

JERUSALEM COLLEGE OF ENGINEERING

(An Autonomous Institution)

(Approved by AICTE, Affiliated to Anna University

Accredited by NBA and NAAC with 'A' Grade)

Velachery Main Road, Narayanapuram, Pallikaranai, Chennai – 600 100



REGULATIONS 2019

CHOICE BASED CREDIT SYSTEM

B.TECH

INFORMATION TECHNOLOGY

SYLLABUS AND CURRICULUM



JERUSALEM COLLEGE OF ENGINEERING
(An Autonomous Institution Affiliated to Anna University, Chennai)

VISION OF THE INSTITUTION

Jerusalem College of Engineering is committed in emerging as an international institution of excellence in imparting finest quality engineering, technology and management education rooted in ethical and societal values through various academic programmes, multi-disciplinary research, consultancy and entrepreneurship activities and hence to contribute towards social transformation and nation building.

MISSION OF THE INSTITUTION

- Generating abundant resources and making conducive policies, the management led by the Chief Executive Officer strives towards promoting globally competitive academic programmes augmented with value added courses, in-plant training activities, co-curricular activities and ambience that support intellectual growth and skill acquisition
- Promoting collaborative trans-border research programmes continuing education in synergy with academia, industries and research organizations leading to real time solutions and life-long learning
- Transforming young men and women into competent professionals and entrepreneurs motivated by a passion for professional excellence, driven by human values and proactively engage in the betterment of the society through innovative practices and academic excellence
- Facilitating effective interaction among faculty members and students and fostering network of alumni, industries, institutions and other stake-holders for successful career gain and placement

VISION OF THE DEPARTMENT

Department of Information Technology strives to provide quality education, academic excellence based on ethical and societal values, exposing students to all concepts, so as to promote global competitiveness in higher education, multi-disciplinary research and entrepreneurship.

MISSION OF THE DEPARTMENT

- To attain academic excellence through innovative practices in teaching and research methodologies.
- To produce globally competent information technologists and entrepreneurs.
- To motivate students to pursue higher education interlaced with communication skills leading to lifelong learning and societal transformations.
- To provide excellence in multi-disciplinary research and development activities rooted in ethical and moral values.

PROGRAM OUTCOMES (POs)

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

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

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

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

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

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

7.**Environment and sustainability:** Understand the impact of the professional engineering solutions

in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

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

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

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

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

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

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1: To ensure graduates will be proficient in utilizing the fundamental knowledge of basic sciences, mathematics and Information Technology for the applications relevant to various streams of Engineering and Technology.

PEO2: To enrich graduates with the core competencies necessary for applying knowledge of computers and telecommunications equipment to store, retrieve, transmit, manipulate and analyze data in the context of business enterprise.

PEO3: To enable graduates to think logically, pursue lifelong learning and will have the capacity to understand technical issues related to computing systems and to design optimal solutions.

PEO4: To enable graduates to develop hardware and software systems by understanding the importance of social, business and environmental needs in the human context.

PEO5: To enable graduates to gain employment in organizations and establish themselves as professionals by applying their technical skills to solve real world problems and meet the diversified needs of industry, academia and research.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO-I: Proficiency to effectively integrate IT-based solutions for contemporary cross-functional applications.

PSO-II: Ability to analyze, design, implement and evaluate the information systems with ethics, to meet the local and global requirements for scientific and industry solutions.

JERUSALEM COLLEGE OF ENGINEERING
(AN AUTONOMOUS INSTITUTION AFFILIATED ANNA UNIVERSITY, CHENNAI)
B.TECH INFORMATION TECHNOLOGY

REGULATION 2019
CHOICE BASED CREDIT SYSTEM
Course Summary Sheet

S.No	Category	Credits as per Semester								Total Credits
		1	2	3	4	5	6	7	8	
1	HS	3	3	*	-	1	-	-	-	7
2	BS	10	6	3	3	-	-	-	-	22
3	ES	10	13	5	-	-	-	-	-	28
4	PC	-	-	11	16	12	11	8	-	58
5	PE	-	-	-	-	3	6	3	-	12
6	OE	-	-	-	3	3	3	3	-	12
7	EEC	-	-	-	1	-	3	7	10	21
TOTAL (B.Tech)		23	22	19	23	19	23	21	10	160
Non Credit/ Mandatory			1Sub.					1Sub.	1Sub	

JERUSALEM COLLEGE OF ENGINEERING**(An Autonomous Institution Affiliated to Anna University, Chennai)****B.TECH INFORMATION TECHNOLOGY REGULATIONS REGULATION– 2019****CHOICE BASED CREDIT SYSTEM****I - VIII SEMESTERS CURRICULAM****SEMESTER I**

S. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	JHS1121	Communicative English and Soft Skills I	HS	4	2	0	2	3
2.	JMA1101	Matrices and Calculus	BS	4	2	2	0	3
3.	JPH1101	Engineering Physics	BS	3	3	0	0	3
4.	JCY1101	Engineering Chemistry	BS	3	3	0	0	3
5.	JGE1101	Engineering Basics	ES	3	3	0	0	3
6.	JGE1102	Programming in C	ES	3	3	0	0	3
PRACTICALS								
7.	JPC1111	Physics and Chemistry Laboratory	BS	2	0	0	2	1
8.	JGE1112	Programming in C Laboratory	ES	4	0	0	4	2
9.	JGE1111	Design Appreciation Laboratory	ES	4	0	0	4	2
TOTAL				30	16	2	12	23

SEMESTER II

S. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	JHS1221	Technical English and Soft Skills II	HS	4	2	0	2	3
2.	JMA1201	Vector Calculus and Complex Analysis	BS	4	2	2	0	3
3.	JBE1223	Applied Science for Electronics and Information Engineering	BS	4	2	0	2	3
4.	JGE1201	Python Programming	ES	3	3	0	0	3
5.	JEC1204	Digital Logic Fundamentals	ES	3	3	0	0	3
6	JGE1202	Engineering Graphics and Design	ES	5	1	0	4	3
7	JNC1261	Environmental Science	NCM	3	3	0	0	0
PRACTICALS								
8	JGE1211	Python Programming Laboratory	ES	4	0	0	4	2
9	JEC1214	Digital Logic Fundamentals Laboratory	ES	4	0	0	4	2
TOTAL				34	16	2	16	22

SEMESTER III

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	JMA1303	Discrete Mathematics and Number Theory	BS	4	2	2	0	3
2	JCS1301	Data Structures	ES	3	3	0	0	3
3	JCS1302	Database Management Systems	PC	3	3	0	0	3
4	JCS1303	Computer Architecture	PC	3	3	0	0	3
5	JCS1321	Object Oriented Programming(integrated)	PC	4	2	0	2	3
PRACTICALS								
6	JPT1001	Soft Skills and Aptitude I	EEC	2	0	0	2	*
7	JCS1311	Data Structures Laboratory	ES	4	0	0	4	2
8	JCS1312	Database Management Systems Laboratory	PC	4	0	0	4	2
TOTAL				27	13	2	12	19

***Only internal assessment**

SEMESTER IV

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	JMA1404	Applied Probability and Queuing Theory	BS	4	2	2	0	3
2	JCS1401	Computer Networks	PC	3	3	0	0	3
3	JCS1402	Operating Systems	PC	3	3	0	0	3
4	JCS1403	Design and Analysis of Algorithms	PC	3	3	0	0	3
5	JCS1404	Software Engineering	PC	3	3	0	0	3
6		Open Elective I	OE	3	3	0	0	3
PRACTICALS								
7	JPT1001	Soft Skills and Aptitude II	EEC	2	0	0	2	1
8	JCS1411	Networks Laboratory	PC	4	0	0	4	2
9	JCS1412	Operating Systems Laboratory	PC	4	0	0	4	2
TOTAL				29	17	2	10	23

SEMESTER V

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	JCS1003	Mobile Computing	PC	3	3	0	0	3
2	JCS1501	Internet Programming	PC	3	3	0	0	3
3	JCS1502	Object Oriented Analysis and Design(integrated)	PC	4	2	0	2	3
4		Professional Elective –I	PE	3	3	0	0	3
5		Open Elective II	OE	3	3	0	0	3
PRACTICALS								
6.	JHS1511	Professional Communication	HS	2	0	0	2	1
7.	JPT1002	Technical Skills and Aptitude-I	EEC	2	0	0	2	*
8.	JCS1511	Internet Programming Laboratory	PC	4	0	0	4	2
9.	JIT1514	Mobile Applications Development Lab	PC	4	0	0	4	1
TOTAL				28	14	0	14	19

*Only internal assessment

SEMESTER VI

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	JIT1601	Internet of Things	PC	3	3	0	0	3
2	JIT1602	Artificial Intelligence	PC	3	3	0	0	3
3	JCS1603	Cryptography and Network Security	PC	3	3	0	0	3
4		Professional Elective II	PE	3	3	0	0	3
5		Professional Elective III	PE	3	3	0	0	3
6		Open Elective III	OE	3	3	0	0	3
PRACTICALS								
7	JPT1002	Technical Skills and Aptitude II	EEC	2	0	0	2	1
8	JIT1612	Artificial Intelligence Laboratory	PC	4	0	0	4	2
9	JIT1621	Mini Project	EEC	2	0	0	2	1
10	JIT1641	Internship	EEC	2	-	-	2	1
TOTAL				28	18	0	8	23

SEMESTER VII

S. No	COURSE CODE	COURSE TITLE	CATEGOR Y	CONTACT PERIODS	L	T	P	C
THEORY								
1	JCS1701	Big Data Analytics	PC	3	3	0	0	3
2	JCS1702	Cloud Computing	PC	4	2	0	2	3
3		Professional Elective – V	PE	3	3	0	0	3
4		Open Elective -IV	OE	3	3	0	0	3
5	JNC1361	Essence of Indian Traditional Knowledge	NCM	3	3	0	0	0
PRACTICALS								
6.	JGE1701	Professional Readiness for Innovation and Entrepreneurship	EEC	6	0	0	6	3
7	JBA1711	Entrepreneurship for Engineers	EEC	2	0	0	2	1
8	JCS1711	Big Data Analytics Laboratory	PC	4	0	0	4	2
9	JIT1731	Project work – Phase I	EEC	6	0	0	6	3
TOTAL				34	14	0	20	21

SEMESTER VIII

S. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	JNC1861	Indian Constitution	NCM	2	3	0	0	0
PRACTICALS								
2	JIT1851	Comprehension and Technical Seminar	EEC	2	0	0	2	1
3	JIT1832	Project work – Phase II	EEC	18	0	0	18	9
TOTAL				23	3	0	20	10

Professional Elective IV

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	JGE1001	Professional Ethics in Engineering	PE	3	3	0	0	3
2.	JGE1006	Human Rights	PE	3	3	0	0	3
3.	JCE1001	Disaster Management	PE	3	3	0	0	3
4.	JGE1002	Intellectual Property Rights	PE	3	3	0	0	3
5.	JIT1012	Software Project Management	PE	3	3	0	0	3
6.	JIT1013	Information Management	PE	3	3	0	0	3

Professional Elective V

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	JCS1011	Business Intelligence	PE	3	3	0	0	3
2.	JIT1014	Deep Learning	PE	3	3	0	0	3
3.	JCS1012	Adhoc Sensor Network	PE	3	3	0	0	3
4.	JIT1016	Data Analysis And Virtualization	PE	3	3	0	0	3
5.	JIT1017	Foundation skills in integrated product development	PE	3	3	0	0	3
6.	JIT1019	Free and Open Source Software	PE	3	3	0	0	3

HUMANITIES AND SOCIAL SCIENCES (HS)

Sl. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1	JHS1121	Communicative English and Soft Skills I	HS	4	2	0	2	3
2	JHS1221	Technical English and Soft Skills II	HS	4	2	0	2	3
3	JPT1001	Soft Skills and Aptitude I	HS	4	0	0	4	0
4	JPT1001	Soft Skills and Aptitude II	HS	4	0	0	4	1
5	JPT1002	Technical Skills and Aptitude I	HS	4	0	0	4	1
6	JPT1002	Technical Skills and Aptitude II	HS	4	0	0	4	1
7	JHS1511	Professional Communication	HS	2	0	0	2	1

BASIC SCIENCES (BS)

Sl. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1	JMA1101	Matrices and Calculus	BS	4	3	1	0	3
2	JPH1101	Engineering Physics	BS	3	3	0	0	3
3	JCY1101	Engineering Chemistry	BS	3	3	0	0	3
4	JPC1111	Physics and Chemistry laboratory	BS	2	0	0	2	1
5	JMA1201	Vector Calculus and Complex Analysis	BS	4	3	1	0	3
6	JBE1223	Applied Science for Information Engineering	BS	3	3	0	0	3
7	JMA1303	Discrete mathematics and Number Theory	BS	3	3	0	0	3
8	JMA1404	Applied probability and Queuing Theory	BS	3	3	0	0	3

ENGINEERING SCIENCES (ES)

Sl. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1	JGE1101	Engineering Basics	ES	3	3	0	0	3
2	JGE1102	Programming in C	ES	3	3	0	0	3
3	JGE1112	Programming in C Laboratory	ES	4	0	0	4	2
4	JGE1111	Design Appreciation Laboratory	ES	4	0	0	4	2
5	JGE1201	Python Programming	ES	3	3	0	0	3
6	JEC1204	Digital Logic Fundamentals	ES	3	3	0	0	3
7	JGE1202	Engineering Graphics and Design	ES	5	1	0	4	3
8	JGE1211	Python Programming Laboratory	ES	4	0	0	4	2
9	JEC1214	Digital Logic Fundamentals Laboratory	ES	4	0	0	4	2
10	JCS1301	Data Structures	ES	3	3	0	0	3
11	JCS1311	Data Structure Laboratory	ES	4	0	0	4	2

PROFESSIONAL CORE (PC)

Sl. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
SEMESTER – III								
1	JCS1302	Database Management Systems	PC	3	3	0	0	3
2	JCS1303	Computer Architecture	PC	3	3	0	0	3
3	JCS1321	Object Oriented Programming	PC	4	2	0	2	3
4	JCS1312	Database Management Systems Laboratory	PC	4	0	0	4	2
SEMESTER – IV								
5	JCS1401	Computer Networks	PC	3	3	0	0	3
6	JCS1402	Operating Systems	PC	3	3	0	0	3
7	JCS1403	Design and Analysis of Algorithms	PC	3	3	0	0	3
8	JCS1404	Software Engineering	PC	3	3	0	0	3
9	JCS1411	Networks Laboratory	PC	4	0	0	4	2
10	JCS1412	Operating Systems Laboratory	PC	4	0	0	4	2

SEMESTER – V

11	JCS1003	Mobile Computing	PC	3	3	0	0	3
12	JCS1501	Internet Programming	PC	3	3	0	0	3
13	JCS1502	Object Oriented Analysis and Design	PC	4	2	0	2	3
14	JCS1511	Internet Programming Laboratory	PC	4	0	0	4	2
15	JIT1514	Mobile Application Development Laboratory	PC	4	0	0	4	1

SEMESTER – VI

16	JIT1601	Internet of Things	PC	3	3	0	0	3
17	JIT1602	Artificial Intelligence	PC	3	3	0	0	3
18	JCS1603	Cryptography and Network Security	PC	3	3	0	0	3
19	JIT1612	Artificial Intelligence Laboratory	PC	4	0	0	4	2

SEMESTER – VII

20	JCS1701	Big Data Analytics	PC	3	3	0	0	3
21	JCS1702	Cloud Computing	PC	4	2	0	2	3
22	JCS1711	Data Analytics Laboratory	PC	4	0	0	4	2

PROFESSIONAL ELECTIVES (PE)**SEMESTER V****ELECTIVE – I**

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	JIT1004	Graphics and Multimedia	PE	3	3	0	0	3
2.	JIT1002	Agile Methodologies	PE	3	3	0	0	3
3.	JEC1013	Fundamentals of Nano-science	PE	3	3	0	0	3
4.	JIT1005	Computer Hardware and Interfacing	PE	3	3	0	0	3
5.	JIT1003	Electronic Commerce	PE	3	3	0	0	3
6.	JGE1005	Total Quality Management	PE	3	3	0	0	3

SEMESTER VI**ELECTIVE – II**

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	JCS1601	Compiler Design	PE	3	3	0	0	3
2.	JCS1007	Augmented Reality & Virtual Reality	PE	3	3	0	0	3
3.	JIT1003	Embedded Systems	PE	3	3	0	0	3
4.	JIT1004	Social Network Analysis	PE	3	3	0	0	3
5.	JCS1009	Data Warehousing And Data Mining	PE	3	3	0	0	3
6.	JIT1005	Enterprise Resource planning	PE	3	3	0	0	3

SEMESTER VI**ELECTIVE – III**

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	JIT1006	Block Chain Technology	PE	3	3	0	0	3
2.	JIT1007	Machine Learning Techniques	PE	3	3	0	0	3
3.	JCS1010	Cyber Security And Digital Forensics	PE	3	3	0	0	3
4.	JIT1008	Service oriented Architecture	PE	3	3	0	0	3
5.	JIT1009	Natural Language Processing	PE	3	3	0	0	3
6.	JIT1010	Quantum Computing	PE	3	3	0	0	3

PROFESSIONAL ELECTIVE - IV

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	JGE1001	Professional Ethics in Engineering	PE	3	3	0	0	3
2.	JGE1003	Human Rights	PE	3	3	0	0	3
3.	JCE1001	Disaster Management	PE	3	3	0	0	3
4.	JGE1004	Intellectual Property Rights	PE	3	3	0	0	3
5.	JIT1012	Software Project Management	PE	3	3	0	0	3
6.	JIT1013	Information Management	PE	3	3	0	0	3

PROFESSIONAL ELECTIVE - V

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	JIT1014	Deep Learning	PE	3	3	0	0	3
2.	JCS1012	Adhoc Sensor Network	PE	3	3	0	0	3
3.	JIT1016	Data Analysis and Visualization	PE	3	3	0	0	3
4.	JIT1017	Foundation skills in integrated product development	PE	3	3	0	0	3
6.	JCS1011	Business Intelligence	PE	3	3	0	0	3
7.	JIT1019	Free and Open Source Software	PE	3	3	0	0	3

