement a recommender system.

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 TEXT 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 – Learning to Rank – Evaluations -- Search Engine Ranking – Search Engine User Interaction – Browsing – Applications ofa 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 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO2
AVERAGE	**3.00**	**1.00**	**2.00**	**1.67**	**2.67**	**1.00**	**1.33**	**2.33**	**1.50**	**2.00**	**2.67**	**2.00**	**1**	**2**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOKS:

1. Ricardo Baeza-Yates and Berthier Ribeiro-Neto, ―Modern Information Retrieval: The Concepts and Technology behind Search, Second Edition, ACM Press Books, 2011.
2. Ricci, F, Rokach, L. Shapira, B.Kantor, "Recommender Systems Handbook", First Edition, 2011.

REFERENCES:

1. C. Manning, P. Raghavan, and H. Schütze, ―Introduction to Information Retrieval, Cambridge University Press, 2008.
2. Stefan Buettcher, Charles L. A. Clarke and Gordon V. Cormack, ―Information Retrieval:
3. Implementing and Evaluating Search Engines, The MIT Press, 2010.

IT1803A **SOCIAL NETWORK ANALYSIS** **L T P C**
3 0 0 3

COURSE OBJECTIVES:

- To gain knowledge about the empirical and theoretical study of social networks, itsstructure and social network data sources.
- To study about the semantic technologies for social network analysis.
- To gain knowledge on visualization of social networks and its applications.
- To gain knowledge about social network analysis software for characterizing thenetwork structure.
- To engage in critical thinking regarding the applicability of social network theory tovarious sociological phenomena.

COURSE OUTCOMES:

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

- Understand basic principles behind network analysis algorithms and developpractical skills of network analysis.
- Model and represent knowledge for social semantic Web.
- Apply data mining techniques on social networks.
- Use extraction and mining tools for analyzing Social networks.
- Develop secure social network applications.

UNIT I INTRODUCTION **9**

Social Network Analysis: Definition and Features – The Development of Social Network Analysis – Basic Graph Theoretical Concepts of Social Network Analysis – Ties, Density, Path, Length, Distance, Betweenness, Centrality, Clique – Electronic Sources for Network Analysis – Electronic Discussion Networks, Blogs and Online Communities, Web-based Networks – Applications of Social Network Analysis.

UNIT II SOCIAL NETWORK ANALYSIS **9**

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

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

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

UNIT IV SOCIAL NETWORK MINING **9**

Detecting and Discovering Communities in Social Network: Evaluating Communities – Methods for Community Detection – Applications of Community Mining Algorithms –Ethical Practices in Social Network Mining – Understanding and Predicting Human Behavior for Social Communities — Decentralized Online Social Networks — Multi-Relational Characterization of Dynamic Social Network Communities – Inferential Methods in SocialNetwork Analysis.

UNIT V VISUALIZATION AND APPLICATIONS OF SOCIAL NETWORKS **9**

Visualization of Social Networks Node-Edge Diagrams – Random Layout – Force-DirectedLayout – Tree Layout – Matrix Representations –Matrix and Node-Link Diagrams – Hybrid Representations – Visualizing Online Social Networks – Applications – Covert Networks – Community Welfare – Collaboration Networks – Co-Citation Networks – Data Privacy in Social Networks

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO2
AVERAGE	**3.00**	**1.00**	**2.00**	**1.67**	**2.67**	**1.00**	**1.33**	**2.33**	**1.50**	**2.00**	**2.67**	**2.00**	**1**	**2**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOKS:

1. Peter Mika, "Social Networks and the Semantic Web", Springer, 2007.
2. Borko Furht, "Handbook of Social Network Technologies and Applications", Springer,2010.
3. Song Yang, Franziska B. Keller, Lu Zheng, "Social Network Analysis: Methods andExamples", Sage Publication, 2016.

REFERENCES:

1. GuandongXu, Yanchun Zhang, Lin Li, "Web Mining and Social NetworkingTechniques and Applications", Springer, 2011.
2. Max Chevalier, Christine Julien, Chantal Soulé-Dupuy, "Collaborative and SocialInformation Retrieval and Access: Techniques for Improved User Modelling", IGIGlobal, 2009.
3. John G. Breslin, Alexandre Passant, Stefan Decker, "The Social Semantic Web", Springer, 2009.
4. John Scott, Peter J. Carrington, "The SAGE Handbook of Social Network Analysis", Sage Publication, 2011.

CS1809A	UI and UX Design	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To provide a sound knowledge in UI & UX
- To understand the need for UI and UX
- To understand the various Research Methods used in Design
- To explore the various Tools used in UI & UX
- Creating a wireframe and prototype

COURSE OUTCOMES:

At the end of the course, students would:

- Build UI for user Applications
- Evaluate UX design of any product or application
- Demonstrate UX Skills in productdevelopment Implement Sketching principles
- Create Wireframe and Prototype

UNIT I FOUNDATIONS OF DESIGN 9

UI vs. UX Design - Core Stages of Design Thinking - Divergent and Convergent Thinking - Brainstorming and Game storming - Observational Empathy.

UNIT II FOUNDATIONS OF UI DESIGN 9

Visual and UI Principles - UI Elements and Patterns - Interaction Behaviors and Principles – Branding - Style Guides.

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 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO2
AVERAGE	**3.00**	**1.00**	**2.00**	**1.67**	**2.67**	**1.00**	**1.33**	**2.33**	**1.50**	**2.00**	**2.67**	**2.00**	**1**	**2**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXTBOOKS:

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

REFERENCES:

1. Jenifer Tidwell, Charles Brewer, Aynne Valencia, “Designing Interface” 3 rdEdition ,O’Reilly 2020
2. Steve Schoger, Adam Wathan “Refactoring UI”, 2018
3. Steve Krug, “Don't Make Me Think, Revisited: A Commonsense Approach toWeb & Mobile”, Third Edition, 2015
4. https://www.nngroup.com/articles/
5. https://www.interaction-design.org/literature.