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

Sl. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1	JPT1001	Soft Skills and Aptitude I	EEC	2	0	0	2	*
2	JPT1001	Soft Skills and Aptitude II	EEC	2	0	0	2	1
3	JPT1002	Technical Skills and Aptitude-I	EEC	2	0	0	2	*
4	JPT1002	Technical Skills and Aptitude II	EEC	2	0	0	2	1
5	JIT1621	Mini Project	EEC	2	0	0	2	1
6	JIT1641	Internship	EEC	2	-	-	2	1
7	JGE1701	Professional Readiness for Innovation and Entrepreneurship	EEC	6	0	0	6	3
8	JBA1711	Entrepreneurship for Engineers	EEC	2	0	0	2	1
9	JIT1731	Project work – Phase I	EEC	6	0	0	6	3
10.	JIT1832	Project Work Phase 2	EEC	18	0	0	18	9
11.	JIT1851	Comprehension and Technical Seminar	EEC	2	0	0	2	1

NON CREDIT MANDATORY (NCM)

Sl. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	JNC1261	Environmental Science	NCM	3	3	0	0	0
2.	JNC1361	Essence of Indian Traditional Knowledge	NCM	3	3	0	0	0
3.	JNC1861	Indian Constitution	NCM	3	3	0	0	0

LIST OF OPEN ELECTIVES (PE) OFFERED BY IT DEPT. FOR OTHER DEPARTMENTS

Sl. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
SEMESTER – IV								
1	JIT9001	Introduction to Information System	OE	3	3	0	0	3
2	JIT9002	Basics of Database System	OE	3	3	0	0	3
3	JIT9003	Java Programming Fundamentals	OE	3	3	0	0	3
SEMESTER – V								
1	JIT9004	Fundamentals of Knowledge based System	OE	3	3	0	0	3
2	JIT9005	Basics of Multimedia Application Practices	OE	3	3	0	0	3
3	JIT9006	Mobile Application Practices	OE	3	3	0	0	3
SEMESTER – VI								
1	JIT9007	Introduction to IOT	OE	3	3	0	0	3
2	JIT9008	Software Design and Development	OE	3	3	0	0	3
3	JIT9009	Introduction To Artificial Intelligence	OE	3	3	0	0	3
SEMESTER – VII								
1	JIT9010	Fundamentals of Cloud Computing	OE	3	3	0	0	3
2	JIT9011	Introduction to Cyber Security	OE	3	3	0	0	3
3	JIT9012	Essentials of Virtual System Reality	OE	3	3	0	0	3

JHS1121	COMMUNICATIVE ENGLISH & SOFT SKILLS I (Common to all B.E / B.Tech Programmes)	L	T	P	C
		2	0	2	3

Course Objectives:

- To enable the students of Engineering and Technology to develop their listening skill by learning the key techniques for comprehending information
- To facilitate the learners to speak effectively while exchanging ideas in academic and social domains
- To develop their skills in reading and understanding texts through practice
- To expose them to the correct usage of language to develop their writing skill
- To train the students to use appropriate vocabulary in academic and technical writings

UNIT I Basic Grammar I and Reading for information 6

Parts of speech - Sentence patterns – Tenses - Wh- questions - Yes/no questions - Countable and Uncountable nouns - Affixation – word formation; Reading short comprehension passages - practice in skimming and scanning for specific information and note-making, Critical reading - finding key information in a given text - shifting facts from opinions and paraphrasing

SOFT SKILLS LAB 3

Listening to documentaries, inspiring speeches of great leaders, news bulletins, Ted talks, telephonic conversations

UNIT II Basic Grammar I and Sharing Information 6

Pronouns - Adjectives - Adverbs - Imperatives - Direct and indirect questions - Compound words - Guessing meaning of words in contexts – one word substitutes; Autobiographical writing (writing about one's leisure time activities, hometown, favourite place and school life) – Biographical writing (place, people), Letter writing (informal letters)

SOFT SKILLS LAB 3

Self-introduction, peer introduction, picture description, JAM

UNIT III Basic Grammar III and Free Writing I 6

Conjunctions – Prepositions - Articles - Degrees of comparison – Discourse markers - Reference words; Process description, Coherence and cohesion in writing cause and effect / compare & contrast / narrative / analytical paragraphs

SOFT SKILLS LAB	3
Language functions: Giving reasons, talking about future plans, comparing and contrasting, making suggestions	
UNIT IV Basic Grammar IV and Language Development	6
Subject-verb agreement - Modal verbs - Phrasal verbs - Single word substitutes - Use of abbreviations & acronyms - Cloze reading - Interpreting visual material, Jumbled sentences	
SOFT SKILLS LAB	3
Interpersonal Skills: role play, group discussion, debate, conduct of meeting	
UNIT V Basic Grammar V and Free Writing II	6
Clause - Direct and indirect speech – Correction of errors - Word association (connotations) - Lexical items (fixed / semi fixed expressions) - Essay writing – different types of essays, dialogue writing	
SOFT SKILLS LAB	3
Creative writing and speaking skills: Poster making and description, project proposals	
TOTAL: 45 PERIODS	

Course Outcomes:

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

- Listen to different talks and lectures and understand them easily
- Communicate their thoughts confidently using communicative strategies
- Read and grasp different genres of texts effortlessly
- Write grammatically correct academic, business and technical texts
- Apply the language skills efficiently in all forms of communication

Textbooks:

1. Board of Editors, Department of English, Anna University, Chennai. Using English: A Course Book for Undergraduate Engineers and Technologists, Orient Black Swan: Chennai, 2017.
2. Dhanavel, S.P. English and Communication Skills for Students of Science and Engineering. Orient Black Swan Publications, Chennai, 2011.

Reference Books:

1. Raman, Meenakshi & Sangeetha Sharma, Technical Communication: English Skills for Engineers. Oxford University Press, New Delhi. 2011.
2. Regional Institute of English. English for Engineers. Cambridge University Press, New Delhi. 2006
3. Rizvi M, Ashraf. Effective Technical Communication. Tata McGraw-Hill Publishing Company Limited, New Delhi, 2007.
4. Rutherford, Andrea J. Basic Communication Skills for Technology. Pearson Edition (II Edition), New Delhi, 2001.

Reference Books for Soft Skills Lab – I:

1. Mandel, Steve. *Effective Presentation Skills*. New Delhi: Viva Books Pvt. Ltd., 2004.
2. Kilmet, Stephen. "The Resume and "The Computerized Resume." In *Writing for Design Professionals*.
3. Writing Cover Letters-Kilmet, Stephen. "Cover Letter," and "Enclosures and Attachments." In *Writing for Design Professionals*. New York
4. Writing a Proposal "Standard Proposal for Funding." in *Writing in the Disciplines*. Fort

Extensive Reading:

Kalam, Abdul. *The Wings of Fire*, Universities Press, Hyderabad. 1999

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	1	2	3	-	2
CO2	-	-	-	-	-	-	-	1	2	3	-	2
CO3	-	-	-	-	-	-	-	1	2	3	-	2
CO4	-	-	-	-	-	-	-	1	2	3	-	2
CO5	-	-	-	-	-	-	-	1	2	3	-	2
AVG	-	-	-	-	-	-	-	1	2	3	-	2

JMA1101	MATRICES AND CALCULUS (Common to all B.E /B.Tech Programmes)	L	T	P	C
		2	2	0	3

COURSE OBJECTIVES:

- To equip students with the knowledge of matrices required for applications in engineering.
- To familiarize students on concepts of differential and integral calculus as tools required for applications in engineering.
- To introduce ordinary differential equations which is widely used in problem solving and engineering applications.

UNIT I MATRICES

12

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors – Cayley-Hamilton theorem – Diagonalization of matrices by similarity and orthogonal transformations – Reduction of a quadratic form to canonical form – Nature of quadratic forms.

UNIT II FUNCTIONS OF SEVERAL VARIABLES

12

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

UNIT III APPLICATIONS OF DIFFERENTIAL CALCULUS 12

Curvature and radius of curvature – Circle of curvature – Evolutes – Envelopes – Evolute as envelope of normals.

UNIT IV APPLICATIONS OF INTEGRAL CALCULUS 12

Multiple integrals: Double integrals – Change of order of integration – Change of variables – Area enclosed by plane curves – Triple integrals – Volume of solids.

Improper integrals: Beta and Gamma Integrals – Definitions and properties – Simple problems.

UNIT V ORDINARY DIFFERENTIAL EQUATIONS 12

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

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of the course, students will be able

- To understand applications of matrix theory in quadratic forms
- To use calculus for problems and applications dealing with functions of several variables
- To apply differential calculus in practical problem solving in the area of geometry
- To gain insight on the applications of multiple integrals in area and volume problems
- To solve ordinary differential equations that occur in many physical and engineering applications

TEXT BOOKS:

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd Edition, 2014.
2. Kreyszig Erwin, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2016.
3. P.Anuradha and V.Sudhakar, "Matrices and Calculus", Scitech Publications, 1st Edition, Chennai, 2019.

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1. Anton, H, Bivens, I and Davis, S, "Calculus", Wiley, 10th Edition, 2016.
2. Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New delhi, 3rd Edition, 2007.
3. Srimantha Pal and Bhunia, S.C, "Engineering Mathematics" Oxford University Press, 2015.
4. Weir, M.D and Joel Hass, "Thomas Calculus", 12th Edition, Pearson India, 2016.

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2. <https://nptel.ac.in/courses/111/107/111107108/>
3. <https://nptel.ac.in/courses/111/104/111104144/>
4. <https://nptel.ac.in/courses/111/105/111105122/>
5. <https://nptel.ac.in/courses/111/107/111107111/>

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	-	-	-	2	-	-	2
CO2	3	3	2	2	-	-	-	-	2	-	-	2
CO3	3	3	2	2	-	-	-	-	2	-	-	2
CO4	3	3	2	2	-	-	-	-	2	-	-	2
CO5	3	3	2	2	-	-	-	-	2	-	-	2
AVG	3	3	2	2	-	-	-	-	2	-	-	2

JPH1101	ENGINEERING PHYSICS (Common to all B.E /B.Tech Programmes)	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To enable the students to understand the basics of the latest advancements in Physics
- To introduce the principles of quantum mechanics
- To impart knowledge of laser and fiber optic communication

UNIT I CRYSTAL PHYSICS

9

Single crystal, Polycrystal and Amorphous materials – Single Crystals: Unit cell, Crystal systems, Bravais lattices, Directions and Planes in a crystal, Miller indices – Inter planar distances – Coordination number and Packing factor for SC, BCC, FCC, HCP and

Diamond structures - Crystal imperfections: Point defects, Line defects – Burgers vector, Stacking faults – Growth of single crystal: Solution and Melt growth techniques.

UNIT II PROPERTIES OF MATTER

9

Elasticity – Stress-strain diagram and its uses - factors affecting elastic moduli and tensile strength – torsional stress and deformations – twisting couple - torsion pendulum: theory and experiment - bending of beams - stress due to bending in beams - bending moment – cantilever: theory and experiment – uniform and non-uniform bending: theory and experiment - I-shaped girders.

UNIT III ULTRASONICS

9

Production of ultrasound by Magnetostriction effect and Piezo electric effect Detection of ultrasonic wave – Properties of ultrasonic wave – Acoustic grating - Industrial applications – Drilling, Welding, Soldering and Cleaning – SONAR - Non Destructive Testing – Pulse echo system through Transmission and Reflection modes- A, B and C–scan displays, Medical applications - Sonograms.

UNIT IV PHOTONICS AND FIBRE OPTICS 9

Spontaneous and stimulated emission-Population inversion -Einstein's A and B coefficients derivation – Laser Principle - Semiconductor lasers (homojunction & heterojunction)-Industrial and Medical Applications – Optical Fiber: types (material, refractive index, mode) - Propagation of light in optical fibers – Numerical aperture and Acceptance angle –attenuation, dispersion, bending -Fiber Optical Communication system (Block diagram) -Active and passive fiber sensors-Endoscope.

UNIT V QUANTUM PHYSICS 9

Black body radiation –Planck's theory (derivation) –Deduction of Wien's displacement law and Rayleigh – Jeans' Law from Planck's theory –Compton effect: theory and experimental verification –Properties of Matter waves –G.P Thomson experiment -Schrödinger's wave equation –Time independent and time dependent equations –Physical significance of wave function –Particle in a one dimensional box -Electron microscope - Scanning electron microscope -Transmission electron microscope

TOTAL: 45 PERIODS

OUTCOMES:

Students will be able

To enhance knowledge on properties of matter

To assess the properties of ultra sonics and imaging devices

To understand and to compute problems in Quantum Physics.

To learn the use of modern optical fiber communication systems and tools in real life applications.

To gain more insight on the functioning of optical materials for optoelectronics.

TEXT BOOKS:

1. Bhattacharya, D.K. & Poonam, T. "Engineering Physics". Oxford University Press, 2015.
2. Gaur, R.K. & Gupta, S.L. "Engineering Physics". Dhanpat Rai Publishers, 2012.
3. Pandey, B.K. & Chaturvedi, S. "Engineering Physics". Cengage Learning India, 2012.

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1. Halliday, D., Resnick, R. & Walker, J. "Principles of Physics". Wiley, 2015.
2. Serway, R.A. & Jewett, J.W. "Physics for Scientists and Engineers". Cengage Learning, 2010.
3. Tipler, P.A. & Mosca, G. "Physics for Scientists and Engineers with Modern Physics".
4. W.H.Freeman, 2007
5. Rajendran V, "Engineering Physics", Tata McGraw Hill, 2009.
6. Arumugam M, "Materials Science", Anuradha Publications, 2015.
7. Willam F Smith, "Material Science and Engineering", Tata McGraw - Hill Publications, 2008.
8. John D.Cutnell, "Cutnell and Johnson Physics", Willey Publications, 2018.

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3. https://onlinecourses.nptel.ac.in/noc21_bt50/preview
4. <https://nptel.ac.in/courses/115/104/115104096/>
5. <https://nptel.ac.in/courses/108/104/108104113/>

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	1	-	-	1	-	-	1	-	1	-
CO2	2	1	1	-	-	1	-	-	1	-	1	-
CO3	2	1	1	-	-	1	-	-	1	-	1	-
CO4	2	1	1	-	-	1	-	-	1	-	1	-
CO5	2	1	1	-	-	1	-	-	1	-	1	-
AVG	2	1	1	--	-	1	-	-	1	-	1	-

JCY1101	ENGINEERING CHEMISTRY (Common to all B.E /B.Tech Programmes)				L	T	P	C
					3	0	0	3

COURSE OBJECTIVE

- To acquaint the student with concepts of photochemistry and analytical techniques.
- To make the students conversant with boiler feed water and water treatment techniques.
- To make the students acquire sound knowledge in corrosion of materials.
- To understand polymer chemistry and the principle of energy in batteries.
- To impart knowledge on the basics of nano materials and engineering materials.

UNIT I: PHOTOCHEMISTRY AND ANALYTICAL TECHNIQUES **9**

Photochemistry- Laws of photochemistry - Grotthuss–Draper law, Stark–Einstein law and Lambert-Beer Law (problems). Photo processes - Internal Conversion, Inter-system crossing, Fluorescence and its applications in medicine – Phosphorescence-Chemiluminescence and Photo-sensitization.

Analytical Techniques – UV-visible spectroscopy – principles – instrumentation (block diagram only) – Colorimetry- Principle-Instrumentation, estimation of iron by colorimetry – Flame photometry – principle – Instrumentation – estimation of sodium by Flame photometry – atomic absorption spectroscopy – principles – instrumentation – applications.

UNIT II WATER TECHNOLOGY **9**

Hardness-Units of Hardness- Temporary hardness-Permanent hardness- Estimation hardness by EDTA method- Alkalinity – Types- water quality parameters (pH, EC, TDS, DO, BOD, COD) – Break point chlorination- Treatment of water for domestic use- Boiler feed water-requirements- boiler troubles (scale and sludge- caustic embrittlement-boiler corrosion-priming and foaming) - softening of hard water -external treatment (zeolite and demineralization) - internal treatment (phosphate, calgon, carbonate, colloidal) -- desalination of brackish water –reverse osmosis.

UNIT III ELECTROCHEMISTRY AND CORROSION

9

Electrochemistry- Electrochemistry- Electrochemical cell - redox reaction, electrode potential- oxidation potential- reduction potential, measurement and applications - electrochemical series and its significance - Nernst equation (derivation and problems).

Corrosion- causes- types-chemical, electrochemical corrosion- galvanic corrosion-differential aeration corrosion (pitting, waterline, wire fence, pipeline, crevice, stress corrosion), Factors influencing the rate of corrosion- corrosion control - material selection and design aspects – cathodic protection methods (sacrificial anode and impressed current cathodic methods)- Electroplating of Copper and electroless plating of nickel- corrosion inhibitors (anodic and cathodic inhibitors).

UNIT IV POLYMER , COMPOSITES AND ENERGY STORAGE DEVICES

9

Introduction- Classification of polymers – Natural and synthetic; Thermoplastic and Thermosetting. Functionality – Degree of polymerization. Techniques of polymerization: Bulk, emulsion, solution and suspension. Bio degradable polymer- Types- synthetic methods – applications of biodegradable polymers. Polymer composites and its application.

Energy Storage Devices - Batteries and fuel cells: Types of batteries – primary battery (dry cell) secondary battery (lead acid battery, nickel-cadmium battery, lithium-ion-battery). Fuel cell – H₂-O₂ fuel cell- solid oxide fuel cell - polymer electrolyte membrane fuel cell (PEMFC) applications.

UNIT V ENGINEERING MATERIALS AND NANOCHEMISTRY

9

Engineering Materials- Refractories – classification – acidic, basic and neutral refractories – properties (refractoriness, refractoriness under load, dimensional stability, porosity, thermal spalling) – manufacture of alumina, magnesite and zirconia bricks. cement- manufacture and properties - setting and hardening of cement, special cement- waterproof and white cement–properties and uses.

Nanochemistry – Introduction – distinction between molecules, nanoparticles and bulk materials; Synthesis: precipitation, thermolysis, hydrothermal, solvothermal, electrodeposition, chemical vapour deposition, laser ablation; Properties and applications.

COURSE OUTCOMES

- Students understood topics like fluorescence/phosphorescence and their mechanism, laws of photochemistry. From instrumental techniques students understood about their principles and applications in various fields.
- To understand the basic principle of water treatment and techniques involved in purification process for future learning.
- Based on electrochemical reactions, students understood the corrosion of materials, control and

prevention methods.

- The knowledge gained on polymer chemistry will help the students to differentiate the types of polymers and polymerization reactions. Preparative methods of some biodegradable polymers and their applications are clearly understood. Understanding principle of batteries, its uses and different types of non conventional energy resources will give an idea and development of new energy resources .
- The knowledge gained on engineering materials will facilitate better understanding of engineering processes and applications for further learning. Students understood about the unique behavior of nano materials from its bulk materials, also understood about various synthetic methods of nano materials and their applications.

TEXT BOOKS:

1. Jain P.C. and Monica Jain, “Engineering Chemistry”, Dhanpat Rai Publishing Company (P) Ltd., New Delhi, 2010.
2. R.Gopalan, D.Venkapayya, Sulochna Nagarajan,Text book of Engineering Chemsitry, Vikas publishing pvt ltd, 4th edition, 2013.

REFERENCES:

1. K.Sesha Maheswaramma, Mridula Chugh, Engineering chemistry, Pearson, 2016.
2. O.G.Palanna, Engineering Chemistry, Mc Graw Hill, 2017
3. Dara S.S, Umare S.S, “Engineering Chemistry”, S. Chand & Company Ltd., New Delhi 2013.
4. Sivasankar B., “Engineering Chemistry”, Tata McGraw-Hill Publishing Company, Ltd., New Delhi, 2008.
5. Gowariker V.R. , Viswanathan N.V. and Jayadev Sreedhar, “Polymer Science”, New Age International P (Ltd.), Chennai, 2006.
6. Ozin G. A. and Arsenault A. C., “Nanochemistry: A Chemical Approach to Nanomaterials”, RSC Publishing, 2005.
7. B.R.Puri, L.R.Sharma, Madan S.Pathana, Principle of physical chemistry, 47th edition, Vishal publishing Co, 2017.

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2. <https://www.samcotech.com/what-is-a-boiler-feed-water-treatment-system-how- does-it-work/>
3. <https://nptel.ac.in/courses/113/101/113101098/>
4. <https://nptel.ac.in/courses/112/107/112107221/>
5. <https://nptel.ac.in/courses/113/106/113106093/>

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	1	1	1	1	-	-	-	1	1
CO2	1	1	1	1	1	1	1	-	1	1	1	-
CO3	1	1	1	1	1	1	1	-	1	1	1	-
CO4	1	1	1	1	1	1	1	1	1	1	1	1
CO5	1	1	1	1	1	1	1	-	1	1	1	1
AVG	1	1	1	1	1	1	1	1	1	1	1	1

JGE1101	ENGINEERING BASICS (Common to all B.E /B.Tech Programmes)	L	T	P	C
		3	0	0	3

Course Objectives

To impart knowledge on

- Essentials of Civil Engineering and Mechanical Engineering to the students
- Electric circuits and working principles of Electrical Machines.
- Principle and characteristics of various electronic devices.
- Transducers and working of measuring instruments.

UNIT 1 BASICS OF CIVIL ENGINEERING 11

Over view of Civil Engineering- Civil engineering contributions to the welfare of society- Specialized sub divisions in Civil engineering-Structural, Construction, Geotechnical, Environmental, Transportation and water resources engineering.

UNIT 2 BASICS OF MECHANICAL ENGINEERING 11

Introduction to Concept of Mechanization and Automation, Robotics; Manufacturing methods- casting, machining, forming operations. Introduction to IC Engine- working principle of Petrol and diesel engine; Types of Power plants- Hydel power plant and thermal power plant; Steam generators-Fire tube boiler and water tube boiler; Thermal systems-Heat exchangers, Radiator and oil cooler; Design of ingenious Mechanisms-Parts feeding mechanism.

UNIT 3 ELECTRIC CIRCUITS AND ELECTRICAL MACHINES 9

Basic circuit components – Ohms Law – Kirchoff’s Law-Introduction to AC circuits – waveforms and RMS value – power and power factor-Principles of operation of DC machines-Transformers-three phase and single-phase induction motors.

UNIT 4 ELECTRONIC DEVICES & CIRCUITS 7

Types of Materials – Silicon & Germanium- N type and P type materials – Construction and Characteristics :PN Junction diode –Zener Diode –Bipolar Junction Transistor – Diode and Transistor as a switch – Amplifiers.

UNIT 5 MEASUREMENTS & INSTRUMENTATION 7

Elements of generalized measurement system – Basic terminologies: Accuracy, precision, resolution, sensitivity, linearity, span and range – Errors in measurement – Standards of measurement - calibration – Operating forces: Deflection force, controlling force, damping force-Classification of instruments.

TOTAL : 45 PERIODS

Course Outcomes

- Understand about the various specialization civil engineering
- Undertand the energy sources and working principle of power plants and apply the kleodge of powerplants to diagonise and solve the Engineering problem.
- To Understand the working priciple of IC Engines
- Ability to understand electric circuits and working principles of electrical machines.
- Choose appropriate instruments for electrical measurement for a specific application.

TEXTBOOKS

1. Shanmugam Gand palanichamy MS, “ Basic civil and mechanical Engineering”, Tata McGraw Hillpublishing Co., 2016
2. D P Kothari and I.J Nagarath, ‖Electrical Machines —Basic Electrical and Electronics Engineering‗,McGraw Hill Education(India) Private Limited, Third Reprint ,2016.
3. Thereja .B.L., —Fundamentals of Electrical Engineering and Electronics‗, S. Chand & Co. Ltd., 2008.
4. A.K. Sawhney, A Course in Electrical & Electronic Measurements & Instrumentation, Dhanpat Raiand Co, New Delhi, 2010.
5. H.S. Kalsi, Electronic Instrumentation, Tata McGraw-Hill, New Delhi, 2010.
6. D P Kothari and I.J Nagarath, ‖Electrical Machines —Basic Electrical and Electronics Engineering‗,McGraw Hill Education(India) Private Limited, Third Reprint ,2016.
7. Thereja .B.L., —Fundamentals of Electrical Engineering and Electronics‗, S. Chand & Co. Ltd.,2008.
8. A.K. Sawhney, A Course in Electrical & Electronic Measurements & Instrumentation, Dhanpat Raiand Co, New Delhi, 2010.

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CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	1	1	-	-	-	-	-	-	-
CO2	1	1	1	1	1	-	-	-	-	-	-	-
CO3	1	1	1	1	1	-	-	-	-	-	-	-
CO4	1	1	1	1	1	-	-	-	-	-	-	-
CO5	1	1	1	1	1	-	-	-	-	-	-	-
AVG	1	1	1	1	1	-	-	-	-	-	-	-

JGE1102	PROGRAMMING IN C (Common to all B.E /B.Tech Programmes)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To learn Fundamentals of Computing
- To implement programs using basic features of C
- To learn to use C pointers and dynamically allocated memory techniques
- To learn advanced features of the C programming language
- To be able to use file operations in C

UNIT I INTRODUCTION TO PROBLEM SOLVING 9

Simple model of a Computer – Hardware – Software – Data Representation, Problem Solving Techniques – Bottom up design and top down design - applications, Introduction to Algorithms and Flow Chart - Notion of memory, addresses, variables, instructions, execution of instructions. Operating system commands, file editing, compiling, linking, executing a program

UNIT II C PROGRAMMING BASICS 9

Introduction to ‘C’ programming – structure of a ‘C’ program – compilation and linking processes. Conversion of simple algorithm to program-Constants, Variables – Data Types – Expressions using operators in ‘C’ – Managing Input and Output operations – Decision Making and Branching – Looping statements – solving simple scientific and statistical problems.

UNIT III ARRAYS AND STRINGS 9

Arrays – Initialization – Declaration – One dimensional and two dimensional arrays - String- String operations –Arrays of strings.

UNIT IV FUNCTIONS AND USER DEFINED DATA TYPES 9

Function – definition of function – Declaration of function – Pass by value - Pass by reference–Command Line Argument in C-- Recursion - Enumerators - Structures - Unions.

UNIT V POINTERS AND FILES 9

Macros - storage classes - Pointers- Definition – Initialization – Pointers arithmetic – Double Pointers, Basic file operations-Example problems.

TOTAL HOURS: 45

COURSE OUTCOMES:

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

- Design and represent solutions to problems as algorithm and flow chart
- Write simple C Programs using loops and conditional statements
- Write simple C Programs using arrays
- Write simple C Programs using functions
- Write simple C codes using pointers, structures and union

TEXT BOOKS:

1. PradiDey, ManasGhosh, "Programming in C", First Edition, Oxford University Press, 2018
2. Yashavant P. Kanetkar. "Let Us C", BPB Publications, 16th edition 2017.

REFERENCES:

1. Kernighan, B.W and Ritchie, D.M, "The C Programming language", Second Edition, PearsonEducation, 2015.
3. Dromey R.G., "How to Solve it by Computer", Pearson Education, Fourth Reprint, 2008
4. E. Balagurusamy, "Computing Fundamentals and C Programming", McGraw-Hill Publishing Company Limited, (2017).

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3. <https://www.studytonight.com/c/string-and-character-array.php>
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CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	-	-	-	-	3	3	3	-	3
CO2	3	3	3	-	-	-	-	3	3	3	-	3
CO3	3	3	3	-	-	-	-	3	3	3	-	3
CO4	3	3	3	-	-	-	-	3	3	3	-	3
CO5	3	3	3	-	-	-	-	3	3	3	-	3
AVG	3	3	3	-	-	-	-	3	3	3	-	3

JPC1111	Physics and Chemistry Laboratory (Common to all B.E /B.Tech Programmes)	L	T	P	C
		0	0	2	1

PHYSICS LABORATORY

OBJECTIVES:

To provide students the firsthand experience of verifying various concepts learnt in theory courses.

LIST OF EXPERIMENTS:

1. Determination of Young's modulus for the given uniform bar by uniform bending method
2. Determination of wavelength of the diode laser and hence determine the size of the coated powder particle
3. Determination of velocity of Ultrasound using Ultrasonic interferometer and also find the compressibility of the given liquid
4. Determination of moment of inertia of the given circular disc and rigidity modulus of the metal wire using torsional pendulum
5. Determination of Planck' constant using different color filters
6. Determination of Wavelength of spectral lines in mercury spectrum using spectrometer
7. Analysis of I-V Characterization of Solar cell

CHEMISTRY LABORATORY

LIST OF EXPERIMENTS

1. Estimation of HCl using Na_2CO_3 as primary standard and Determination of alkalinity in water sample.
2. Determination of total, temporary & permanent hardness of water by EDTA method.
3. Determination of DO content of water sample by Winkler's method.
4. Determination of chloride content of water sample by argentometric method.
5. Estimation of copper in brass by Iodometry.
6. Determination of molecular weight of polyvinyl alcohol using Ostwald viscometer.

OUTCOMES:

Students will be able

1. Acquire experience in analyzing the elastic materials.
2. Understand the acoustic properties of various liquids.
3. Acquire knowledge in optical properties of solids.
4. Make the student to acquire practical skills in the determination of water quality parameters through volumetric and instrumental analysis.
5. Acquaint the students with the determination of molecular weight of a polymer by viscometry

REFERENCES:

1. Practical Fiber Optics, D. Bailey and E. Wright, 2003
2. J.Mendham, RC Denney, JD Barnes, MJK Thomas, Text book of quantitative chemical analysis, Vogel's, 2008

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3. <http://www.mgcub.ac.in/pdf/material/20200428101433e562a8b8e8.pdf>
4. <http://depthome.brooklyn.cuny.edu/physics/lab/phy2/newlabs/Diffraction-grating-ver-2.pdf>
5. http://web.physics.ucsb.edu/~phys128/experiments/interferometry/measuring_wavelength.pdf

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	1	-	1	1	-	-	1	-	1	1
CO2	2	1	1	-	1	1	-	-	1	-	1	1
CO3	2	1	1	-	1	1	-	-	1	-	1	1
CO4	2	1	1	-	1	1	-	-	1	-	1	1
CO5	2	1	1	-	1	1	-	-	1	-	1	1
AVG	2	1	1	--	1	1	-	-	1	-	1	1

JGE1112	PROGRAMMING IN C LABORATORY (Common to all B.E /B.Tech Programmes)	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES

The students should be made to:

Be exposed to the syntax of C.

Be familiar with programming in C.

Learn to use arrays, strings, functions, pointers, structures and unions in C.

LIST OF EXERCISES

1. Usage of Basic Linux commands
2. C Programming using Simple statements and expressions
3. Scientific problem solving using decision making and looping.
4. Simple programming for one dimensional and two dimensional arrays.
5. Solving problems using Strings
6. C Programming using Pointers
7. C Programming using user defined functions (Pass by value and Pass by reference)
8. C Programming using Recursion
9. C Programming using structures and union
10. C Programming using enumerated data types
11. C Programming using macros and storage classes
12. C Programming using Files

TOTAL: 45 PERIODS

OUTCOMES

At the end of the course, the student should be able to: Write simple C Programs

Able to solve scientific problems using C Develop modularized applications in C

REFERENCES:

1. Yashavant P. Kanetkar. "Let Us C", BPB Publications, 16th edition 2017.

WEBSITE REFERENCE

<https://www.geeksforgeeks.org/>

WEBSITE REFERENCES

1. <https://www.javatpoint.com/first-c-program>

2. <https://www.w3resource.com/c-programming-exercises/>
3. <https://www.javatpoint.com/functions-in-c>
4. <https://www.programiz.com/c-programming/c-structures-pointers>
5. <https://www.sitesbay.com/cprogramming/c-applications>

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	2	-	-	-	2	2	2		2
CO2	3	3	3	3	-	-	-	3	3	3		3
CO3	3	3	3	3	-	-	-	3	3	3		3
CO4	3	3	3	3	-	-	-	3	3	3		3
CO5	3	3	3	3	-	-	-	3	3	3		3
AVG	3	3	3	3	-	-	-	3	3	3		3

JGE1111	DESIGN APPRECIATION LABORATORY (Common to all B.E /B.Tech Programmes)	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.
- To kindle own creativity, ideation and realize the importance of team working.
- To gain knowledge through experience in handling of engineering aggregates.
- To appreciate the use of various mechanisms involved in engineering products.
- To understand the interactions between its subsystems and their functionality.

GROUP A (CIVIL & MECHANICAL)

I CIVIL ENGINEERING PRACTICE

13

Buildings:

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

Plumbing Works:

(a) Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.

(b) Study of pipe connections requirements for pumps and turbines.

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

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

(e) Demonstration of plumbing requirements of high-rise buildings.

Carpentry using Power Tools only:

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

(b) Hands-on-exercise: Wood work, joints by sawing, planing and cutting.

II MECHANICAL ENGINEERING PRACTICE

18

Welding:

(a) Preparation of butt joints, lap joints and T- joints by Shielded metal arc welding.

(b) Gas welding practice

Basic Machining:

- (a) Simple Turning and Taper turning
- (b) Drilling Practice

Sheet Metal Work:

- a. Forming & Bending:
- b. Model making – Trays and funnels.
- c. Different type of joints.

Machine assembly practice:

- a. Centrifugal pump
- b. Air conditioner
- c. Internal combustion engine (2 Stroke and 4 Stroke)
- d. Transmission system for diesel engine
- e. Braking systems
- f. Gear Box

Demonstration on:

- (a) Smithy operations, upsetting, swaging, setting down and bending. Example – Exercise – Production of hexagonal headed bolt.
- (b) Foundry operations like mould preparation for gear and step cone pulley.
- (c) Fitting – Exercises – Preparation of square fitting and V – fitting models.

GROUP B (ELECTRICAL & ELECTRONICS)

III	ELECTRICAL ENGINEERING PRACTICE	13
	<ul style="list-style-type: none">1. Residential house wiring using switches, fuse, indicator, lamp and energy meter.2. Fluorescent lamp wiring.3. Stair case wiring4. Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.5. Measurement of energy using single phase energy meter.6. Measurement of earth resistance for electrical equipment.	
IV	ELECTRONICS ENGINEERING PRACTICE	16
	<ul style="list-style-type: none">1. Study of Electronic components– Resistor, capacitor and inductor-colour coding.2. Measurement of AC signal parameter (peak-peak, rms period, frequency) using CRO.3. Study of logic gates AND, OR, NOT, NAND, NOR, EX-OR and EX-NOR.4. Generation of Clock Signal.5. Soldering practice – Components Devices and Circuits – Using general purpose PCB.	

TOTAL: 60 PERIODS

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

CIVIL

1. Assorted components for plumbing consisting of metallic pipes, plastic pipes, flexible pipes, couplings, unions, elbows, plugs and other fittings. 15 Sets
2. Carpentry vice (fitted to work bench) 15 Nos
3. Standard woodworking tools 15 Sets
4. Models of industrial trusses, door joints, furniture joints 5 each
5. Power Tools:
 - (a) Rotary Hammer 2 Nos
 - (b) Demolition Hammer 2 Nos
 - (c) Circular Saw 2 Nos
 - (d) Planer 2 Nos
 - (e) Hand Drilling Machine 2 Nos
 - (f) Jigsaw 2 Nos

MECHANICAL

1. Arc welding transformer with cables and holders 5 Nos
2. Welding booth with exhaust facility 5 Nos
3. Welding accessories like welding shield, chipping hammer, wire brush etc. 5 Sets
4. Oxygen and acetylene gas cylinders, blow pipe and other welding outfit. 2 Nos
5. Centre lathe 2 Nos
6. Hearth furnace, anvil and smithy tools 2 Sets
7. Moulding table, foundry tools 2 Sets
8. Power Tool: Angle Grinder 2 Nos
9. Study-purpose items: centrifugal pump, air-conditioner 1 each

ELECTRICAL

1. Assorted electrical components for house wiring 15 Sets
2. Electrical measuring instruments 10 Sets
3. Study purpose items: Iron box, fan and regulator, emergency lamp 1 each
4. Megger (250V/500V) 1 No
5. Power Tools:
 - (a) Range Finder 2 Nos
 - (b) Digital Live-wire detector 2 Nos

ELECTRONICS

1. Soldering guns 10 Nos
2. Assorted electronic components for making circuits 50 Nos
3. Small PCBs 10 Nos
4. Multimeters 10 Nos
5. Study purpose items: Telephone, FM radio, low-voltage power supply

Course Outcomes:

- On successful completion of this course, the student will be able to fabricate carpentry components and pipe connections including plumbing works.
- Illustrate on centrifugal pump, Air conditioner, operations of smithy, foundry and fittings
- Carry out basic home electrical works and appliances
- Measure the electrical quantities
- Elaborate on the components, gates, soldering practices.