IT1804A **CYBER FORENSICS** **L T P C**
3 0 0 3

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

- Understand the basics of computer forensics
- Apply a number of different computer forensic tools to a given scenario
- Analyze and validate forensics data
- Identify the vulnerabilities in a given network infrastructure
  Implement real-world hacking techniques to test system security

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 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO2
AVERAGE	**3.00**	**1.00**	**2.00**	**1.67**	**2.67**	**1.00**	**1.33**	**2.33**	**1.50**	**2.00**	**2.67**	**2.00**	**1**	**2**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOKS:

1. Bill Nelson, Amelia Phillips, Frank Enfinger, Christopher Steuart, ―Computer Forensics and Investigations‖, Cengage Learning, India Edition, 2016.
2. CEH official Certfied Ethical Hacking Review Guide, Wiley India Edition, 2015.

REFERENCES:

1. John R.Vacca, ―Computer Forensics‖, Cengage Learning, 2005
2. MarjieT.Britz, ―Computer Forensics and Cyber Crime‖: An Introduction‖, 3rd Edition, Prentice Hall, 2013.
3. AnkitFadia ― Ethical Hacking‖ Second Edition, Macmillan India Ltd, 2006
4. Kenneth C.Brancik ―Insider Computer Fraud‖ Auerbach Publications Taylor & Francis Group–2008.

IT1806A GPU ARCHITECTURE AND PROGRAMMING L T P C
3 0 0 3

COURSE OBJECTIVES:

- To understand the basics of GPU architectures
- To write programs for massively parallel processors
- To understand the issues in mapping algorithms for GPUs
- To introduce different GPU programming models

COURSE OUTCOMES:

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

- Describe GPU Architecture
- Write programs using CUDA, identify issues and debug them
- Implement efficient algorithms in GPUs for common application kernels, such as matrix multiplication
- Write simple programs using OpenCL
- Identify efficient parallel programming patterns to solve problems

UNIT I GPU ARCHITECTURE 12

Evolution of GPU architectures - Understanding Parallelism with GPU –Typical GPU Architecture - CUDA Hardware Overview - Threads, Blocks, Grids, Warps, Scheduling - Memory Handling with CUDA: Shared Memory, Global Memory, Constant Memory and Texture Memory.

UNIT II CUDA PROGRAMMING 8

Using CUDA - Multi GPU - Multi GPU Solutions - Optimizing CUDA Applications: Problem Decomposition, Memory Considerations, Transfers, Thread Usage, Resource Contentions.

UNIT III PROGRAMMING ISSUES 8

Common Problems: CUDA Error Handling, Parallel Programming Issues, Synchronization, Algorithmic Issues, Finding and Avoiding Errors.

UNIT IV OPENCL BASICS 8

OpenCL Standard — Kernels — Host Device Interaction — Execution Environment — Memory Model – Basic OpenCL Examples.

UNIT V ALGORITHMS ON GPU 9

Parallel Patterns: Convolution, Prefix Sum, Sparse Matrix - Matrix Multiplication - Programming Heterogeneous Cluster.

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
AVERAGE	3.00	1.00	2.00	1.67	2.67	1.00	1.33	2.33	1.50	2.00	2.67	2.00	1	2

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOKS:

1. Shane Cook, CUDA Programming: ―A Developer's Guide to Parallel Computing with GPUs (Applications of GPU Computing), First Edition, Morgan Kaufmann, 2012.
2. David R. Kaeli, Perhaad Mistry, Dana Schaa, Dong Ping Zhang, ―Heterogeneous computing with OpenCL‖, 3rd Edition, Morgan Kauffman, 2015.

REFERENCES:

1. Nicholas Wilt, ―CUDA Handbook: A Comprehensive Guide to GPU Programming, Addison - Wesley, 2013.
2. Jason Sanders, Edward Kandrot, ―CUDA by Example: An Introduction to General Purpose GPU Programming‖, Addison - Wesley, 2010.
3. David B. Kirk, Wen-mei W. Hwu, Programming Massively Parallel Processors - A Hands-on Approach, Third Edition, Morgan Kaufmann, 2016.
4. http://www.nvidia.com/object/cuda_home_new.html
5. http://www.openCL.org

IT1807A NATURAL LANGUAGE PROCESSING

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- 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

COURSE OUTCOMES:

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

- To tag a given text with basic Language features
- To design an innovative application using NLP components
- To implement a rule based system to tackle morphology/syntax of a language
- To design a tag set to be used for statistical processing for real-time applications
- To compare and contrast the use of different statistical approaches for differenttypes of NLP applications.

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.

UNIT IV SEMANTICS AND PRAGMATICS **10**

Requirements for representation, First-Order Logic, Description Logics – Syntax-Driven Semantic analysis, Semantic attachments – Word Senses, Relations between Senses, Thematic Roles, selectional restrictions – Word Sense Disambiguation, WSD using Supervised, Dictionary & Thesaurus, Bootstrapping methods – Word Similarity using Thesaurus and Distributional methods.

UNIT V DISCOURSE ANALYSIS AND LEXICAL RESOURCES **8**

Discourse segmentation, Coherence – Reference Phenomena, Anaphora Resolution using Hobbs and Centering Algorithm – Coreference Resolution – Resources: Porter Stemmer, Lemmatizer, Penn Treebank, Brill's Tagger, WordNet, PropBank, FrameNet, Brown Corpus, British National Corpus (BNC).

TOTAL :45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO2
AVERAGE	**3.00**	**1.00**	**2.00**	**1.67**	**2.67**	**1.00**	**1.33**	**2.33**	**1.50**	**2.00**	**2.67**	**2.00**	**1**	**2**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOKS:

1. Daniel Jurafsky, James H. Martin—Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics andSpeech, Pearson Publication, 2014.
2. Steven Bird, Ewan Klein and Edward Loper, —Natural Language Processing with
3. Python, First Edition, O'Reilly Media, 2009.

REFERENCES:

1. Breck Baldwin, —Language Processing with Java and LingPipe Cookbook,
2. Atlantic Publisher, 2015.
3. Richard M Reese, —Natural Language Processing with Java, O'Reilly Media,
4. 2015.
5. Nitin Indurkhya and Fred J. Damerau, —Handbook of Natural Language
6. Processing, Second Edition, Chapman and Hall/CRC Press, 2010.
7. Tanveer Siddiqui, U.S. Tiwary, "Natural Language Processing and InformationRetrieval", Oxford University Press, 2008.

IT1808A **PARALLEL ALGORITHMS** **L T P C**
3 0 0 3

COURSE OBJECTIVES:

- To understand different parallel architectures and models of computation. To introduce the various classes of parallel algorithms.
- To study parallel algorithms for basic problems.

COURSE OUTCOMES:

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

- Develop parallel algorithms for standard problems and applications.

Analyse efficiency of different parallel algorithms.

UNIT I INTRODUCTION **9**

Need for Parallel Processing - Data and Temporal Parallelism - Models of Computation - RAM and PRAM Model — Shared Memory and Message Passing Models- Processor Organisations - PRAM Algorithm — Analysis of PRAM Algorithms- Parallel Programming Languages.

UNIT II PRAM ALGORITHMS **9**

Parallel Algorithms for Reduction – Prefix Sum – List Ranking –Preorder Tree Traversal – Searching -Sorting - Merging Two Sorted Lists – Matrix Multiplication - Graph Coloring - Graph Searching.

UNIT III SIMD ALGORITHMS -I **9**

2D Mesh SIMD Model - Parallel Algorithms for Reduction - Prefix Computation - Selection - Odd-Even Merge Sorting - Matrix Multiplication

UNIT IV SIMD ALGORITHMS -II 9

Hypercube SIMD Model - Parallel Algorithms for Selection- Odd-Even Merge Sort- Bitonic Sort- Matrix Multiplication Shuffle Exchange SIMD Model - Parallel Algorithms for Reduction -Bitonic Merge Sort - Matrix Multiplication - Minimum Cost Spanning Tree

UNIT V MIMD ALGORITHMS 9

UMA Multiprocessor Model -Parallel Summing on Multiprocessor- Matrix Multiplication on Multiprocessors and Multicomputer - Parallel Quick Sort - Mapping Data to Processors.

TOTAL : 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO2

AVERAGE	**3.00**	**1.00**	**2.00**	**1.67**	**2.67**	**1.00**	**1.33**	**2.33**	**1.50**	**2.00**	**2.67**	**2.00**	**1**	**2**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOKS:

1. Michael J. Quinn, "Parallel Computing : Theory & Practice", Tata McGraw Hill Edition, Second edition, 2017.
2. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, "Fundamentals of Computer Algorithms", University press, Second edition , 2011.
3. V Rajaraman, C Siva Ram Murthy, " Parallel computers- Architecture and Programming ", PHI learning, 2016.

REFERENCES:

1. Ananth Grame, George Karpis, Vipin Kumar and Anshul Gupta, "Introduction to Parallel Computing", 2nd Edition, Addison Wesley, 2003.
2. M Sasikumar, Dinesh Shikhare and P Ravi Prakash , " Introduction to Parallel Processing", PHI learning , 2013.
3. S.G.Akl, "The Design and Analysis of Parallel Algorithms", PHI, 1989.

IT1809A FUNDAMENTALS OF NANOSCIENCE

L	**T**	**P**	**C**
3	**0**	**0**	**3**

COURSE OBJECTIVES:

- To learn about basis of nanomaterial science, preparation method, types and application

COURSE OUTCOMES:

- Will familiarize about the science of nanomaterials
- Will demonstrate the preparation of nanomaterials
- Will develop knowledge in characteristic nanomaterial

UNIT I INTRODUCTION 8

Nanoscale Science and Technology- Implications for Physics, Chemistry, Biology and Engineering- Classifications of nanostructured materials- nano particles- quantum dots, nanowires- ultra-thinfilms- multilayered materials. Length Scales involved and effect on properties: Mechanical, Electronic, Optical, Magnetic and Thermal properties. Introduction to properties and motivation for study (qualitative only).

UNIT II GENERAL METHODS OF PREPARATION 9

Bottom-up Synthesis-Top-down Approach: Co-Precipitation, Ultrasonication, Mechanical Milling, Colloidal routes, Self-assembly, Vapour phase deposition, MOCVD, Sputtering, Evaporation, Molecular Beam Epitaxy, Atomic Layer Epitaxy, MOMBE.

UNIT III NANOMATERIALS 12

Nanoforms of Carbon - Buckminster fullerene- graphene and carbon nanotube, Single wall carbon Nanotubes (SWCNT) and Multi wall carbon nanotubes (MWCNT)- methods of synthesis(arc- growth, laser ablation, CVD routes, Plasma CVD), structure-property Relationships applications- Nanometal oxides-ZnO, TiO2,MgO, ZrO2, NiO, nanoalumina, CaO, AgTiO2, Ferrites, Nanoclays- functionalization and applications-Quantum wires, Quantum dots-preparation, properties and applications.

UNIT IV CHARACTERIZATION TECHNIQUES 9

ray diffraction technique, Scanning Electron Microscopy - environmental techniques, Transmission Electron Microscopy including high-resolution imaging, Surface Analysis techniques- AFM, SPM, STM, SNOM, ESCA, SIMS-Nanoindentation.

UNIT V APPLICATIONS 7

NanoInfoTech: Information storage- nanocomputer, molecular switch, super chip, nanocrystal, Nanobiotechlogy: nanoprobes in medical diagnostics and biotechnology, Nano medicines, Targetted drug delivery, Bioimaging - Micro Electro Mechanical Systems (MEMS), Nano Electro Mechanical Systems (NEMS)- Nanosensors, nano crystalline silver for bacterial inhibition, Nanoparticles for sunbarrier products - In Photostat, printing, solar cell, battery.