Web site References:

1. www.vikaspublishing.com/engineering-practices-lab
2. <https://archive.org/mechanicalengineeringworkshoplaboratory>

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	1	1	1	1	-	-	-	1	1
CO2	1	1	1	1	1	1	1	-	1	1	1	-
CO3	1	1	1	1	1	1	1	-	1	1	1	-
CO4	1	1	1	1	1	1	1	1	1	1	1	1
CO5	1	1	1	1	1	1	1	-	1	1	1	1
AVG	1	1	1	1	1	1	1	-	1	1	1	1

SEMESTER II

JHS1221	TECHNICAL ENGLISH & SOFT SKILLS II (Common to all B.E /B.Tech Programmes)	L	T	P	C
		2	0	2	3

Course Objectives:

- To make the students of engineering and technology enhance their ability to read and comprehend different texts
- To improve their creative and critical thinking so as to use in demanding contexts
- To equip the learners with the skills of writing convincing job applications and effective reports
- To develop their speaking skills to make technical presentations and participate in group discussions
- To facilitate them to hone their soft skills

UNIT I Technical Writing and Visual Conversion 6

Definitions, Purpose statements, Technical vocabulary, regular and irregular verbs - Process Description and Interpretation of Graphs and Charts

Soft Skills Lab 3

Skimming and scanning, understanding logic and sequencing in reading, inferring the exact meaning of text, making out meaning of pictorial and graphical representations

UNIT II Technical Writing and Guidelines Preparation 6

Conditional clauses, Numerical adjectives, Collocation, verbal analogies - Instructions, Recommendations, Checklist

Soft Skills Lab 3

Comprehensive listening: Listening to telephonic conversations, listening to native accents, short and long conversations from different domains, listening to various pre-recorded conversations and speeches

UNIT III 9

Soft Skills Lab

Listening and speaking practice based on BEC, IELTS and TOEFL

UNIT IV Technical Writing and Business letters 6

Cause and effect, impersonal passive voice, idioms and phrases, words used as nouns and verbs -- Letter writing – job application, business correspondence (letters) - calling for quotations, placing order, complaint letters, preparing a memo, notice and e-mail – itinerary

Soft Skills Lab 3

Group Discussions - Process, Skills, Guidelines, Evaluation, Oral Presentation – Planning, Preparing, Organizing, Presenting

UNIT V Technical Writing and Report Writing

6

Degrees of comparison, editing, Email etiquette, Misspelled words -- Report writing: survey, feasibility, industrial visit, reporting various incidents and accidents, Minutes of meeting

Soft Skills Lab

3

Starting a Career – vision statement, preparing logo and tagline, making short term and long term goals, setting plans

TOTAL:45 PERIODS

Course Outcomes:

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

- Read and understand general and technical texts
- Apply creative and critical thinking and communicate their ideas efficiently
- Participate in group discussions and deliver short speeches effectively
- Write effectively and persuasively in academic and workplace contexts
- Face the future challenges confidently and successfully

Textbooks:

1. Department of English, Anna University, Chennai. Mindscapes: English for Technologists and Engineers. Orient Black Swan, Chennai.
2. Dhanavel, S.P. English and Communication Skills for Students of Science and Engineering. Orient Black Swan Publications, Chennai, 2011.

Reference Books:

1. Rizvi, M. Ashraf, "Effective Technical Communication", Tata McGraw – Hill, 2006.
2. Ibbotson, Mark, "Cambridge English for Engineering", Cambridge University Reference Press, 2008
3. Richard Johnson-Sheehan, "Technical Communication Today" 4th Edition Books Longman Publishing Group, 2011.
4. Kenton, Sharon & Deborah Valentine, "Cross Talk: Communicating in a Multicultural Work place", Prentice Hall, 1996.
5. English, Laura M & Sarah Lynn, "Business Across Cultures: Effective Communication Strategies", Addison Wesley, 1995.

Reference Books for Soft Skills Lab – II:

1. Richard Johnson-Sheehan, "Technical Communication Today" 4th Edition Books Longman Publishing Group, 2011
2. Porter, Patricia A., and Margaret Grant, "Communicating Effectively in English: Oral Communication for Non-Native Speakers", 2nd Edition, Wadsworth, 1992.
3. Alley, Michael, "The Craft of Scientific Presentations: Critical Steps to Succeed and Critical Errors to Avoid", 1st Edition, Springer, 2007.
4. Gopalaswamy, Ramesh & Ramesh Mahadevan. ACE of Soft Skills: Attitude, Communication and Etiquette for Success, New Delhi: Pearson, 2010.

Extensive Reading:

Wells, H.G. The Time Machine, Peacock, India, 2008.

Web Links:

1. <https://learnenglish.britishcouncil.org/business-english>
2. <https://www.thebalancecareers.com>
3. <https://www.deakin.edu.au/students/studying/study-support/academic-skills/report-writing>
4. <https://www.englishclub.com>
5. <https://www.ielts.org>

Extensive Reading:

Wells, H.G. The Time Machine, Peacock, India, 2008.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	1	2	3	-	2
CO2	-	-	-	-	-	-	-	1	2	3	-	2
CO3	-	-	-	-	-	-	-	1	2	3	-	2
CO4	-	-	-	-	-	-	-	1	2	3	-	2
CO5	-	-	-	-	-	-	-	1	2	3	-	2
AVG	-	-	-	-	-	-	-	1	2	3	-	2

JMA1201	VECTOR CALCULUS AND COMPLEX ANALYSIS (Common to all B.E /B.Tech Programmes)	L	T	P	C
		2	2	0	3

COURSE OBJECTIVES:

- To familiarize students on concepts of vector calculus and complex analysis in problem solving.
- To build concepts of Laplace transforms leading up to its applications on solving differential equations

UNIT I VECTOR CALCULUS

12

Vector Differentiation: Gradient and directional derivative – Divergence and curl - Vector identities – Irrotational and Solenoidal vector fields

Vector Integration: Line and surface integrals - Green's theorem – Gauss and Stoke's theorems – Verification and evaluation in simple problems.

UNIT II ANALYTIC FUNCTIONS

12

Analytic functions – Zeros and Singularities - Necessary and sufficient conditions for analyticity in Cartesian and polar coordinates (without proof) - Properties – Harmonic conjugates – Construction of analytic functions - Conformal mappings – $w = z + c$, $w = cz$, $w = \frac{1}{z}$ – Bilinear transformation.

UNIT III COMPLEX INTEGRATION

12

Cauchy's integral theorem – Cauchy's integral formula – Taylor's and Laurent's series - Types of Singularities and residues – Cauchy's Residue theorem – Application of residue theorem for evaluation of real integrals (Circular contour and semi-circular contour only).

UNIT IV LAPLACE TRANSFORMS

12

Definition - Existence conditions – Transforms of elementary functions – Transforms of unit step function and unit impulse function – Properties with proof – Initial and final value theorems – Transform of periodic functions – Convolution theorem with proof – Problems.

UNIT V INVERSE LAPLACE TRANSFORMS

12

Definition - Evaluation of Inverse Laplace transforms by using properties, partial fractions, residues and convolution theorem - Applications to solution of linear second order ordinary differential equations with constant coefficients.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of the course, students will be able

- To understand concepts of vector calculus and evaluate line and surface integrals
- To understand analyticity of complex valued functions, bilinear transformation and conformal mappings
- To evaluate complex integrals using Cauchy's integral and Cauchy's residue theorems
- To find Laplace transforms of functions using definition and properties
- To apply Laplace transform method in solving differential equations

TEXT BOOKS:

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd Edition, 2014.
2. Kreyszig Erwin, "Advanced Engineering Mathematics ", John Wiley and Sons, 10th Edition, New Delhi, 2016.
3. P.Anuradha and V.Sudhakar, "Vector Calculus and Complex Analysis", Scitech Publications, 1st Edition, Chennai, 2019.

REFERENCES:

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

WEB REFERENCES

1. <https://nptel.ac.in/courses/111/105/111105122/>
2. <https://nptel.ac.in/courses/111/106/111106141/>
3. <https://nptel.ac.in/courses/111/107/111107056/>
4. <https://nptel.ac.in/courses/111/106/111106139/>

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	-	-	-	2	-	-	2
CO2	3	3	2	2	-	-	-	-	2	-	-	2
CO3	3	3	2	2	-	-	-	-	2	-	-	2
CO4	3	3	2	2	-	-	-	-	2	-	-	2
CO5	3	3	2	2	-	-	-	-	2	-	-	2
AVG	3	3	2	2	-	-	-	-	2	-	-	2

JBE1223	APPLIED SCIENCE FOR ELECTRONICS AND INFORMATION ENGINEERING	L	T	P	C
		2	0	2	3

COURSE OBJECTIVES

- To understand the essential principles of semiconductor device and Electron transport properties.
- To understand the essential principles of magnetic properties of materials.
- To understand the essential principles of optical properties of materials.
- To compare the basic concepts of hybridization with chemical bonding.
- To understand about the principles in various analytical techniques.

UNIT I SEMICONDUCTING MATERIAL

8

Intrinsic semiconductor – Carrier concentration – Fermi level – Variation of Fermi level with temperature – Electrical conductivity – Band gap determination – Compound semiconductors -Direct and Indirect band gap- Carrier concentration in N-type and P-type semiconductor – Variation of Fermi level with temperature and Impurity concentration — Hall effect –Determination of Hall coefficient – Applications.

UNIT II MAGNETIC AND SUPERCONDUCTING MATERIALS

8

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 - Superconductivity: properties – Type I and Type II superconductors – BCS theory of superconductivity (Qualitative) – High T_c superconductors – Applications of Superconductors – SQUID, Cryotron, Magnetic levitation.

UNIT III OPTICAL PROPERTIES OF MATERIALS

7

Classification of Optical materials - metals, insulators and semiconductors) – Carrier generation and Recombination processes - Absorption emission and Scattering of light (concepts only) - Photo current in a P-N diode – Solar cell - LED – Organic LED – Optical data storage techniques.

UNIT IV CHEMICAL BONDING AND CONDUCTIVITY IN SOLIDS

11

Valence bond theory-concept of hybridization (sp, sp² and sp³) - Molecular orbital theory-energy level diagram for H₂, N₂, O₂. Band theory - Salient feature-Application of band theory (conductor, semiconductor, insulator)-Semiconductor- Types (intrinsic and extrinsic) - Band energy levels for pure silicon crystal, band model of n-type and p-type semiconductanceof silicon. Types -Nonelemental semiconductor, Defect semiconductor, Chalcogen semiconductor (definition, properties). Preparation of Germanium-Fractional distillation and crystal growth methods. Fullerenes-preparation, properties and applications. Conducting polymer-Types-mechanism of conduction (polyacetylene) -polyaniline - properties, applications.

UNIT V INSTRUMENTAL METHODS OF ANALYSIS

11

Thermal analysis techniques- Thermo gravimetric analysis and Differential thermal analysis- Principle, instrumentation and applications - Concept of chromatography – Principle, instrumentation and applications of Paper chromatography, Column chromatography, Thin layer chromatography and Gas chromatography. Principle and applications of Conductometric titrations, Potentiometric titrations and pH-metry.

PHYSICS LABORATORY

LIST OF EXPERIMENTS: (ANY 5)

1. Determination of dispersive power of the given solid prism using spectrometer
2. Determination of thickness of the given thin material by forming interference fringes using air-wedge setup
3. Analysis of I-V Characterization of Solar cell
4. Determination of energy gap of the given semiconductor by plotting the graph between current and temperature
5. Determination of acceptance angle of the given fiber cable.
6. Determination of Young's modulus for the given uniform bar by nonuniform bending method

CHEMISTRY LABORATORY

LIST OF EXPERIMENTS (ANY 5)

1. Determination of strength of hydrochloric acid using pH meter.
2. Determination of strength of acids in a mixture of acids using conductivity meter.
3. Conductometric titration of strong acid vs strong base.
4. Estimation of iron content using potentiometer.
5. Estimation of iron content of the water sample using spectrophotometer (thiocyanate method).
6. Estimation of sodium and potassium present in water using flame photometer.
7. Determination of SAP and FAV values of an oil.
8. Estimation of acetic acid adsorbed on charcoal

TOTAL: 60 PERIODS

COURSE OUTCOMES

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

- Acquire knowledge on basics of conductivity of solids, semiconductor physics and its applications in various devices,
- Get knowledge on magnetic properties of materials and their applications in data storage
- Have the necessary understanding on the functioning of optical materials for optoelectronics
- Acquainted with hands-on knowledge in the quantitative chemical analysis through instrumental analysis
- Acquire practical knowledge on interference pattern, semiconductor devices, solar cells and instrumental analysis of acids, bases and heavy metals.

TEXT BOOKS

1. Kasap, S.O.- Principles of Electronic Materials and Devices, McGraw, Education, 2007.
2. Jasprit Singh, Semiconductor Devices: Basic Principles, Wiley 2012.
3. Kittel, C. Introduction to Solid State Physics. Wiley, 2005.
4. Umesh K Mishra & Jasprit Singh, "Semiconductor Device Physics and Design", Springer, 2008.
5. Jain P.C. and Monica Jain, "Engineering Chemistry", Dhanpat Rai Publishing Company (P) Ltd., New Delhi, 2010.

REFERENCES

1. Garcia, N. & Damask, A. "Physics for Computer Science Students". Springer-Verlag, 2012
2. Wahab, M.A. "Solid State Physics: Structure and Properties of Materials". Narosa Publishing House, 2009.
3. K.SeshaMaheswaramma, MridulaChugh, Engineering chemistry, Pearson, 2016.
4. O.G.Palanna, Engineering Chemistry, Mc Graw Hill, 2017.
5. Gurdeep R.Chatwal, Sham K. Anand, Instrumental methods of chemical analysis, HimalayaPublishing House, 2007.
6. Practical Fiber Optics, D. Bailey and E. Wright, 2003.
7. J.Mendham, RC Denney, JD Barnes, MJK Thomas, Text book of quantitative chemical analysis, Vogel's, 2008.
8. Quantitative and qualitative analysis, U.Alexeyer, MIR publication, Moscow (1979). AnalyticalChemistry, Gary D.Christian, Wiley, 2005.

WEBSITE LINK

1. <https://nptel.ac.in/courses/115/102/115102025/>
2. <https://www.youtube.com/watch?v=6QUFuZpCgGw>
3. <http://tiny.cc/0vhjuz>
4. <https://nptel.ac.in/content/storage2/courses/103108100/module7/module7.pdf>
5. <https://nptel.ac.in/courses/108/108/108108122/>

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	1	-	-	1	-	-	1	-	1	-
CO2	2	1	1	-	-	1	-	-	1	-	1	-
CO3	2	1	1	-	-	1	-	-	1	-	1	-
CO4	2	1	1	-	-	1	-	-	1	-	1	-
CO5	2	1	1	-	-	1	-	-	1	-	1	-
AVG	2	1	1	--	-	1	-	-	1	-	1	-

JGE1201	Python Programming (Common to all B.E /B.Tech Programmes)	L	T	P	C
		3	0	0	3

Course Objectives

- To provide an introduction to Python Programming Language.
- To understand the decision making and looping concepts.
- To understand functions, strings and list in Python.
- To understand tuples, dictionaries and files.
- To know the exception handling and 2D concepts.

Unit 1 Introduction to Python 9

History of Python, Features, Installing Python, Running Python Program, Interactive mode programming, Script Mode Programming, Identifiers, Reserved Words, Indentation, Comments, Variables, Data Types, Data Type Conversion

Unit 2 Decision Making and Looping 9

Python Operators, Operator Precedence, Decision Making: if Statement, if else Statement, if elif else Statement, nested if Statement, Loops: while loop, for loop, nested loops; Loop Control Statements: continue Statement, break Statement, pass Statement: Iterator and Generator

Unit 3 Functions, String, List 9

Functions: Pre defined Functions, User defined Functions, Recursion, Lambda Function; String: Functions, methods, modules; Lists: Operations, pre-defined functions, advanced list processing; Packages

Unit 4 Tuples, Dictionary, Files 9

Tuples: Tuple Operations and methods, Dictionary: Dictionary Operations and methods; Files: Text Files, Reading and writing Files; Format Operator, Command line argument

Unit 5 Exception handling and graphics 9

Date & Time Methods, Exception handling clauses, Raising an Exception, User Defined Exception; Simple graphics and image processing, simple 2D drawing - colors and shapes.

Total : 45 Periods

Course Outcomes : At the end of the course, the student will be able

- Co1 : To understand the evolution of Python and run basic python programs.
- Co2 : To structure simple python programs for solving programs.
- Co3 : To Decompose larger programs into functions.
- Co4 : To Understand compound structures like list, tuple, dictionary.
- Co5 : To Learn basic 2D graphics concepts in Python.

Textbooks :

1. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist``, 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016_(<http://greenteapress.com/wp/think-python/>)
2. Guido van Rossum and Fred L. Drake Jr, —An Introduction to Python – Revised and updated for Python 3. 2, Network Theory Ltd., 2011.

References :

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

Web site References:

1. https://www.w3schools.com/python/python_reference.asp
2. <https://www.pythonforbeginners.com/basics/python-websites-tutorials>
3. <https://www.programiz.com/python-programming/methods/built-in/list>
4. <https://www.geeksforgeeks.org/python-convert-dictionary-to-list-of-tuples/>
5. <https://www.javatpoint.com/python-exception-handling>

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	-	-	-	-	-	-	-	-	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-
CO3	3	3	3	-	-	-	-	-	-	-	-	-
CO4	3	3	3	-	-	-	-	-	-	-	-	-
CO5	3	3	3	-	-	-	-	-	-	-	-	-
AVG	3	3	3	-	-	-	-	-	-	-	-	-

JEC1204	DIGITAL LOGIC FUNDAMENTALS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To design digital circuits using simplified Boolean functions
- To analyze and design combinational circuits
- To analyze and design synchronous sequential circuits
- To analyze and design asynchronous sequential circuits
- To understand Memory and Programmable Logic Devices

UNIT I BOOLEAN ALGEBRA AND LOGIC GATES 12

Number Systems - 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 - Binary Adder-Subtractor - Decimal Adder - Binary Multiplier - Magnitude Comparator - Decoders – Encoders – Multiplexers.

UNIT III SYNCHRONOUS SEQUENTIAL LOGIC 12

Sequential Circuits - Storage Elements: Latches , Flip-Flops - Analysis of Clocked Sequential Circuits - State Reduction and Assignment - Design Procedure - Registers and Counters.

UNIT IV ASYNCHRONOUS SEQUENTIAL LOGIC 12

Analysis and Design of Asynchronous Sequential Circuits – Reduction of State and Flow Tables – Race-free State Assignment – Hazards.

UNIT V MEMORY AND PROGRAMMABLE LOGIC 12

RAM – Memory Decoding – Error Detection and Correction - ROM - Programmable Logic Array – Programmable Array Logic – Sequential Programmable Devices.