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO	PO	PO 9	PO	PO 11	PO	PSO1	PSO2

							7	8		10		12		
AVERAGE	**3.00**	**1.00**	**2.00**	**1.67**	**2.67**	**1.00**	**1.33**	**2.33**	**1.50**	**2.00**	**2.67**	**2.00**	**1**	**2**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOKS :

1. A.S. Edelstein and R.C. Cammearata, eds., ―Nanomaterials: Synthesis, Properties and Applications‖, Institute of Physics Publishing, Bristol and Philadelphia, 1996.
2. N John Dinardo, ―Nanoscale Charecterisation of surfaces & Interfaces‖, 2nd edition, Weinheim Cambridge, Wiley-VCH, 2000.

REFERENCES:

a. G Timp, ―Nanotechnology‖, AIP press/Springer, 1999.
b. Akhlesh Lakhtakia,―The Hand Book of Nano Technology, Nanometer Structure, Theory, Modeling and Simulations‖. Prentice-Hall of India (P) Ltd, New Delhi, 2007.

OPEN ELECTIVE - I

OIT501A	DATABASE MANAGEMENT SYSTEMS	L	T	P	C
		3	0	0	3

OBJECTIVES

- To learn the fundamentals of data models
- To learn conceptual modeling using ER diagrams.
- To study SQL queries and database programming
- To learn proper designing of relational database.
- To understand database security concepts
- To understand Information retrieval techniques

COURSE OUTCOMES:

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

- understand relational data model, evolve conceptual model of a given problem, its mapping to relational model and Normalization
- query the relational database and write programs with database connectivity
- understand the concepts of database security and information retrieval systems

UNIT I DBMS AND CONCEPTUAL DATA MODELIN 9

Purpose of Database System – Data independence - Data Models – Database System Architecture – Conceptual Data modeling: ER models - Enhanced-ER Model. Introduction to relational databases – Relational Model – Keys – ER-to-Relational Mapping. Modeling of a library management system.

UNIT II DATABASE QUERYING 11

Relational Algebra – SQL: fundamentals – DDL – Specifying integrity constraints - DML – Basic retrieval queries in SQL - Complex SQL retrieval queries – nested queries – correlated queries – joins - aggregate functions. Creating a table, populating data, adding integrity constraints, querying tables with simple and complex queries.

UNIT III DATABASE PROGRAMMING 7

Database programming with function calls, stored procedures - views — triggers. Embedded SQL. ODBC connectivity with front end tools. Implementation using ODBC/JDBC and SQL/PSM, implementing functions, views, and triggers in MySQL / Oracle.

UNIT IV DATABASE DESIGN 9

Functional Dependencies – Design guidelines – Normal Forms: first, second, third – Boyce/Codd Normal Form – Normalization algorithms. Design of a banking database system / university database system.

UNIT V ADVANCED TOPICS 9

Database security issues – Discretionary access control – role based access – Encryption and publickey infrastructures – challenges. Information Retrieval: IR Concepts, Retrieval Models, Queries in IR systems.

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
AVERAGE	**3.00**	**1.00**	**2.00**	**1.67**	**2.67**	**1.00**	**1.33**	**2.33**	**1.50**	**2.00**	**2.67**	**2.00**	**1**	**2**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOKS:

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

REFERENCES:

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

OIT502A **CLOUD COMPUTING** **L T P C**
3 0 0 3

COURSE OBJECTIVES:

- To learn about the concept of cloud and utility computing.
- To have knowledge on the various issues in cloud computing.
- To be familiar with the lead players in cloud.
- To appreciate the emergence of cloud as the next generation computing paradigm.

COURSE OUTCOMES:

On Completion of the course, the students should be able to:

- Articulate the main concepts, key technologies, strengths and limitations of cloud computing.
- Learn the key and enabling technologies that help in the development of cloud.
- Develop the ability to understand and use the architecture of compute and storage cloud, service and delivery models.
- Explain the core issues of cloud computing such as resource management and security.
- Learn to choose the appropriate technologies, and approaches for implementation and use of cloud.

UNIT I INTRODUCTION TO CLOUD COMPUTING 9

Introduction to Cloud Computing – Roots of Cloud Computing – Desired Features of Cloud Computing – Challenges and Risks – Benefits and Disadvantages of Cloud Computing.

UNIT II VIRTUALIZATION 9

Introduction to Virtualization Technology – Load Balancing and Virtualization – Understanding Hypervisor – Seven Layers of Virtualization – Types of Virtualization – Server, Desktop, ApplicationVirtualization.

UNIT III CLOUD ARCHITECTURE, SERVICES AND STORAGE 9

NIST Cloud Computing Reference Architecture – Public, Private and Hybrid Clouds - laaS – PaaS – SaaS – Architectural Design Challenges – Cloud Storage.

UNIT IV RESOURCE MANAGEMENT AND SECURITY IN CLOUD 9

Inter Cloud Resource Management – Resource Provisioning Methods – Security Overview – Cloud Security Challenges – Data Security –Application Security – Virtual Machine Security.

UNIT V CASE STUDIES 9

Google App Engine(GAE) – GAE Architecture – Functional Modules of GAE – Amazon Web Services(AWS) – GAE Applications – Cloud Software Environments – Eucalyptus – Open Nebula – Open Stack.

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2

AVERAGE	**3.00**	**1.00**	**2.00**	**1.67**	**2.67**	**1.00**	**1.33**	**2.33**	**1.50**	**2.00**	**2.67**	**2.00**	**1**	**2**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOKS:

1. Buyya R., Broberg J., Goscinski A., "Cloud Computing: Principles and Paradigm", FirstEdition, John Wiley & Sons, 2011.
2. Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, "Distributed and Cloud Computing, FromParallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
3. Rittinghouse, John W., and James F. Ransome, "Cloud Computing: Implementation,Management, And Security", CRC Press, 2017.

REFERENCES:

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

3 0 0 3

COURSE OBJECTIVES:

The objective of this course is to enable the students to

- Understand the basic concepts of intelligent agents
- Develop general-purpose problem solving agents, logical reasoning agents, and agents that reason underuncertainty
- Employ AI techniques to solve some of today's real world problems.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to

- Explain autonomous agents that make effective decisions in fully informed, partially observable, andadversarial settings
- Choose appropriate algorithms for solving given AI problems
- Design and implement logical reasoning agents
- Design and implement agents that can reason under uncertainty

UNIT I INTELLIGENT AGENTS 9

Introduction to AI – Agents and Environments – Concept of rationality – Nature of environments – Structure ofagents- Problem solving agents – search algorithms – uninformed search strategies

UNIT II PROBLEM SOLVING 9

Heuristic search strategies – heuristic functions Local search and optimization problems – local search in continuous space – search with non- deterministicactions – search in partially observable environments – online search agents and unknown environments

UNIT III GAME PLAYING AND CSP 9

Game theory – optimal decisions in games – alpha-beta search – monte-carlo tree search – stochastic games –partially observable game- Constraint satisfaction problems – constraint propagation – backtracking search for CSP – local search for CSP– structure of CSP

UNIT IV LOGICAL AGENTS 9

Knowledge-based agents – propositional logic – propositional theorem proving – propositional model checking –agents based on propositional logic- First-order logic – syntax and semantics – knowledge representation and engineering – inferences in first-orderlogic – forward chaining – backward chaining – resolution

UNIT V KNOWLEDGE REPRESENTATION AND PLANNING 9

Ontological engineering – categories and objects – events – mental objects and modal logic – reasoning systems for categories – reasoning with default information

Classical planning – algorithms for classical planning – heuristics for planning – hierarchical planning – non-deterministic domains – time, schedule, and resources – analysis

TOTAL : 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
AVERAGE	**3.00**	**1.00**	**2.00**	**1.67**	**2.67**	**1.00**	**1.33**	**2.33**	**1.50**	**2.00**	**2.67**	**2.00**	**1**	**2**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOK:

1. Stuart Russel and Peter Norvig, "Artificial Intelligence: A Modern Approach", Fourth Edition, Pearson Education, 2020.

REFERENCES:

1. Dan W. Patterson, "Introduction to AI and ES", Pearson Education, 2007
2. Kevin Night, Elaine Rich, and Nair B., "Artificial Intelligence", McGraw Hill, 2008
3. Patrick H. Winston, "Artificial Intelligence", Third edition, Pearson Edition, 2006
4. Deepak Khemani, "Artificial Intelligence", Tata McGraw Hill Education, 2013
5. Artificial Intelligence by Example: Develop machine intelligence from scratch using real artificial intelligenceuse cases - by Dennis Rothman, 2018

OIT701A **DIGITAL FORENSICS** **L T P C**

3 0 0 3

COURSE OBJECTIVES:

- Describe digital forensics and relate it to an investigative process.
- Explain the legal issues of preparing for and performing digital forensic analysis.
- Demonstrate the process of Electronic Discovery
- Explains the Intrusion Investigation Process
- Explain how to recover hidden data for forensic analysis from Windows file system

COURSE OUTCOMES:

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

- Gain in-depth knowledge in the field of Digital forensics
- Analysis of data to identify evidence
- Perform the Electronic Discovery of data
- Use mathematical techniques to detect fake data
- Perform forensic analysis on NTFS file system.

UNIT I INTRODUCTION TO DIGITAL FORENSICS 9

Forensics Soundness, Forensic Analysis Fundamentals, Crime Reconstruction, Networks and the Internet, Conclusion.

UNIT II FORENSIC ANALYSIS 9

Introduction, Applying the Scientific Method to Digital Forensics, Uses of Digital Forensic Analysis, Data Gathering and Observation, Hypothesis Formation, Evaluating Hypotheses, Conclusions and Reporting.

UNIT III ELECTRONIC DISCOVERY 9

Introduction to Electronic Discovery, Case Management, Identification of Electronic data, Forensic Preservation of Data, Data Processing, Production of Electronic Data

UNIT IV INTRUSION INVESTIGATION 9

Introduction and Methodologies, Preparation, Case Management and Reporting, Common Initial Observations, Scope Assessment, Collection, Analyzing Digital Evidence, Combination/ Correlation, Feeding Analysis Back into the Detection Phase.

UNIT V WINDOWS FORENSIC ANALYSIS 9

Introduction - NTFS Overview, Forensic Analysis of the NTFS Master File Table (MFT) , Metadata , Artifacts of User Activities , Deletion and Destruction of Data, Windows Internet and Communications Activities , Windows Process Memory, BitLocker and Encrypting File System (EFS)

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2

AVERAGE	**3.00**	**1.00**	**2.00**	**1.67**	**2.67**	**1.00**	**1.33**	**2.33**	**1.50**	**2.00**	**2.67**	**2.00**	**1**	**2**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOKS:

1. Handbook of Digital Forensics and Investigation, Eoghan Casey , Elsevier Academic Press, USA.

REFERENCES:

1. The Basics of Digital Forensics: The Primer for Getting Started in Digital Forensics Book by John Sammons
2. Computer Forensics For Dummies 1st Edition by Carol Pollard

OIT702A MULTIMEDIA AND ANIMATION TECHNIQUES L T P C

3 0 0 3

COURSE OBJECTIVES:

- To comprehend the building blocks of multimedia,
- To learn multimedia authoring tools,
- To understand data compression and applications of multimedia
- To know about the various multimedia tools
- To learn basic animations

COURSE OUTCOMES:

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

- A grasp on basic elements of multimedia
- Use and apply authoring tools
- Use multimedia tools
- Create animations

UNIT I MULTIMEDIA –AN OVERVIEW 9

Introduction- Components of Multimedia-Software Tools-Multimedia Presentation and Production-Characteristics of a Multimedia Presentation-Hardware and Software Requirements-Data Compression-Multimedia Sharing and Distribution-Uses of Multimedia-Analog and Digital Representations–Digitization-Nyquist's Sampling Theorem-Quantization Error-Visual Display Systems.

UNIT II MULTIMEDIA BASICS 9

Text, Image, Audio, Video –types, representations, standards, file formats.

UNIT III MULTIMEDIA AUTHORING AND TOOLS 9

Multimedia Authoring-Requirements - Intramedia Processing-Intermedia processing - Multimedia Authoring Paradigms and User Interfaces-Device-Independent Content Authoring-Distributed Authoring and Versioning-Multimedia Services and Content Management-Asset Management- Adobe DreamWeaver-Flash- Edge Animate CC, Camatasia Studio 8, Claro, E-Learning Authoring Tools –Articulate, Elucidate, Hot Lava.