TOTAL : 60 PERIODS

OUTCOMES:

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

- Simplify Boolean functions using KMap
- Design and Analyze Combinational and Sequential Circuits
- Design and Analyze synchronous sequential circuits
- Analyze and design asynchronous sequential circuits
- Implement designs using Programmable Logic Devices

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 Learning, 2013

5. Donald D. Givone, Digital Principles and Design, Tata McGraw Hill, 2003.

WEBSITE REFERENCES:

1. <https://nptel.ac.in/courses/108/105/108105113/>
2. <http://www.nptelvideos.com/lecture.php?id=93303>.
3. <https://nptel.ac.in/courses/117/106/117106086/>
4. <https://nptel.ac.in/courses/117/106/117106086/>
5. <http://www.nptelvideos.com/lecture.php?id=9616CO->

PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1	2	2	1	-	-	-	-	2	2
CO2	3	3	1	2	3	1	-	-	-	-	2	2
CO3	3	3	1	2	2	1	-	-	-	-	2	2
CO4	3	3	1	2	2	1	-	-	-	-	2	2
CO5	2	2	1	2	2	1	-	-	-	-	2	2
AVG	3	3	1	2	2	1	-	-	-	-	2	2

JGE1212	ENGINEERING GRAPHICS & DESIGN (Common to all B.E /B.Tech Programmes)	L	T	P	C
		2	0	4	3

AIM : To develop graphic skills in students.

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

UNIT I PLANE CURVES AND FREE HAND SKETCHING

12

Curves used in engineering practices:

Conics – Construction of ellipse, Parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves.

Free hand sketching:

Representation of Three Dimensional objects – General principles of orthographic projection – Need for importance of multiple views and their placement – First angle projection – layout views

– Developing visualization skills through free hand sketching of multiple views from pictorial views of objects.

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES

12

Projection of points and straight lines located in the first quadrant – Determination of true lengths and true inclinations – Projection of polygonal surface and circular lamina inclined to both reference planes.

UNIT III PROJECTION OF SOLIDS

12

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.

UNIT IV SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES

12

Sectioning of above solids in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other – Obtaining true shape of section.

Development of lateral surfaces of simple and truncated solids – Prisms, pyramids, cylinders and cones – Development of lateral surfaces of solids with cylindrical cutouts, perpendicular to the axis.

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS 12

Principles of isometric projection – isometric scale – isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones. Perspective projection of prisms, pyramids and cylinders by visual ray method.

TOTAL : 60 PERIODS

COMPUTER AIDED DRAFTING:

Using AutoCAD Software and Simple 2D Sketches.

TEXT BOOKS:

1. Natarajan K.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.
3. Bhatt N.D. and Panchal V.M., —Engineering Drawing], Charotar Publishing House, 50th Edition, 2010

REFERENCES:

1. Basant Agarwal and Agarwal C.M., “Engineering Drawing”, Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.
2. Gopalakrishna K.R., “Engineering Drawing” (Vol. I & II combined), Subhas Stores, Bangalore, 2007.
3. 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.
4. N S Parthasarathy and Vela Murali, “Engineering Graphics”, Oxford University, Press, New Delhi, 2015.
5. Shah M.B and Rana B.C., “Engineering Drawing”, Pearson, 2nd Edition, 2009.

Publication of Bureau of Indian Standards:

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

Web site References:

1. www.pdfdrive.com/engineering-drawing-books.html
2. <https://freevideolectures.com>
3. <https://nptel.ac.in/courses>
4. <https://nptel.ac.in/courses/105/104/105104148/>
5. <https://nptel.ac.in/courses/112/103/112103019/>

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	-	1	1	-	1	1	1	1	1
CO2	1	1	1	1	1	1	1	-	1	1	1	-
CO3	1	-	1	1	1	-	1	1	1	1	1	1
CO4	-	1	1	1	-	1	1	1	1	1	1	1
CO5	1	1	1	-	1	1	1	1	1	1	-	1
AVG	1	1	1	1	1	1	1	1	1	1	1	1

JNC1261	<p style="text-align: center;">ENVIRONMENTAL SCIENCE (Common to all B.E /B.Tech Programmes)</p>	L	T	P	C
		3	0	0	0

COURSE OBJECTIVES

- To study the interrelationship between living organism and environment.
- To finding and implementing scientific, technological to environmental problems due to pollution.
- To study about various natural resources and the individual responsibility to conserve it.
- To study on the social issues over environment.
- To get knowledge on population explosion, human rights and value education.

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY

9

Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids - Nitrogen Cycle, Oxygen Cycle, Carbon Cycle, Phosphorous Cycle. Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – value of biodiversity- threats to biodiversity– conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.

UNIT II ENVIRONMENTAL POLLUTION

9

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 – climate change, global warming, acid rain, ozone layer depletion.

UNIT III NATURAL RESOURCES

9

Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over- utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources- effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity. Energy resources: renewable and non renewable energy sources, Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources.

UNIT V SOCIAL ISSUES AND THE ENVIRONMENT

9

Urban problems related to energy – water conservation- rain water harvesting, watershed management – resettlement and rehabilitation of policy. – consumerism and waste products – environment production act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act – enforcement machinery involved in environmental legislation- central and state pollution control boards- Public awareness.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT

9

Human 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

COURSE OUTCOMES

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

- Explain about ecosystem, their structure and function to conserve biodiversity.
- Recognize the level of environmental pollution and their control measures.
- Explain about the various types of natural resources and role of a human being in maintaining a cleansustainable environment for the future generations.
- Identify the social problems in the environment to reduce social issues.
- Understand environment and human health – human rights – value education, and the role of information technology in environment and human health.

TEXT BOOKS:

1. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2006.
2. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education, 2004.

REFERENCES:

1. Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT LTD, New Delhi, 2007.
2. Erach Bharucha, —Textbook of Environmental Studies, Universities Press (I) PVT, LTD, Hyderabad, 2015.
3. Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press, 2005.
4. G. Tyler Miller and Scott E. Spoolman, —Environmental Science, Cengage Learning India PVT, LTD, Delhi, 2014.

WEB SITE REFERENCES:

1. <https://moef.gov.in/e-books/>
2. <https://www.csindia.org/understanding-eia-383>
3. <https://nptel.ac.in/courses/120108004>
4. <https://nptel.ac.in/courses/107/103/107103081/>
5. <https://nptel.ac.in/courses/109/104/109104045/>

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	-	-	-	3	2	-	-	1	-
CO2	1	-	-	-	-	-	3	2	-	-	1	-
CO3	1	-	-	-	-	-	3	2	-	-	1	1
CO4	1	-	-	-	-	2	3	2	-	-	1	-
CO5	1	-	-	-	-	2	3	2	-	-	1	-
AVG	1	-	-	-	-	2	3	2	-	-	1	1

JGE1211	PYTHON PROGRAMMING LABORATORY (Common to all B.E /B.Tech Programmes)	L	T	P	C
		0	0	4	2

Course Objectives

To write, test, and debug simple Python programs.
To implement Python programs with conditionals and loops. Use functions for structuring Python programs.

Represent compound data using Python lists, tuples, dictionaries. To implement basic 2D diagrams.

LIST OF PROGRAMS

1. Compute the GCD of two numbers.
2. Find the square root of a number (Newton's method)
3. Exponentiation (power of a number)
4. Find the maximum of a list of numbers
5. Guess an integer number in a range
6. Insert a card in a list of sorted cards.
7. Multiply matrices
8. Programs that take command line arguments (word count)
9. Find the most frequent words in a text read from a file
10. Create a User defined Exception
11. Draw a 2D circle and square

Total : 60Periods

PLATFORM NEEDED

Python 3 interpreter for Windows/Linux

Course Outcomes :

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

Write, test, and debug simple Python programs.

Implement Python programs with conditionals and loops.

Develop Python programs step-wise by defining functions and calling them. Use Python lists, tuples, dictionaries for representing compound data.

Draw 2D graphic diagrams in Python.

WEBSITE REFERENCE:

1. <https://www.programiz.com/python-programming/examples>
2. <https://www.javatpoint.com/python-condition-and-loops-programs>
3. <https://realpython.com/python-lists-tuples/>
4. <https://www.tutorialsteacher.com/python/python-user-defined-function>
5. <https://www.cdslab.org/python/notes/visualization/2d/2d.html> CO-

PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	-	3	-	-	3	3	3	-	3
CO2	3	3	3	-	3	-	-	3	3	3	-	3
CO3	3	3	3	-	3	-	-	3	3	3	-	3
CO4	3	3	3	-	3	-	-	3	3	3	-	3
CO5	3	3	3	-	3	-	-	3	3	3	-	3
AVG	3	3	3	-	3	-	-	3	3	3	-	3

JEC1214	DIGITAL LOGIC FUNDAMENTALS LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

- To understand the various basic logic gates
- To design and implement the various combinational circuits
- To design and implement combinational circuits using MSI devices.
- To design and implement sequential circuits

LIST OF EXPERIMENTS

1. Verification of Boolean Theorems using basic gates.
2. Design and implementation of combinational circuits using basic gates for arbitrary functions, codeconverters.
3. Design and implement Half/Full Adder and Subtractor
4. Design and implement combinational circuits using MSI devices:
 - 4 – bit binary adder / subtractor
 - Parity generator / checker
 - Magnitude Comparator
5. Application using multiplexers
6. Design and implement shift-registers.
7. Design and implement synchronous counters.
8. Design and implement asynchronous counters.
9. Design and implementation of a simple digital system (Mini Project).

TOTAL: 60PERIODS

OUTCOMES:

- Upon Completion of the course, the students will be able to:
- Implement simplified combinational circuits using basic logic gates
- Implement combinational circuits using MSI devices
- Implement sequential circuits like registers and counters

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

1. Digital trainer kits - 30
2. Digital ICs required for the experiments in sufficient numbers

WEBSITE REFERENCES:

1. <http://vlabs.iitkgp.ac.in/dec/>
2. www.electronicshobby.com

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	1	2	1	-	-	-	1	3
CO2	3	3	2	2	1	2	1	-	-	-	2	3
CO3	3	2	2	2	1	2	1	-	-	-	2	3
CO4	3	2	2	2	1	2	1	-	-	-	2	3
AVG	3	3	2	2	1	2	1	-	-	-	2	3

SEMESTER III

JMA1303	DISCRETE MATHEMATICS AND NUMBER THEORY	L	T	P	C
		2	2	0	3

COURSE OBJECTIVES

- To equip students with the ability to deal with abstraction by way of propositional logic
- To familiarize students in combinatorial problems and basics of graph theory
- To introduce fundamental concepts in number theory and its applications

UNIT I LOGIC AND PROOFS

12

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

UNIT II COMBINATORICS

12

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

UNIT III 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 IV DIVISIBILITY THEORY AND CANONICAL DECOMPOSITIONS

12

Division algorithm – Base-b representations – Number patterns – Prime and composite numbers – GCD – Euclidean algorithm – Fundamental theorem of arithmetic – LCM - Linear Diophantine equations

UNIT V CONGRUENCES AND CLASSICAL THEOREMS

12

Congruences – Linear Congruences - Applications: Divisibility tests - Modular exponentiation - Chinese remainder theorem – 2 x 2 linear systems – Wilson’s theorem – Fermat’s little theorem – Euler’s theorem – Euler’s Phi functions – Tau and Sigma functions

TOTAL : 60 PERIODS

COURSE OUTCOMES

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

- To use propositional logic and various proof methods and strategy in applications
- To use counting principles and mathematical induction in solving combinatorial problems

- To demonstrate efficient use of graph theoretic concepts in solving connectivity and shortest path problems
- To apply divisibility theory and canonical decompositions of number theory in applications
- To solve simple problems using classical theorems of number theory

TEXT BOOKS

1. Rosen, K.H., “Discrete Mathematics and its Applications”, 7th Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, Special Indian Edition, 2011.
2. Tremblay, J.P. and Manohar.R, “Discrete Mathematical Structures with Applications to Computer Science”, Tata McGraw Hill Pub. Co. Ltd, New Delhi, 30th Reprint, 2011.
3. Koshy, T., “Elementary Number Theory with Applications”, Elsevier Publications, New Delhi, 2002.

REFERENCES

1. Grimaldi, R.P., “Discrete and Combinatorial Mathematics: An Applied Introduction”, 4th Edition, Pearson Education Asia, Delhi, 2007.
2. Lipschutz, S. and Mark Lipson., “Discrete Mathematics”, Schaum’s Outlines, Tata McGrawHill Pub. Co. Ltd., New Delhi, 3rd Edition, 2010.
3. Koshy, T., “Discrete Mathematics with Applications”, Elsevier Publications, 2006.
4. Lidl, R. and Pitz, G, “Applied Abstract Algebra”, Springer Verlag, New Delhi, 2nd Edition, 2006.
5. Niven, I., Zuckerman.H.S., and Montgomery, H.L., “An Introduction to Theory of Numbers”, John Wiley and Sons, Singapore, 2004.
6. San Ling and Chaoping Xing, “Coding Theory – A first Course”, Cambridge Publications, Cambridge, 2004.

WEB REFERENCES

1. <https://nptel.ac.in/courses/111/106/111106086/>
2. <https://nptel.ac.in/courses/111/106/111106155/>
3. <https://nptel.ac.in/courses/111/106/111106102/>
4. <https://nptel.ac.in/courses/111/101/111101137/>
5. <https://nptel.ac.in/courses/111/103/111103020/>

CO-PO MAPPINGS

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	-	-	-	2	-	-	2
CO2	3	3	2	2	-	-	-	-	2	-	-	2
CO3	3	3	2	2	-	-	-	-	2	-	-	2
CO4	3	3	2	2	-	-	-	-	2	-	-	2
CO5	3	3	2	2	-	-	-	-	2	-	-	2
AVG	3	3	2	2	-	-	-	-	2	-	-	2

JCS1301	DATA STRUCTURES	L	T	P	C
		3	0	0	3

UNIT I DATA STRUCTURES IN C –LISTS 9

Dynamic memory allocation using malloc (), free() - Pointers to Structure - Introduction to Data Structures– Abstract Data Types (ADTs) – List ADT – Array-based implementation – Linked list implementation – Singly linked lists- Circularly linked lists– Doubly-linked lists – Applications of lists – Polynomial Manipulation

UNIT II LINEAR DATA STRUCTURES- STACK AND QUEUE 9

Stack ADT – Array implementation of stack – Linked List implementation of stack– Applications of stack ADT– Infix to Postfix Notation, Evaluating arithmetic expressions – Queue ADT – Array implementation of Queue – Linked List implementation of Queue – Circular queue – Applications of queues

UNIT III NON-LINEAR DATA STRUCTURES- TREES 9

Tree ADT –Tree terminologies – Binary Tree ADT- Tree traversals – Expression trees – Binary search tree ADT - AVL Trees – Complete binary tree – Full binary tree-Heap – Priority queue Using Heap –B-Tree - B+Tree

UNIT IV NON-LINEAR DATA STRUCTURES- GRAPHS 9

Graphs - Definition – Representation of Graph – Types of graph – Breadth-first traversal–Depth first traversal – Topological Sort – Applications of graphs-Shortest path algorithm – Dijkstra’s algorithm- Minimum spanning trees- Prim’s Algorithm-Kruskal’s Algorithm

UNIT V SEARCHING, SORTING AND HASHING TECHNIQUES 9

Searching- Linear Search – Binary Search. Sorting – Bubble sort – Selection sort – Insertion sort Hashing- Hash Functions – Separate Chaining – Open Addressing – Rehashing

TOTAL 45 PERIODS

COURSE OUTCOMES

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

- Write programs using pointers and structures in C
- Implement abstract data types of linear data structures
- Apply the different linear data structures to problem solutions
- Apply the different non-linear data structures to problem solutions
- Implement the various sorting and hashing algorithms

TEXT BOOKS

1. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, 2nd Edition, PearsonEducation,2014.

- Yashavant Kanetkar, "Understanding Pointers in C & C++", 5th Revised & Updated Edition, BPB Publications, 2018.

REFERENCES

- Reema Thareja, "Data Structures Using C", Second Edition, Oxford University Press, 2014.
- E. Balagurusamy, "Data Structures Using C", McGraw Hill Education; First edition 2017.
- Jeri R. Hanly, Elliot B. Koffman, "Problem Solving and Program Design in C", 7th Edition, 2012, Prentice-Hall.
- A.K Sharma, "Data Structures using C", Second Edition, Pearson Education India 2013.
- Aaron M. Tenenbaum, Yedidyah Langsam, Moshe J. Augenstein, "Data Structures Using C", Pearson Education; First edition 2019.
- Aho, Hopcroft and Ullman, "Data Structures and Algorithms", Pearson Education, 2002.

WEBSITE LINKS

- <https://nptel.ac.in/courses/106/102/106102064/>
- <https://www.hackerearth.com/practice/data-structures/arrays/1-d/tutorial/>
- <https://www.geeksforgeeks.org/data-structures/>
- https://www.tutorialspoint.com/data_structures_algorithms/index.htm

Mapping of CO with PO/PSO

	Program 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	PSO 1	PSO 2	PSO 3
CO-1	3	3	3	1	-	-	-	2	3	3	-	3	2	3	1
CO-2	3	3	3	-	-	-	-	3	3	3	-	3	3	3	3
CO-3	3	3	3	1	-	-	-	3	3	3	-	3	3	3	1
CO-4	3	3	3	1	-	-	-	3	3	3	-	3	3	3	2
CO-5	3	3	3	1	-	-	-	3	3	3	-	3	2	3	2

JCS1302	DATABASE MANAGEMENT SYSTEMS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To learn the working of various data models and get exposed to SQL querying
- To design database with ER models and understand the significance of normalization
- To understand the fundamental concepts of transaction processing- concurrency control techniques and recovery procedures
- To have an introductory knowledge about the Storage and Query processing Techniques
- To familiarize the students with different types of advanced databases

UNIT I DATA MODELS AND QUERYING 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 DESIGN AND NORMALIZATION 9

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

UNIT III TRANSACTION PROCESSING 9

Transaction Concepts – ACID Properties – Schedules – Serializability – Concurrency Control – Need for Concurrency – Locking Protocols – Two Phase Locking – Deadlock – Transaction Recovery Save Points – Isolation Levels – SQL Facilities for Concurrency and Recovery.

UNIT IV 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 – Query optimization.