UNIT IV MULTIMEDIA APPLICATIONS 9

Multimedia Databases – Content Based Information Retrieval, Multimedia Communications - Multimedia Information Sharing and Retrieval – Applications – Social Media Sharing, Online Social Networking - Virtual Reality - Multimedia for Portable Devices, Collaborative Multimedia Applications

UNIT V ANIMATION 9

Appeal - Solid Drawing-Squash and Stretch - Timing- Staging - Secondary Action-Follow Through and Overlapping Action - Exaggeration-Arcs - Straight Ahead and Pose to Pose-Anticipation - Slow In and Slow Out-Character Design- Methods of Creation-Wave Forms-Character Speech -Character Movement-The Walk Cycle.

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
AVERAGE	**3.00**	**1.00**	**2.00**	**1.67**	**2.67**	**1.00**	**1.33**	**2.33**	**1.50**	**2.00**	**2.67**	**2.00**	**1**	**2**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOK:

1. Ranjan Parekh, "Principles of Multimedia", 2nd Edition, Mcgraw Hill, 2012.
2. Parag Havaldar and Gerard Medioni, ―Multimedia Systems - Algorithms, Standards and Industry Practices‖, Course Technology, Cengage Learning, 2010.

REFERENCES:

1. Ralf Steinmetz and Klara Nahrstedt, ―Multimedia Computing, Communications and Applications‖, First Edition, Pearson, 2005.
2. Ze - Nian Li, Mark S Drew and Jiangchuan Liu ―Fundamentals of Multimedia‖, Second Edition, Springer, 2014.
3. Heather D.Freeman "The Moving Image Workshop: Introducing Animation, Motion Graphics and Visual Effects in 45 Practical Projects" Published by Fairchild Books,2015

OIT703A BASICS OF CYBER SECURITY AND ETHICAL HACKING L T P C
3 0 0 3

COURSE OBJECTIVES:

- Acquire fundamental knowledge on the concepts of cyber security and Ethical Hacking
- Understand cyber-attack, types of cybercrimes, cyber laws
- Demonstrate the techniques for system hacking
- Detect and prevent the security attacks in different environments

COURSE OUTCOMES:

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

- Able to understand cyber-attack, types of cybercrimes, cyber laws
- Understand how to protect them self and ultimately society from such attacks
- Describe and understand the basics of the ethical hacking
- Demonstrate the techniques for system hacking
- Detect and prevent the security attacks in different environments

UNIT I INTRODUCTION TO CYBER SECURITY 9

Network and Security concepts- Information Assurance Fundamentals, Basic Cryptography- Symmetric Encryption, Public Key Encryption, Firewalls, Microsoft Windows Security Principles.

UNIT II ATTACKERS TECHNIQUES AND MOTIVATION 9

Proxies- Types – Detecting the use of proxies , Tunneling Techniques- HTTP, DNS, ICMP, Steganography- Detection and prevention, Fraud Techniques- Phishing-Malicious code, Rogue Antivirus, Threat Infrastructure- Botnets, Fast-flux.

UNIT III MALICIOUS CODE 9

Self-Replicating Malicious Code- Virus, worms, Evading Detection and Elevating Privileges, Rootkits, Spyware, Token Kidnapping, Man in the middle attack, Form Grabbing, DLL injection- Windows Registry DLL Injection- Injecting Applications - Reflective DLL Injections, Browser Helper Objects.

UNIT IV INTRODUCTION TO ETHICAL HACKING 9

Foundation Topics, Security Fundamentals, Security Testing, Hacker and Cracker Description, Ethical Hackers, Test Plans, Ethics and Legality, Attacker's Process, The ethical hacker's process, Security and the Stack.

UNIT V TECHNICAL FOUNDATIONS OF HACKING 9

Footprinting & Scanning- Overview of the Seven-Step Information-Gathering Process, Information Gathering, Documentation, Google Hacking, Usenet, Identifying Active machines, Finding Open Ports and Access Points, OS Fingerprinting, System Hacking, Malware threats – Trojans, Keystroke Logging and Spyware, Covert Communication, Malware Countermeasures, Sniffers, Session Hijacking, and Denial of Service.

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2

AVERAGE	**3.00**	**1.00**	**2.00**	**1.67**	**2.67**	**1.00**	**1.33**	**2.33**	**1.50**	**2.00**	**2.67**	**2.00**	**1**	**2**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOKS:

1. Cyber Security Essentials by James Graham , Richard Howard, Ryan Olson, CRS Press, Taylor & Francis Group, New York.
2. Certified Ethical Hacker, Version 9, Second Edition, Michael Gregg, Pearson IT Certification.

REFERENCES:

1. Anti- Hacker Tool Kit (Indian edition) by Mike Sherma , Mc Graw Hill publication
2. Hacking the Hacker, Roger Grimes, Wiley
3. The Unofficial Guide to Ethical Hacking, Ankit Fadia, Premier Press New Delhi, 2003.
Govindarajan M, Natarajan S, Senthil Kumar V. S, ―Engineering Ethics‖, Prentice Hall ofIndia, New Delhi, 2004

REFERENCES:

1. Charles B. Fleddermann, ―Engineering Ethics‖, Pearson Prentice Hall, New Jersey, 2004.
2. Charles E.Harris, Michael S. Pritchard and Michael J. Rabins, ―EngineeringEthics – Concepts and Cases‖, Cengage Learning, 2009.
3. John R Boatright, ―Ethics and the Conduct of Business‖, Pearson Education, New Delhi,2003
4. Edmund GSeebauer and Robert L Barry, ―Fundamentals of Ethics forScientists and Engineers‖, Oxford University Press, Oxford, 2001.
5. Laura P.Hartman and Joe Desjardins, ―Business Ethics: Decision Making forPersonal Integrity and Social Responsibility‖ Mc Graw Hill education, India Pvt. Ltd.,New Delhi, 2013.
6. World Community Service Centre, _ Value Education‘, Vethathiri publications, Erode, 2011.