UNIT V ADVANCED DATABASE SYSTEMS 9

Distributed Databases Architecture – Data Storage – Transaction Processing – Object-based Databases Object Database Concepts – Object-Relational Features – ODMG Object Model – ODL – OQL XML Databases – XML Hierarchical Model – DTD – XML Schema – XQuery – Database Connectivity – Fundamentals of Database security.

TOTAL : 45 PERIODS

COURSE OUTCOMES

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

- Design efficient databases and extract information with SQL queries
- Develop preliminary design of normalized databases
- Analyze the various transactions and provide smooth access of data
- Create organized databases and write optimized queries
- Learn the various advanced database concepts and security

TEXT BOOKS

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, Seventh Edition, Tata McGraw Hill, 2020.
2. RamezElmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, Sixth Edition, Pearson Education, 2015.

REFERENCES

1. Raghu Ramakrishnan, “Database Management Systems”, Fourth Edition, McGraw-Hill College Publications, 2015.
2. C.J.Date, A.Kannan, S.Swamynathan, “An Introduction to Database Systems”, Eighth Edition, Pearson Education, 2008.
3. G.K.Gupta, “Database Management Systems”, Tata McGraw Hill, 2011.

WEBSITE LINKS

1. <https://www.tutorialspoint.com/dbms/index.htm>
2. <https://www.studytonight.com/dbms/>
3. <https://www.w3schools.in/dbms/>
4. <https://sqlzoo.net/>

Mapping of CO with PO/PSO

	Program 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	PSO 1	PSO 2	PSO 3
CO-1	3	2	3	3	2	2	3	3	2	3	3	1	2	2	3
CO-2	3	3	3	3	3	2	2	2	3	1	2	3	3	3	1
CO-3	3	2	3	1	3	3	3	2	3	3	3	3	3	2	2
CO-4	1	3	3	2	3	3	2	3	3	2	3	2	3	3	2
CO-5	3	3	3	2	2	2	3	3	2	3	2	3	2	3	2

COURSE OBJECTIVES

- To understand the basic structure and operations of a computer
- To familiarize with arithmetic and logic unit and implementation of fixed-point and floating-point arithmetic operations
- To expose the concept of pipelining
- To understand parallelism and multi-core processors
- To learn cache memories and virtual memory

UNIT I BASIC STRUCTURE OF A COMPUTER SYSTEM 9

Functional Units – Basic Operational Concepts – Performance – Instructions: Operations, Operands
– Instruction Representation – Logical Operations – Decision Making – Addressing and Addressing Modes

UNIT II ARITHMETIC FOR COMPUTERS 9

Fixed-point Representation – Addition, Subtraction, Multiplication, Division – Floating-point Representation – Floating-point Operations - Subword Parallelism

UNIT III PROCESSOR AND CONTROL UNIT 9

Basic MIPS Implementation – Building a Datapath – Control Implementation Scheme – Pipelining – Pipelined Datapath and Control – Handling Data Hazards – Handling Control Hazards – Exceptions.

UNIT IV PARALLELISM 9

Parallel Processing Challenges – Flynn’s Classification – Hardware Multithreading – Multi-core Processors and other Shared Memory Multiprocessors – Introduction to Graphics Processing Units, Clusters, Warehouse Scale Computers

UNIT V MEMORY & I/O SYSTEMS 9

Memory Hierarchy – Memory Technologies – Cache Basics – Measuring and Improving Cache Performance – Virtual Memory, TLB’s – Accessing I/O Devices – DMA and Interrupts

TOTAL : 45 PERIODS**COURSE OUTCOMES**

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

- Understand the basic structure of computers, operations and instructions
- Design arithmetic and logic unit
- Realize pipelined execution and design control unit
- Familiarize in the concepts of parallel processing architectures
- Acquire knowledge in various memory systems and I/O communication

TEXT BOOKS

1. David A. Patterson and John L. Hennessy, “Computer Organization and Design: The Hardware/Software Interface”, Fifth Edition, Morgan Kaufmann / Elsevier, 2014.
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, “Computer Organization and Embedded Systems”, Sixth Edition, Tata McGraw Hill, 2012.

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1. V. Carl Hamacher, Zvonko G. Varanescic and Safat G. Zaky, "Computer Organization", VI Edition, McGraw Hill Inc, 2012.
2. William Stallings "Computer Organization and Architecture", Seventh Edition, Pearson Education, 2006.
3. Vincent P. Heuring, Harry F. Jordan, "Computer System Architecture", Second Edition, Pearson Education, 2005.
4. Govindarajalu, "Computer Architecture and Organization, Design Principles and Applications", First Edition, Tata McGraw Hill, New Delhi, 2005.
5. John P. Hayes, "Computer Architecture and Organization", Third Edition, Tata McGraw Hill, 1998.

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1. <https://nptel.ac.in/courses/106/105/106105163/>
2. <https://people.inf.ethz.ch/omutlu/lecture-videos.html>
3. <https://freevidelectures.com/course/2274/computer-architecture>

Mapping of CO with PO/PSO

	Program Outcomes												PSO		
	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	PS O 1	PSO 2	PSO 3
CO-1	3	2	3	1	1	2	3	3	2	3	3	1	2	2	3
CO-2	3	3	3	1	1	2	2	2	3	1	2	3	3	3	2
CO-3	3	2	3	1	1	3	3	2	3	3	3	3	3	2	2
CO-4	1	3	3	1	1	3	2	3	3	2	3	2	3	3	2
CO-5	3	3	3	1	1	2	3	3	2	3	2	3	2	3	2

JCS1321	OBJECT ORIENTED PROGRAMMING (Integrated)	L	T	P	C
		2	0	2	3

COURSE OBJECTIVES

- To understand the basic concepts of Object Oriented Programming in Java
- To know the principles of inheritance and interfaces
- To define exceptions and use of I/O streams
- To learn the concepts of threads and generics classes
- To design and build simple Graphical User Interfaces using swing components

UNIT I INTRODUCTION TO OOP AND JAVA FUNDAMENTALS 12

Object Oriented Programming –objects and classes –features of OOP-OOP in Java –Characteristics of Java –The Java Environment -Java Source File–Compilation. Fundamental Programming Structures in Java –constructors, methods – method overloading, access specifiers -static members - Comments, Data Types, Variables, Operators, Control Flow, Arrays, Packages, and Naming

Conventions, Case study-simple program using objects, classes and constructors.

UNIT II INHERITANCE AND INTERFACES 12

Inheritance –Super classes-sub classes –Protected members –constructors in sub classes-the Object class –abstract classes and methods-final methods and classes –Interfaces –defining an interface, implementing interface, differences between classes and interfaces and extending interfaces -Object cloning -inner classes, Reflection, Array Lists –Strings, Case study- program using inheritance strings and array List.

UNIT III EXCEPTION HANDLING AND I/O 12

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, Case study-program using Exceptions and File Handling

UNIT IV MULTITHREADING, GENERIC PROGRAMMING AND ADVANCED JAVA 12

Differences between multi-threading and multitasking, thread life cycle, creating threads, synchronizing threads, Inter-thread communication, Fibers, daemon threads, thread groups. Generic Programming –Generic classes –generic methods –Bounded Types –Restrictions and Limitations, Case study- program using Multithreading and Generic Programming.

UNIT V EVENT DRIVEN PROGRAMMING 12

Graphics programming -Frame –Components -working with 2D shapes -Using color, fonts, and images -Basics of event handling - event handlers - adapter classes - actions -mouse events -AWT event hierarchy - Introduction to Swing –layout management -Swing Components –Text Fields, Text Areas –Buttons - Check Boxes – Radio Buttons –Lists-choices-Scrollbars –Windows –Menus–Dialog Boxes, Case study - Program using AWT components and Swing Components.

TOTAL : 60 PERIODS

LIST OF EXPERIMENTS

1. Write a Java Program to capture the personal details of a person.
2. Develop an application with Employee class with Emp_name, Emp_id, Address, Mail_id, Mobile no as members. Inherit the classes, Programmer, Assistant Professor, Associate Professor and Professor from employee class. Add Basic Pay (BP) as the member of all the inherited classes with 97% of BP as DA, 10 % of BP as HRA, 12% of BP as PF, 0.1% of BP for staff club fund. Generate pay slips for the employees with their gross and net salary.
3. Write a program to perform string operations using ArrayList.
4. Write a program to do the arithmetic operations with required exceptions.
5. Write a program to read a file and print on the console
6. Write a java program that implements a multi-threaded application that has three threads. First thread generates a random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print a value of cube of the number.
7. Write a java program to find the maximum value from the given type of elements using a generic function.

8. Design a login screen using JAVA AWT components.

COURSE OUTCOMES

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

- Develop Java programs using OOP principles
- Develop Java programs using inheritance and interfaces concepts
- Build Java applications using exceptions, I/O streams and Java beans
- Develop Java applications with threads and generic classes
- Develop interactive applications using swings

TEXT BOOKS

1. Herbert Schildt, “Java The complete reference”, 11th Edition, McGraw Hill Education, 2017.
2. Cay S. Horstmann, Gary cornell, “Core Java Volume –I Fundamentals”, 9th Edition, Prentice Hall, 2013.

REFERENCES

1. Paul Deitel, Harvey Deitel, “Java SE 8 for programmers”, 3rd Edition, Pearson, 2015
2. Steven Holzner, “Java 2 Black book”, Dreamtech press, 2011.

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1. https://www.w3schools.com/java/java_intro.asp
2. <https://www.tutorialspoint.com/java/index.html>
3. <https://www.javatpoint.com/java-tutorial>
4. <https://developer.ibm.com/tutorials/j-introtojava1/>

Mapping of CO with PO/PSO

	Program Outcomes												PSO		
	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	PS O 1	PSO 2	PSO 3
CO-1	3	2	3	1	2	2	3	3	2	3	3	1	2	2	3
CO-2	3	3	3	-	-	2	2	2	3	1	2	3	3	3	1
CO-3	3	2	3	-	-	3	3	2	3	3	3	3	3	2	2
CO-4	1	3	3	-	-	3	2	3	3	2	3	2	3	3	2
CO-5	3	3	3	-	-	2	3	3	2	3	2	3	2	3	2

JPT1001	SOFT SKILLS AND APTITUDE I	L	T	P	C
		0	0	2	*

COURSE OBJECTIVES

- To help students groom their personality and develop their skill of building social relationships
- To improve the personality traits of students and their creativity
- To help students gain knowledge in rational thinking and aptitude
- To make students think logically and judiciously
- To help student acquire technical skills in C programming language

UNIT I SOFT SKILLS AND APTITUDE - I 5

Self-Realization – Self Motivation – Relationship Building – Personality Enrichment – Personality Traits – Intra Personal Communication – Inter Personal Communication – Behavioral Based Perception – Attitude & Behavior – SWOT Analysis

UNIT II SOFT SKILLS AND APTITUDE - II 5

Dimensions of Personality – Self Confidence – Open Mindedness – Acceptance – Creativity - Strategies for developing creativity – Overcoming myths of creativity – Presence of Mind – Staying Focused – Self Acceptance – Self Growth

UNIT III QUANTITATIVE APTITUDE 6

Number system – Divisibility Rule – Simplification – Surds and Indices – Square root and Cube root – Averages – Percentage

UNIT IV LOGICAL REASONING 6

Number series – Alphabet series – Alphabet test – Word test – Letter Arrangement – Word Arrangement – Coding and Decoding – Analogy

UNIT V TECHNICAL APTITUDE IN C-I 8

Technical Aptitude in C: Program Structure – Data types – Variables – Constants – Operators – Decision Making - Switch statement – Looping statements – Functions – Call by reference - Recursive Arrays, Single dimensional, Multi-dimensional

TOTAL : 30 PERIODS

COURSE OUTCOMES

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

- Build better relationship with all in their social settings
- Engage in creative activities focusing on their career
- Solve the real time and complex problems in aptitude
- Solve critical reasoning and real time application problems

- Apply their knowledge in the basics of C programming

TEXT BOOKS

1. Dr.R.S.Aggarwal, “Quantitative Aptitude”, S. Chand Publishing,2020.
2. Dr.R.S.Aggarwal, “A Modern Approach to Verbal Reasoning”, S. Chand Publishing,2017.
3. Dr.R.S.Aggarwal, “A Modern Approach to Non-Verbal Reasoning”, S. Chand Publishing,2017.
4. Pradip Dey, Manas Ghosh, “Fundamentals of Computing and Programming in C”, First Edition, Oxford University Press, 2009.
5. Yashavant P. Kanetkar, “Let Us C”, BPB Publications, 2011.

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1. <https://www.indiabix.com/aptitude/questions-and-answers/>
2. <https://m4maths.com/placement-puzzles.php>
3. <https://www.youtube.com › watch/average>
4. <https://www.youtube.com › watch/coding and decoding>
5. <https://www.youtube.com › watch/c programs>
6. <https://www.youtube.com › watch/self confidence>
7. <https://www.youtube.com › watch/motivation>

Mapping of CO with PO/PSO

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

JCS1311	DATA STRUCTURES LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES

- To implement linear and non-linear data structures
- To identify and implement appropriate data structures for various applications
- To execute different operations of search trees
- To implement various sorting and searching algorithms
- To implement hashing techniques

LIST OF PROGRAMS

Implement the following programs

1. List ADT using Python with insert, delete, search and modify operations
2. Linked list
3. Polynomial Manipulation using list ADT
4. Stack using Python
5. a. Stack ADT using arrays
b. Stack ADT using linked list
6. a. Queue ADT using arrays
b. Queue ADT using linked list
7. Infix to Postfix conversion
8. Circular queue
9. Binary Search Trees and Tree traversals
10. AVL Trees
11. BFS and DFS of a graph
12. Bubble sort, Selection sort, Insertion sort using Python
13. Linear search and Binary search using Python
14. Hashing-Linear Probing and Quadratic Probing

TOTAL : 60 PERIODS

COURSE OUTCOMES

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

- Identify appropriate data structures for specified problem definition
- Implement operations like searching, insertion, deletion, traversing mechanism etc. on various data structures
- Apply appropriate linear / non -linear data structure operations for solving a given problem
- Implement appropriate sorting/searching technique for given problem
- Apply appropriate hash functions that result in a collision free scenario for data storage and retrieval

TEXT BOOKS

1. Yashavant Kanetkar, “Understanding Pointers in C & C++”, 5th Revised & Updated Edition, BPB Publications, 2018.
2. Rance D. Necaie, “Data Structures and Algorithms Using Python”, Wiley Publications, 2010.

WEBSITE LINKS

1. <https://www.geeksforgeeks.org/data-structures/>
2. <https://nptel.ac.in/courses/106/106/106106130/>
3. https://www.tutorialspoint.com/python_data_structure/

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

HARDWARE

Standalone desktops 30 Nos. (or) Server supporting 30 terminals or more

SOFTWARE

Ubuntu C / Python3

Mapping of CO with PO/PSO

	PO	PO2	PO3	P O4	P O5	PO6	PO7	P O8	PO9	P O10	P O11	P O12	PSO1	PSO2	PSO3
CO-1	3	-	-		-	-	-	-	-	-	-	2	3	3	3
C O-2	-	3	2	2	-	-	-	-	-	-	-	2	3	3	3
C O-3	3	-	-	3	-	-	-	-	-	-	-	-	3	3	3
CO-4	-	3	2	3	-	-	-	-	-	-	-	2	3	3	3
C O-5	-	3	2	-	-	-	-	-	-	-	-	2	3	3	3

JCS1312	DATABASE MANAGEMENT SYSTEMS LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES

- To familiarize with DDL, DML and DCL Commands
- To learn the use of nested and join queries
- To understand functions, procedures and procedural extensions of databases
- To be familiar with database triggers for specific application
- To develop applications using front-end tools and back-end DBMS

LIST OF EXPERIMENTS

1. Data Definition Commands, Data Manipulation Commands for inserting, deleting, updating and retrieving Tables and Transaction Control statements
2. Database Querying – Simple queries, Nested queries, Sub queries and Joins
3. Creation of Views, Sequences, Indexes, Savepoint and commit constraints
4. Database Programming: Implicit and Explicit Cursors with PL/SQL block
5. Creation of PL/SQL Procedures and Functions
6. Creation of PL/SQL Triggers
7. Exception Handling
8. Database Design using ER modeling, Normalization and Implementation for any application
9. Database Connectivity with Front End Tools
10. Mini project (Application Development) in one or two of the following systems
 - a) Student database system
 - b) Inventory Control System
 - c) Online Library Management
 - d) Hospital Management System
 - e) Railway Reservation System
 - f) Personal Information System
 - g) Online Course registration and maintenance System
 - h) Attendance Management System
 - i) Hotel Management System
 - j) E-commerce portal
 - k) Online auction system

TOTAL: 60 PERIODS

COURSE OUTCOMES

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

- Execute typical data definitions, data control and data manipulation commands
- Familiarize with Nested and Join Queries for extracting combinatorial data
- Implement simple applications that use Views
- Develop PL/SQL procedures, functions and packages
- Develop applications using Front-end & Back-end Tools and also to handle report generation

TEXT BOOKS

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, Seventh Edition, Tata McGraw Hill, 2020.

2. RamezElmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, Sixth Edition, Pearson Education, 2015.

WEBSITE LINKS

1. <https://www.w3schools.com/sql/default.asp>
2. https://www.tutorialspoint.com/dbms/er_diagram_representation.htm
3. https://www.tutorialspoint.com/python/python_database_access.htm
4. <https://sqlzoo.net>

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

HARDWARE:

Standalone desktops 30 Nos. (or) Server supporting 30 terminals or more.