Web sources:

1. www.onlineethics.org
2. www.nspe.org
3. www.globalethics.org
4. www.ethics.org

CS1403A OBJECT ORIENTED ANALYSIS AND DESIGN L T P C
3 0 2 4

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

- Understand software design with UML diagrams
- Design software applications using OO concepts.
- Identify various scenarios based on software requirements
- Transform UML based software design into pattern based design using design patterns
- Understand the various testing methodologies for OO software

UNIT I UNIFIED PROCESS AND USECASEMODELING 9

Introduction to OOAD with OO Basics - Unified Process – UML diagrams – Use Case –Case study – the Next Gen POS system, Inception -Use case Modelling – Relating Use cases – include, extend and generalization – When to use Use-cases

UNIT II STATIC UML DIAGRAMS ANDTHEIRRELATIONSHIP 9

Class Diagram— Elaboration – Domain Model – Finding conceptual classes and description classes – Associations – Attributes – Domain model refinement – Finding conceptual class Hierarchies – Aggregation and Composition - Relationship between sequence diagrams and use cases – When to use Class Diagrams

UNIT III DYNAMIC AND IMPLEMENTATION UML DIAGRAMS 9

Dynamic Diagrams – UML interaction diagrams - System sequence diagram – Relationship between sequence diagrams and use cases ,Logical architecture and UML package diagram – Logical architecture refinement- Collaboration diagram – When to use Communication Diagrams - State machine diagram and Modelling –When to use State Diagrams - Activity diagram – When to use activity diagrams Implementation Diagrams - UML package diagram - When to use package diagrams - Component and Deployment Diagrams – When to use Component and Deployment diagrams.

UNIT IV DESIGN PATTERNS(GRASP,GOF) 9

GRASP: Designing objects with responsibilities – Creator – Information expert – Low Coupling – High Cohesion – Controller Design Patterns – creational – factory method – structural – Bridge – Adapter – behavioral – Strategy – observer –Applying GoF design patterns – Mapping design to code.

UNIT V TESTING 9

Object Oriented Methodologies – Testing: Issues in OO Testing – Class Testing – OO Integration Testing – GUI Testing – OO System Testing- Software Quality Assurance – Impact of object orientation on Testing – Develop Test Cases and Test Plans.

TOTAL :30 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
AVERAGE	**3.00**	**1.00**	**2.00**	**1.67**	**2.67**	**1.00**	**1.33**	**2.33**	**1.50**	**2.00**	**2.67**	**2.00**	**1**	**2**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOKS:

1. Craig Larman, ―Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development, Third Edition, Pearson Education,2005.
2. Ali Bahrami - Object Oriented Systems Development - McGraw Hill International Edition-1999

REFERENCES:

1. Erich Gamma, a n d Richard Helm, Ralph Johnson, John Vlissides, ―Design patterns: Elements of Reusable Object-Oriented Software, Addison-Wesley,1995.
2. Martin Fowler, ―UML Distilled: A Brief Guide to the Standard Object Modeling Language,Third edition, Addison Wesley,2003.

IT1701A DISTRIBUTED SYSTEMS AND CLOUD COMPUTING

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To understand the concepts that underlie distributed computing systems along with design and implementation issues.
- To study the key mechanisms and models for distributed systems.
- To understand the concept of cloud computing.
- To have knowledge on the various issues in cloud computing.
- To appreciate the emergence of cloud as the next generation computing paradigm.

COURSE OUTCOME:

The students, after the completion of the course, are expected to:

- Analyze and evaluate the diverse web services and emerging technologies employed in modern IT solutions.
- Outline dynamic web pages using DHTML and java script that is easy to navigate and use.
- Illustrate server-side web pages to process and respond to client-side requests.
- Infer the web data structures for XML representation and examine XML integration in JSP for dynamic web page development.
- Categorize the various web services and emerging technologies.

UNIT I INTRODUCTION TO DISTRIBUTED SYSTEM CONCEPTS 9

Introduction to Distributed Systems – Characteristics – Issues in Distributed Systems -Distributed System Model – Request/Reply Protocols – RPC – RMI – Logical Clocks and Casual Ordering of Events – Election Algorithm – Distributed Mutual Exclusion -Distributed Deadlock Detection Algorithms.

UNIT II PROCESSES AND PROCESSORS IN DISTRIBUTED SYSTEMS 9

Threads, system model, processor allocation, scheduling in distributed systems: Load balancing and sharing approach, fault tolerance, Real time distributed systems, Process migration and related issues

UNIT III INTRODUCTION TO CLOUD COMPUTING 9

Introduction to Cloud Computing – Evolution of Cloud Computing – Cloud Characteristics – Elasticity in Cloud – On-demand Provisioning – NIST Cloud Computing Reference Architecture– Architectural Design Challenges – Deployment Models: Public, Private and Hybrid Clouds – Service Models: IaaS – PaaS – SaaS – Benefits of Cloud Computing.

UNIT IV CLOUD ENABLING TECHNOLOGIES 9

Introduction to Web Service and Service Oriented Architecture – SOAP – REST – Basics of Virtualization – Full and Para Virtualization– Implementation Levels of Virtualization – Tools and Mechanisms – Virtualization of CPU – Memory – I/O Devices – Desktop Virtualization – Server Virtualization.

UNIT V CLOUD MANAGEMENT, STORAGE AND SECURITY 9

Resource Provisioning and Methods – Cloud Management Products – Cloud Storage – Provisioning Cloud Storage – Managed and Unmanaged Cloud Storage – Cloud Security Overview – Cloud Security Challenges –Security Architecture. Case Studies: Openstack, Amazon EC2, AWS, Microsoft Azure, Google Compute Engine.

TOTAL: 45 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
AVERAGE	**3.00**	**1.00**	**2.00**	**1.67**	**2.67**	**1.00**	**1.33**	**2.33**	**1.50**	**2.00**	**2.67**	**2.00**	**1**	**2**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT BOOKS:

1. George Coulouris, Jean Dollimore, T. Kindberg, and Gordon Blair, “Distributed Systems: Concepts and Design”, 5th Edition, Addison Wesley, 2012.
2. Thomas Erl, Ricardo Puttini, and Zaigham Mahmood, “Cloud Computing: Concepts, Technology & Architecture”, Prentice Hall, 2013.
3. John W. Rittinghouse, James F. Ransome, “Cloud Computing: Implementation “Management and Security”, CRC Press, 2016.
4. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, “Distributed and Cloud Computing, From Parallel Processing to the Internet of Things”, Morgan Kaufmann Publishers, 2012.

REFERENCE BOOKS:

1. Andrew S. Tanenbaum, Maarten Van Steen, “Distributed Systems - Principles and Paradigms”, Second Edition, Pearson, 2016.
2. Mukesh Singhal, “Advanced Concepts In Operating Systems”, McGraw Hill Series in Computer Science, 2017.

IT1811A	FOUNDATION OF DESIGN AND CREATIVITY	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To provide a sound knowledge in UI & UX
- To understand the need for UI and UX
- To understand the Ethical considerations in UX Research and Design
- To explore the various Tools used in UI & UX
- Creating a wireframe and prototype

COURSE OUTCOMES:

At the end of the course, students would:

- Build UI for user Applications
- Evaluate UX design of any product or application
- Demonstrate UX Skills in productdevelopment
- Implement Sketching principles
- Create Wireframe and Prototype

UNIT I FOUNDATIONS OF DESIGN **9**

UI vs. UX Design - Core Stages of Design Thinking - Divergent and Convergent Thinking - Brainstorming and Game storming - Observational Empathy.

UNIT II FOUNDATIONS OF UI DESIGN **9**

Visual and UI Principles - UI Elements and Patterns - Interaction Behaviors and Principles – Branding - Style Guides.

UNIT III FOUNDATIONS OF UX DESIGN **9**

Introduction to User Experience Design - The Importance and impact of User Experience - User-Centered Design Approach - Key Principles of User Experience -The UX Design Process: An Overview - UX Methodologies: Agile vs. Waterfall - UX Research Methods: Qualitative and Quantitative Approaches - Ethical Considerations in UX Research and Design.

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 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
AVERAGE	**3.00**	**1.00**	**2.00**	**1.67**	**2.67**	**1.00**	**1.33**	**2.33**	**1.50**	**2.00**	**2.67**	**2.00**	**1**	**2**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXTBOOKS:

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

REFERENCES:

1. Jenifer Tidwell, Charles Brewer, Aynne Valencia, “Designing Interface” 3 rdEdition , 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.

TA1101A TAMILAR THOZHIL NUTPAM/TAMILS AND TECHNOLOGY L T P C
0 0 1 1

UNIT I

Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti o

UNIT II

Designing and Structural construction House & Designs in household materials during Sangam Age - Build Silappathikaram- Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.

UNIT III

Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting,steel -Copper and gold- Coins as source beads Terracotta beads -Shell beads/ bone beats - Archeological evidences - Gem stone types described in Silappa

UNIT IV AGRICULTURE AND IRRIGATION TECHNOLOGY

Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry- Wells desi – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.

UNITV SCIENTIFIC TAMIL & TAMIL COMPUTING

Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Development of Tamil Dictionaries – Sorkuvai Project.

TOTAL : 15 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
AVERAGE	3.00	1.00	2.00	1.67	2.67	1.00	1.33	2.33	1.50	2.00	2.67	2.00	1	2

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரல6ொறு – மக்களும் பண் லபொடும் – மக.மக. பிள் மள
   (தவளியீடு:
   தமிழ் ல)ொடு லபொடநூ6் மற்றும் க6் வியிய6் பணிகள் கழகம்).
2. கணினித்தமிழ் – முமனவரஇ6. சு)்தரம் . (விகடன் பிரசுரம்).
3. கீழடி – மவமக)திக்கமரயி6் ல ங் கலகொ6)கர ல)ொகரிகம்
   (தலதொ6் லிய6் Fமற தவளியீடு)
4. தலபொரும) – ஆற்றங் கமர ல)ொகரிகம் . (தலதொ6் லிய6் Fமற தவளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

TA1201A **TAMILAR MARABU/HERITAGE OF TAMILS** **L T P C**
0 0 1 1

UNIT I LANGUAGE AND LITERATURE **3**

Language Families in India - Dravidian Languages – Tamil as aClassical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land -Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.

UNIT II HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE **3**

Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.

UNIT III FOLK AND MARTIAL ARTS **3**

Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils

UNIT IV THINAI CONCEPT OF TAMILS **3**

Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas

UNIT V CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE **3**

Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine– Inscriptions & Manuscripts – Print History of Tamil Books.

TOTAL : 15 PERIODS

MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
AVERAGE	**3.00**	**1.00**	**2.00**	**1.67**	**2.67**	**1.00**	**1.33**	**2.33**	**1.50**	**2.00**	**2.67**	**2.00**	**1**	**2**

correlation levels as 1, 2, 3

1. Slight(Low) 2. Moderate (Medium) 3. Substantial (High)

TEXT-CUM-REFERENCE BOOKS

1.தமிழக வரல6ொறு – மக்களும் பண் லபொடும் – மக.மக. பிள் மள(தவளியீடு:தமிழ் ல)ொடு லபொடநூ6் மற்றும் க6் வியிய6் பணிகள் கழகம்).

2. கணினித்தமிழ் – முமனவரஇ6. சு)தர் ம் . (விகடன் பிரசுரம்).

3. கீழடி – மவமக)திக்கமரயி6் ல ங் கலகொ6)கரல)ொகரிகம் (தலதொ6் லிய6் Fமற தவளியீடு)

4. தலபொரும) – ஆற்றங் கமர ல)ொகரிகம் . (தலதொ6் லிய6் Fமற தவளியீடு)

5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)

6.Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.

7.Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).

8.The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)

9.Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation,Tamil Nadu)

10.Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)

11.Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu.

12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.