SOFTWARE:

Front end: Python / Visual Studio or Equivalent

Back end: Oracle / MS SQL Server / MySQL / DB2 or Equivalent

Mapping of CO with PO/PSO

	PO 1	PO 2	PO 3	PO4	PO5	PO 6	PO 7	PO8	PO 9	PO1 0	PO1 1	PO1 2	PSO1	PSO2	PSO3
CO-1	3	-	-		-	-	-	-	-	-	-	2	3	3	3
CO-2	-	3	2	2	-	-	-	-	-	-	-	2	3	3	3
CO-3	3	-	-	3	-	-	-	-	-	-	-	-	3	3	3
CO-4	-	3	2	3	-	-	-	-	-	-	-	2	3	3	3
CO-5	-	3	2	-	-	-	-	-	-	-	-	2	3	3	3

SEMESTER-IV

JMA1404	APPLIED PROBABILITY AND QUEUING THEORY	L	T	P	C
		2	2	0	3

COURSE OBJECTIVES

- To provide basic concepts of one-dimensional, two-dimensional random variables, standard probability distributions and testing of hypothesis
- To familiarize students in the concepts of random processes and queueing models

UNIT I RANDOM VARIABLES 12

Discrete and continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Exponential and Normal distributions

UNIT II TWO - DIMENSIONAL RANDOM VARIABLES 12

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

UNIT III TESTING OF HYPOTHESIS 12

Statistical hypothesis - Large sample tests based on 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 - Goodness of fit

UNIT IV RANDOM PROCESSES 12

Classification – Stationary process – Markov process – Discrete parameter Markov chain – Chapman Kolmogorov theorem - Poisson process

UNIT V QUEUING MODELS 12

Markovian queues – Birth and death processes – Single and multiple server, Infinite and finite queueing models – Little's formula – Non-Markovian queues - M/G/1 queue – Pollaczek Khinchin formula - M/D/1 and M/EK/1 as special cases

TOTAL : 60 PERIODS

COURSE OUTCOMES

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

- To understand random variables and use standard distributions in solving real time problems
- To use joint density functions to perform correlation and regression analysis
- To apply hypothesis testing for making statistical inferences in large and small sample real life problems
- To demonstrate efficient use of random processes in modeling engineering problems
- To understand and apply concepts of Markovian and Non-Markovian models in problems

TEXT BOOKS

1. Ibe, O.C., “Fundamentals of Applied Probability and Random Processes”, 1st Indian Reprint, Elsevier, 2007.
2. Taha, H.A., “Operations Research”, 9th Edition, Pearson India Education Services, Delhi, 2016.
3. Gross, D., Shortle, J.F, Thompson, J.M and Harris. C.M., “Fundamentals of Queueing Theory”, Wiley Student 4th Edition, 2014.

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1. Hwei Hsu, "Schaum's Outline of Theory and Problems of Probability, Random Variables and Random Processes", Tata McGraw Hill Edition, New Delhi, 2004
2. Trivedi, K.S., "Probability and Statistics with Reliability, Queueing and Computer Science Applications", 2nd Edition, John Wiley and Sons, 2002
3. Yates, R.D. and Goodman. D. J., "Probability and Stochastic Processes", 2nd Edition, Wiley India Pvt. Ltd., Bangalore, 2012
4. Devore. J.L., "Probability and Statistics for Engineering and the Sciences, Cengage Learning, New Delhi, 8th Edition, 2014
5. 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

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1. <https://nptel.ac.in/courses/111/104/111104032/>
2. <https://nptel.ac.in/courses/103/106/103106120/>
3. <https://nptel.ac.in/courses/117/103/117103067/>
4. <https://nptel.ac.in/courses/108/106/108106179/>

CO-PO MAPPINGS

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	-	-	-	2	-	-	2
CO2	3	3	2	2	-	-	-	-	2	-	-	2
CO3	3	3	2	2	-	-	-	-	2	-	-	2
CO4	3	3	2	2	-	-	-	-	2	-	-	2
CO5	3	3	2	2	-	-	-	-	2	-	-	2
AVG	3	3	2	2	-	-	-	-	2	-	-	2

JCS1401	COMPUTER NETWORKS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To learn the basic concepts of layered approach in Computer Networks
- To know functions of data link layer and components to build different types of networks
- To learn the functions of network layer and the various routing protocols
- To familiarize the functions and protocols of the Transport layer
- To familiarize the application layer services

UNIT I INTRODUCTION AND PHYSICAL LAYER 9

Building a network - Requirements Layering and protocols - Design issues for the layers- TCP/IP Protocol suite - OSI Model - Physical layer - Multiplexing and Spread Spectrum - Encoding Techniques-Transmission Media-Performance.

UNIT II DATA-LINK LAYER & MEDIA ACCESS 9

Link layer Services - Framing - Error Detection - Flow control - Media access control - Ethernet (802.3) - Wireless LANs - 802.11 - Bluetooth - Switching and bridging - Basic Internetworking (IP, CIDR, ARP, DHCP, ICMP).

UNIT III NETWORK LAYER 9

Network layer - Routing - Shortest Path Routing - Flooding - Routing (RIP, OSPF, metrics) - Switch basics - Global Internet (Areas, BGP, Ipv6) - Multicast - Addresses - Multicast routing (DVMRP, PIM).

UNIT IV TRANSPORT LAYER 9

Overview of Transport layer - UDP - Reliable byte stream (TCP) - Connection management - Flow control - Retransmission - TCP Congestion control - Congestion avoidance (DECbit, RED) - QoS.

UNIT V APPLICATION LAYER 9

Electronic Mail (SMTP, POP3, IMAP, MIME) - HTTP - Web Services - DNS - SNMP.

TOTAL : 45 PERIODS

COURSE OUTCOMES

Upon completion of the course, students will be able to

- Evaluate the functions and performance of a network
- Comprehend the data flow and control between nodes in the network
- Analyze and design routing algorithms
- Familiarize with the functionalities of various protocols and congestion mechanism in network
- Familiarize with different application layer protocols

TEXT BOOKS

1. Behrouz A. Forouzan, “Data Communications and Networking”, Fifth Edition TMH, 2017.
2. Larry L. Peterson, Bruce S. Davie, “Computer Networks: A Systems Approach”, Fifth Edition, Morgan Kauffmann Publishers Inc., 2012.

REFERENCES

1. James F. Kurose, Keith W. Ross, “Computer Networking: A Top-Down Approach”, Seventh Edition, Pearson Education, 2017.
2. William Stallings, Data and Computer Communications, Tenth Edition, Pearson Education, 2013.
3. Nader F. Mir, Computer and Communication Networks, Second Edition, Prentice Hall, 2014.
4. Ying-Dar Lin, Ren-Hung Hwang and Fred Baker, Computer Networks: An Open Source Approach, McGraw Hill Publisher, 2011.
5. Andrew S. Tanenbaum, David Wetherall, “Computer Networks”, Fifth Edition, Pearson Education, 2013.

WEBSITE REFERENCES

1. <https://www.educba.com/routing-algorithms/>
2. <https://www.cse.iitk.ac.in/users/dheeraj/cs425/lec12.html>
3. <https://www.engineersgarage.com/tutorials/transport-layer-protocols-iot-part-9/>
4. <https://www.geeksforgeeks.org/computer-network-tutorials/>
5. <https://www.tutorialspoint.com/Reference-Models-in-Computer-Network>

Mapping of CO with PO/PSO

	P O- 1	P O- 2	P O- 3	P O- 4	P O- 5	P O- 6	P O- 7	P O- 8	P O- 9	PO -10	PO -11	PO -12	PS O1	PS O2	PS O3
CO-1	3	3	3	-	-	-	-	2	-	-	-	2	3	3	3
CO-2	3	3	3	-	-	-	-	2	-	-	-	2	3	3	3
CO-3	3	3	3	-	-	-	-	2	-	-	-	2	3	3	3
CO-4	2	2	3	-	-	-	-	3	-	-	-	3	3	3	3
CO-5	3	3	3	-	-	-	-	2	-	-	-	2	3	3	3

JCS1402	OPERATING SYSTEMS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To study the basic concepts, structure and functions of operating systems
- To learn process management concepts such as process scheduling, CPU scheduling, semaphores and deadlocks etc.
- To learn various memory management concepts
- To understand the file storage handling management and I/O systems
- To learn the case study of operating system and services

UNIT I OPERATING SYSTEMS OVERVIEW 9

Computer System Overview- Basic Elements – Interrupts - Memory Hierarchy - Cache Memory - Direct Memory Access - Operating System Overview - Objectives and Functions - Evolution of Operating System - Operating System Structure and Operations - System Calls - System Programs- OS Generation and System Boot.

UNIT II PROCESS MANAGEMENT 9

Processes - Process Concept - Process Scheduling - Operations on Processes – Interprocess Communication - CPU Scheduling - Multiple-processor Scheduling - Real Time Scheduling - Threads- Overview - Multithreading Models - Threading Issues - Process Synchronization – Critical Section Problem - Mutex Locks - Semaphores - Monitors - Deadlocks - System Model - Deadlock Characterization - Methods for Handling Deadlocks - Deadlock Prevention - Deadlock Avoidance - Deadlock Detection - Recovery from Deadlock.

UNIT III MEMORY MANAGEMENT 9

Main Memory – Background – Swapping - Contiguous Memory Allocation – Paging – Segmentation - Segmentation with Paging, 32 and 64 Bit Architecture Examples - Virtual Memory – Background - Demand Paging - Page Replacement – Allocation – Thrashing - Allocating Kernel Memory.

UNIT IV FILE SYSTEM AND I/O SYSTEM 9

Mass Storage system – Overview of Mass Storage Structure – Disk Structure – Disk Scheduling and Management, Swap Space Management – File-System Interface – File concept – Access methods – Directory Structure – File Sharing and Protection – File Allocation Methods – Free Space Management – Efficiency and Performance – Recovery – 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

COURSE OUTCOMES

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

- Classify operating system components and system calls based on functionality
- Analyze and evaluate CPU scheduling algorithms and assess the solutions for synchronization problems and deadlock prevention
- Familiarize in memory management and storage management techniques
- Analyze the File System Interface, Directory Structure and I/O systems
- Carry out case studies to generate and illustrate different aspects of various operating systems

TEXT BOOKS

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Concepts”, 9th Edition, John Wiley and Sons Inc., 2018.
2. William Stallings, “Operating Systems – Internals and Design Principles”, 7th Edition, Prentice Hall, 2018.

REFERENCES

1. Andrew S. Tanenbaum, “Modern Operating Systems”, Second Edition, Addison Wesley, 2014.
2. Charles Crowley, “Operating Systems: A Design-Oriented Approach”, Tata McGraw Hill Education, 2018.
3. D M Dhamdhare, “Operating Systems: A Concept-Based Approach”, Second Edition, Tata McGraw Hill Education.

WEBSITE LINKS

1. https://www.tutorialspoint.com/operating_system/os_overview.htm/
2. <https://www.geeksforgeeks.org/introduction-of-process-management/>
3. <https://technobyte.org/memory-management-os-simple-explanation/>
4. <https://inst.eecs.berkeley.edu/~eecsba1/sp97/reports/eecsba1a/index-os.html/>

Mapping of CO with PO/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	PSO1	PSO2	PSO3
CO-1	3	-	2	-	-	-	-	-	-	2	2	2	3	3	3
CO-2	3	-	2	-	-	-	-	-	-	-	2	-	3	3	3
CO-3	1	-	2	-	-	-	-	-	-	1	2	-	3	3	3
CO-4	3	-	2	-	-	-	-	-	-	1	2	-	3	3	3
CO-5	2	-	2	-	-	-	-	-	-	1	2	-	3	3	3

JCS1403	DESIGN AND ANALYSIS OF ALGORITHMS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To impart knowledge on runtime analysis of algorithms
- To study and understand various algorithm design techniques
- To analyze various searching and sorting algorithms
- To study the various graph algorithms
- To learn the limits of computation\

UNIT I INTRODUCTION

9

Introduction Fundamentals of Algorithmic Problem Solving- Important Problem types - Fundamental Data structures –Time complexity- Space complexity- Analysis Framework - Asymptotic notations- Basic Efficiency classes.

UNIT II FUNDAMENTALS OF THE ANALYSIS OF ALGORITHM EFFICIENCY

9

Best, Average and Worst Case Analysis - Linear search - Amortized efficiency – Mathematical Analysis of Non- recursive Algorithm - Mathematical Analysis of Recursive Algorithm - Example: Fibonacci Numbers.

UNIT III ANALYSIS OF SORTING AND SEARCHING ALGORITHMS

9

Brute Force Strategy: Selection Sort and Bubble Sort, Brute-force string matching, Exhaustive search- Knapsack problem, Assignment problem, Travelling Salesman Problem-Divide and conquer: general method-Masters theorem - Merge sort, Quick Sort, Binary Search.

UNIT IV ANALYSIS OF GRAPH ALGORITHMS

9

Dynamic Programming: Warshalls and Floyd Algorithm, Optimal Binary Search trees- Greedy Technique: Container Loading Problem, Huffman trees, knapsack problem.

UNIT V NP COMPLETE AND NP HARD PROBLEMS

9

NP Complete and NP Hard-NP Complete problems, backtracking: n-Queens Problem, Hamiltonian Circuit problem, Subset-Sum problem- Branch and bound: Assignment problem, Knapsack problem, Traveling salesman problem.

TOTAL 45 PERIODS

TEXT BOOKS

1. Anany Levitin, “Introduction to the Design and Analysis of Algorithms”, Third Edition, Pearson Education Asia, 2012
2. Horowitz, Sahni, and Rajasekaran, “Computer Algorithms”, Silicon Press, 2007

REFERENCES

1. Sara Baase and Allen Van Gelder, “Computer Algorithms Introduction to Design and Analysis”, Pearson Education Asia, 2010.
2. T.H.Cormen,C.E.Leiserson,R.L.RivestandC.Stein,“IntroductiontoAlgorithms”,PHIPvt. Ltd., 2009
3. V.Aho,J.E. Hopcroftand J.D.Ullman,“TheDesignand Analysisof ComputerAlgorithms”, Pearson Education Asia, 2003.

WEBSITE LINKS

1. <https://www.geeksforgeeks.org/algorithms-gq/analysis-of-algorithms-gq>
2. <https://www.javatpoint.com/daa-tutorial>

Mapping of CO with PO/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	PSO1	PSO2	PSO3
CO-1	3	3	2	2	1	1	1	1	1	1	1	2	3	3	3
CO-2	3	3	3	3	1	2	1	1	2	2	1	2	3	3	3
CO-3	3	3	3	3	2	2	2	2	1	1	1	2	3	3	3
CO-4	3	3	3	2	2	1	1	1	2	2	2	3	3	3	3
CO-5	3	3	3	3	3	2	2	2	2	1	1	3	3	3	3

JCS1404	SOFTWARE ENGINEERING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To study the different software process models and developments
- To learn the fundamental concepts of requirements engineering and Analysis Modeling
- To analyze and apply the various software design methodologies
- To acquire knowledge in various testing methodologies and tools
- To attain the knowledge in Project Management process

UNIT I SOFTWARE PROCESS AND AGILE DEVELOPMENT 9

Introduction to Software Engineering – The Software Process – Perspective and Specialized Models–Agile Development–Introduction to Agility-Agile Process-Extreme programming-XP Values– XP Process

UNIT II REQUIREMENTS ANALYSIS AND SPECIFICATION 9

Software Requirement – Functional and Non-Functional –User requirements –System requirements Software Requirements Document–Requirement Engineering Process–Feasibility Studies Requirements elicitation and Analysis–Requirement Negotiation–Requirements Validation Requirements Management-Classical analysis – Structured system Analysis – Data Dictionary

UNIT III SOFTWARE DESIGN 9

Design process – Design Concepts – Design Model– Design Heuristic – Architectural Design Architectural Styles– Architectural Mapping using Data Flow- User Interface Design – Interface analysis – Interface Design –Component level Design – Designing Class based components, traditional Components

UNIT IV TESTING AND MAINTENANCE 9

Software Testing Fundamentals -White box Testing – Basis Path Testing-Control Structure Testing Black Box Testing – Regression Testing – Unit Testing – Integration Testing – Validation Testing System Testing – Testing tools– Reengineering Process Model-Reverse and Forward Engineering

UNIT V PROJECT MANAGEMENT 9

Software Project Management – Estimation – LOC – FP Based Estimation – Make/Buy Decision COCOMO I & II Model – Project Scheduling – Earned Value Analysis Planning – Project Plan Planning Process– RFP Risk Management–Identification–Projection–Risk Mitigation-RMMM Plan-CASE Tools

TOTAL : 45 PERIODS

COURSE OUTCOMES

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

- Identify the key activities in managing a software project and compare different process models
- Apply concepts of Requirements Engineering and Analysis Modeling
- Apply systematic procedures in software design and systems
- Compare the various testing strategies
- Handle project management system and its qualities

TEXT BOOKS

1. Roger S. Pressman, “Software Engineering – A Practitioner’s Approach”, Eighth Edition, McGraw-Hill International Edition, 2014.
2. Ian Sommerville, “Software Engineering”, 9th Edition, Pearson Education Asia, 2011.

REFERENCES

1. Rajib Mall, Fundamentals of Software Engineering, Third Edition, PHI Learning Private Limited, 2009.
2. Pankaj Jalote, Software Engineering, A Precise Approach, Wiley India, 2010.
3. Kelkar S.A., “Software Engineering”, Prentice Hall of India Pvt Ltd, 2007.
4. Stephen R.Schach, “Software Engineering”, Tata McGraw-Hill Publishing Company Limited, 2007

WEBSITE LINKS

1. https://www.tutorialspoint.com/software_engineering/index.htm
2. <https://www.guru99.com/software-engineering-tutorial.html>
3. <https://www.geeksforgeeks.org/software-engineering/>
4. <https://lecturenotes.in/m/21862-software-engineering-tutorial>
5. <http://www.engppt.com/2011/12/pressman-software-engineering-ppt-pdf.html/>

Mapping of CO with PO/PSO

	P O- 1	P O- 2	P O- 3	P O- 4	P O- 5	P O- 6	P O- 7	P O- 8	P O- 9	PO -10	PO -11	PO -12	PS O1	PS O2	PS O3
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CO-3	3	3	3	-	3	-	-	-	3	3	-	2	3	3	3
CO-4	-	2	-	-	2	-	-	2	3	-	-	3	3	3	3
CO-5	3	3	3	-	2	2	-	2	3	3	2	3	3	3	3

JPT1001	SOFT SKILLS AND APTITUDE II	L	T	P	C
		0	0	2	1

COURSE OBJECTIVES

- To help students learn various forms of writing and develop content
- To help students acquire time and stress management skills
- To facilitate students to gain required knowledge to understand practical concepts in aptitude
- To develop the thinking and analytical skills of students
- To gain knowledge in concepts of C programming language

UNIT I SOFT SKILLS AND APTITUDE - III **5**

Communication – on Specific topics – both oral and written – Content development – various forms of writing and specific writing – Brainstorming – Individual – Concept focusing – Public Speaking – Analytical writing

UNIT II SOFT SKILLS AND APTITUDE - IV **5**

Importance of Time – Time Management techniques – The art of prioritizing and scheduling – Stress – Positive and Negative Stress - Stress Management techniques – Concept of Goal setting – Importance of Goals – Dream vs Goal – Reasons for failure of Goals – SMART

UNIT III QUANTITATIVE APTITUDE **6**

Ratio and Proportions – Allegations and Mixtures – Problem on Ages – Profit and Loss and Discount

UNIT IV LOGICAL REASONING **6**

Odd man out series – Blood Relation – Seating Arrangement – Number Ranking

UNIT V TECHNICAL APTITUDE IN C-II **8**

Strings - Storage Classes – Pointers – Preprocessor directives - Structures – Union. Type def – Input/Output – File I/O - Header Files – Type casting – Error handling – Command Line Arguments – Variable Arguments – Memory Management - Bitwise operators

TOTAL : 30 PERIODS

COURSE OUTCOMES

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

- Develop different types of content using the skills learnt
- Manage time and stress competently
- Find answers to real time application problems
- Use logical reasoning skills to solve problems differently
- Apply C programming concepts for coding

TEXT BOOKS

1. Dr.R.S.Aggarwal, “Quantitative Aptitude”, S. Chand Publishing, 2020.

2. Dr.R.S.Aggarwal, “A Modern Approach to Verbal Reasoning”, S. Chand Publishing, 2017.
3. Dr.R.S.Aggarwal, “A Modern Approach to Non-Verbal Reasoning”, S. Chand Publishing, 2017.
4. Pradip Dey, Manas Ghosh, “Fundamentals of Computing and Programming in C”, First Edition, Oxford University Press, 2009.
5. Yashavant P. Kanetkar. “Let Us C”, BPB Publications, 2011

WEBSITE LINKS

1. <https://www.indiabix.com/aptitude/questions-and-answers/>
2. <https://m4maths.com/placement-puzzles.php>
3. www.freshersworld.com/
4. <https://www.youtube.com › watch>problems on ages>
5. <https://www.youtube.com › watch>blood relation>
6. <https://www.youtube.com › watch>content>
7. <https://www.youtube.com › watch>SMART>
8. <https://www.youtube.com › watch>strings in C>

Mapping of CO with PO/PSO

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

JCS1411	NETWORKS LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES:

- To learn Socket programming
- To study various networking commands
- To implement and analyze various network protocols
- To learn and implement various socket programming concepts

To simulate and analyze the performance of various network protocols

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 code simulating ARP /RARP protocols.
3. Write a socket program for HTTP web page upload and download.
4. Applications using TCP Sockets like
 - a. Echo client and echo server
 - b. Chat
 - c. File Transfer
5. Applications of DNS using UDP Sockets
6. Study of Network simulator and Simulation of Congestion Control Algorithms
7. Study of TCP/UDP performance using Simulation tool.
8. Simulation of Distance Vector/ Link State Routing algorithm.
9. Performance evaluation of Routing protocols using Simulation tool.
10. Simulation of error correction code (like CRC).

TOTAL :60 PERIODS

COURSE OUTCOMES

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

- Implement various protocols using TCP and UDP
- Implement various network commands
- Simulate the performance of various network protocols
- Implement error correction codes
- Analyze the various routing algorithms

WEBSITE LINKS

1. <https://www.javatpoint.com/socket-programming>
2. https://www.tutorialspoint.com/java/java_networking.htm
3. <https://www.nstools.org/techprog.shtml>
4. <https://ipwithease.com/top-5-network-simulation-tools-in-2020/>

LABORATORY REQUIREMENT FOR BATCH OF 30

STUDENTS: HARDWARE

1. Standalone desktops

30 Nos

SOFTWARE

1. C / C++ / Java / Python / Equivalent Compiler

30 Nos

2. Network simulator like NS2 / Glomosim / OPNET / Packet Tracer / Equivalent

JCS1412	OPERATING SYSTEMS LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES

- To learn Unix commands and shell programming
- To execute various CPU Scheduling Algorithms
- To implement and familiarize in Process Creation and Inter Process Communication
- To implement Deadlock Avoidance and Deadlock Detection Algorithms
- To implement Page Replacement Algorithms, File Organization and File Allocation Strategies

LIST OF EXPERIMENTS

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

TOTAL : 60 PERIODS

COURSE OUTCOMES

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

- Compare the performance of various CPU Scheduling Algorithms
- Implement Deadlock avoidance ,Detection Algorithms and Semaphores
- Create processes and implement IPC
- Analyze the performance of the various Page Replacement Algorithms
- Implement File Organization and File Allocation Strategies

TEXT BOOKS

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Concepts”, 9thEdition, John Wiley and Sons Inc., 2018.

WEBSITE LINKS

1. William Stallings, “Operating Systems – Internals and Design Principles”, 7th Edition, PrenticeHall, 2018.
2. Andrew S. Tanenbaum, “Modern Operating Systems”, Second Edition, Addison Wesley, 2014.
3. Charles Crowley, “Operating Systems: A Design-Oriented Approach”, Tata McGraw HillEducation”, 2018.
4. D M Dhamdhare, “Operating Systems: A Concept-Based Approach”, Second Edition, TataMcGraw Hill Education.

REFERENCES

1. https://www.tutorialspoint.com/operating_system/os_overview.htm/
2. <https://www.geeksforgeeks.org/introduction-of-process-management/>
3. <https://technobyte.org/memory-management-os-simple-explanation/>
4. https://www.cse.iitb.ac.in/~mythili/teaching/cs347_autumn2016/notes/09-file-system-io.pdf/
5. https://www.cs.uic.edu/~jbell/CourseNotes/OperatingSystems/13_IOSystems.html/
6. <https://inst.eecs.berkeley.edu/~eecsba1/sp97/reports/eecsba1a/index-os.html/>

Mapping of CO with PO/PSO

	PO 1	PO 2	PO 3	PO4	PO5	PO 6	PO 7	PO8	PO 9	PO1 0	PO1 1	PO1 2	PSO1	PSO2	PSO3
CO-1	3	-	-		-	-	-	-	-	-	-	2	3	3	3
CO-2	-	3	2	2	-	-	-	-	-	-	-	2	3	3	3
CO-3	3	-	-	3	-	-	-	-	-	-	-	-	3	3	3
CO-4	-	3	2	3	-	-	-	-	-	-	-	2	3	3	3
CO-5	-	3	2	-	-	-	-	-	-	-	-	2	3	3	3

JCS1501	INTERNET PROGRAMMING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To understand different Internet Technologies
- To design interactive web pages using Scripting languages
- To learn java-specific web services architecture
- To understand the essential client side technologies for internet programming
- To develop applications using database connectivity and server side programming in Java environment

UNIT I WEBSITE BASICS, HTML 5, CSS 3, WEB 2.0 9

Web Essentials: Clients, Servers and Communication- The Internet - Basic Internet protocols - World wide web- HTTP Request Message - HTTP Response Message - Web Clients - Web Servers - HTML5 - Tables - Lists - Image - HTML5 control elements - Semantic elements - Drag and Drop - Audio - Video controls - CSS3 - Inline, embedded and external style sheets - Rule cascading - Inheritance - Backgrounds - Border Images - Colors - Shadows - Text - Transformations - Transitions - Animations- Web Servers - Microsoft Internet Information Services - Apache HTTP Server

UNIT II CLIENT SIDE PROGRAMMING 9

Java Script: An introduction to JavaScript–JavaScript DOM Model-Date and Objects - Regular Expressions- Exception Handling-Validation-Built-in objects-Event Handling - DHTML with JavaScript- JSON introduction – Syntax – Function Files – Http Request – SQL

UNIT III SERVER SIDE PROGRAMMING 9

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

UNIT IV PHP and XML

9

An introduction to PHP: PHP- Using PHP- Variables- Program control- Built-in functions - Form Validation- Regular Expressions - File handling – Cookies - Connecting to Database. XML: Basic XML- Document Type Definition- XML Schema DOM and Presenting XML, XML Parsers and Validation, XSL and XSLT Transformation, News Feed (RSS and ATOM).

UNIT V INTRODUCTION TO AJAX and WEB SERVICES

9

AJAX: Ajax Client Server Architecture-XML Http Request Object-Call Back Methods; Web Services: Introduction- Java web services Basics – Creating, Publishing, Testing and Describing a Web services (WSDL)-Consuming a web service, Database Driven web service from an application –SOAP - Session Tracking - UDT to a Web Service

TOTAL 45 PERIODS

COURSE OUTCOMES:

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

- Construct a basic website using HTML and Cascading Style Sheets.
- Build dynamic web page with validation using Java Script objects and by applying different event handling mechanisms.
- Develop server side programs using Servlets and JSP.
- Construct simple web pages in PHP and to represent data in XML format.
- Use AJAX and web services to develop interactive web applications

TEXT BOOK:

Deitel and Deitel and Nieto, “Internet and World Wide Web - How to Program”, Prentice Hall, 5th Edition, 2011.

REFERENCES:

1. Stephen Wynkoop and John Burke “Running a Perfect Website”, QUE, 2nd Edition,1999.
2. Chris Bates, Web Programming – Building Intranet Applications, 3rd Edition, Wiley Publications, 2009.
3. Jeffrey C and Jackson, “Web Technologies A Computer Science Perspective”, Pearson Education, 2011.
4. Gopalan N.P. and Akilandeswari J., “Web Technology”, Prentice Hall of India, 2014.
5. UttamK.Roy, “Web Technologies”, Oxford University Press, 2011.

WEB LINKS:

1. <https://www.htmldog.com/guides/>
2. <https://www.codecademy.com/catalog>

3. <https://www.w3schools.com/>

Mapping of CO with PO/PSO

	Program 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	PSO 1	PSO 2	PSO 3
CO-1	3	3	3	-	-	-	-	2	3	3	-	3	2	3	1
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CO-3	3	3	3	-	-	-	-	3	3	3	-	3	3	3	1
CO-4	3	3	3	-	-	-	-	3	3	3	-	3	3	3	2
CO-5	3	3	3	-	-	-	-	3	3	3	-	3	2	3	2

JCS1502	OBJECT ORIENTED ANALYSIS AND DESIGN	L	T	P	C
		2	0	2	3

COURSE OBJECTIVES:

- To understand the fundamentals of object modelling and Use cases
- To design with static UML diagrams
- To design with the UML dynamic and implementation diagrams
- To improve the software design with design patterns
- To test the software against its requirements specification

UNIT I UNIFIED PROCESS AND USE CASE DIAGRAMS 9

Introduction to OOAD with OO Basics - Iterative, Evolutionary, and Agile – Unified Process – UML diagrams- Case study – the Next Gen POS system - Inception - Evolutionary Requirements - Use cases Modelling – Relating Use cases – include, extend and generalization – When to use Use-cases

UNIT II STATIC UML DIAGRAMS 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 – 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

9

GRASP: Designing objects with responsibilities – Creator – Information expert – Low Coupling – High Cohesion – Controller Design Patterns – creational – factory method – structural – Bridge – Adapter – behavioural – Strategy – observer –Applying GoF design patterns – Mapping design to code.

UNIT V TESTING

9

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

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Design software applications using OO concepts.
- Express software design with UML diagrams
- 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

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, and 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.
3. Grady Booch , James Rumbaugh, Ivar Jacobson, “The Unified Modeling Language User Guide”, Addison Wesley Long man, 1999.
4. BemdBruegge, Allen H. Dutoit, “Object Oriented Software Engineering using UML, Patterns and Java”, Pearson, 2004.

WEB LINKS:

1. https://www.tutorialspoint.com/object_oriented_analysis_design/index.htm
2. <https://nptel.ac.in/courses/106/105/106105153/>
3. <http://www.digimat.in/nptel/courses/video/106105153/L31.html>
4. <https://www.youtube.com/watch?v=qiyMyYqZVY>
5. <http://www.infocobuild.com/education/audio-video-courses/computer-science/ObjectOrientedAnalysis-IIT-Kharagpur/lecture-38.html>

Mapping of CO with PO/PSO

	Program Outcomes												PSO		
	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	PS O 1	PSO 2	PSO 3
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CO-3	3	2	3	1	3	3	3	2	3	3	3	3	3	2	2
CO-4	1	3	3	2	3	3	2	3	3	2	3	2	3	3	2
CO-5	3	3	3	2	2	2	3	3	2	3	2	3	2	3	2

JCS1003	MOBILE COMPUTING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To understand the basic concepts of mobile computing
- To learn the basics of mobile telecommunication system
- To be familiar with the network layer protocols and Ad-Hoc networks
- To know the basis of transport and application layer protocols
- To gain knowledge about different mobile platforms and application development

UNIT I INTRODUCTION 9

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

UNIT II MOBILE TELECOMMUNICATION SYSTEM 9

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

UNIT III MOBILE NETWORK LAYER 9

Mobile IP - DHCP - AdHoc - Proactive protocol - DSDV, Reactive Routing Protocols - DSR, AODV , Hybrid routing - ZRP, Multicast Routing - ODMRP, Vehicular Ad Hoc networks - VANET - MANET Vs VANET - Security.

UNIT IV MOBILE TRANSPORT AND APPLICATION LAYER 9

Mobile TCP - WAP - Architecture - WDP - WTLS - WTP - WSP - WAE - WTA Architecture - WML

UNIT V MOBILE PLATFORMS AND APPLICATIONS 9

Mobile Device Operating Systems - Special Constraints & Requirements - Commercial Mobile Operating Systems - Software Development Kit: IOS, Android, BlackBerry, Windows Phone - Mcommerce - Structure - Pros & Cons - Mobile Payment System -Security Issues

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Explain the basics of mobile telecommunication systems
- Illustrate the generations of telecommunication systems in wireless networks
- Determine the functionality of MAC, network layer and identify a routing protocol for a given Ad hoc network
- Explain the functionality of Transport and Application layers
- Develop a mobile application using android/blackberry/ios/Windows SDK

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 Agarwal, 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, TataMcGraw Hill Edition ,2006.
4. C.K.Toth, “AdHoc Mobile Wireless Networks”, First Edition, Pearson Education, 2002.

WEB LINKS:

1. <https://mjginfologs.com/tutorials-on-mobile-computing/>
2. <https://www.javatpoint.com/mobile-computing>
3. <http://developer.android.com/index.html>
4. <https://developer.apple.com/>
5. <http://developer.windowsphone.com>
6. <http://developer.blackberry.com>

Mapping of CO with PO/PSO

	Program 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	PSO 1	PSO 2	PSO 3
CO-1	3	1	2	1	-	1	-	-	1	2	1	2	2	3	2
CO-2	3	2	3	2	1	1	-	-	2	2	2	2	2	3	3
CO-3	3	3	2	3	2	1	-	-	2	2	2	2	3	3	2
CO-4	3	3	2	3	3	1	-	-	1	2	2	2	3	3	2
CO-5	3	3	2	3	3	1	-	-	2	3	3	3	3	3	2

JPT1002	TECHNICAL SKILLS AND APTITUDE I	L	T	P	C
		0	0	2	*

COURSE OBJECTIVES:

- To make students analyze and solve problems in technical as well as quantitative aptitude
- To enhance the Technical skills and basics of programming language
- To make students understand how to apply the practical knowledge with real time applications
- To make students think and draw a conclusion from different scenarios
- To help students understand python programming concepts

UNIT I OOPS CONCEPTS

6

What is object oriented programming?. Const and classes. Arrays and string arrays fundamentals. Arrays of object, string, The standard C++ String class .Operator overloading: Overloading unary operations. Concept of inheritance. Derived class and based class. Derived class constructors, member function, Virtual Function

UNIT II PYTHON I

6

Python interpreter and interactive mode; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, modules and functions

UNIT III PYTHON II

6

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, list parameters; Tuples:

tuple assignment, Dictionaries: operations and methods; advanced list processing – list comprehension

UNIT IV QUANTITATIVE APTITUDE 6

Boats and streams – Time and work – Pipes and Cistern – Time and Distance – Problems on Trains

UNIT V LOGICAL REASONING 6

Syllogism – Statement and Conclusion – Inequalities – Non Verbal Reasoning – Figure Analogy – Mirror and Water images – Paper cutting and Folding – Cubes and Dices – Pattern completion

TOTAL: 30 PERIODS

COURSE OUTCOMES:

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

- Apply OOPS concepts in applications
- To enhance knowledge in python programming
- Gain knowledge in coding using the python programming
- Solve complex arithmetic problems practically with real time applications
- Think logically in solving problems, enhance decision making, for difficult situations

TEXT BOOKS:

1. Dr.E. Balagurusamy ,”Programming in C++” complete reference 8th Edition.
2. “THE COMPLETE REFERENCE PYTHON”, Herbert schildt., McGraw Hill Education, 2011.
3. Python: The Complete Reference by Martin Brown and Martin C.Brown Published in 2014.
4. Python in a nutshell by Alex Martelli Revised in March 2013.
5. Dr. R.S Agrawal, “Quantitative Aptitude” and Non Verbal Reasoning published in 2000.

WEB LINKS:

1. <https://www.indiabix.com/aptitude/questions-and-answers/>
2. <https://m4maths.com/placement-puzzles.php>
3. [www.freshers world.com](http://www.freshersworld.com)
4. www.careerride.com
5. www.youtube.com/watch/python
6. [www.youtube.com/watch/concepts of python](http://www.youtube.com/watch/concepts%20of%20python)
7. <https://stackoverflow.com/>
8. <https://www.w3schools.com/>
9. <https://www.geeksforgeeks.org/>

JHS1511	PROFESSIONAL COMMUNICATION	L	T	P	C
		0	0	2	1

COURSE OBJECTIVES:

- To enable students to acquire a specialized knowledge of the essential professional skills
- To train them to make effective presentations on a variety of topics
- To help them participate in group discussions displaying teamwork skills
- To build their confidence and help them attend interviews winningly
- To groom them to become successful professionals

UNIT I EXPOSURE TO PROFESSIONAL SKILLS 6

Introduction to Skills: hard skills and soft skills – communication skills – interpersonal skills – employability and career skills – planning and prioritizing work – time management – stress management – emotional intelligence – SWOT analysis

UNIT II PREPARING AND PRESENTING INSPIRING TALKS 6

Key elements of effective presentation – nonverbal communication – impressive self-introduction and short individual presentation – preparing outline – structuring and organising content – presenting – introducing topic – developing points – concluding – answering questions

UNIT III MEASURES TO CRACK GROUP DISCUSSION 6

Group discussion skills – team building – using key strategies – etiquette – content preparation – brainstorming – out of box thinking – mind mapping – turn taking and turn giving – speaking persuasively – questioning and clarifying

UNIT IV INTERVIEW SKILLS TO GET HIRED 6

Interview skills – etiquette – body language – confidence – preparedness – types of interview – Frequently Asked Questions (FAQs) – mock interview – job application and resume writing

UNIT V LANGUAGE SKILLS AND CAREER MAPPING 6

Listening skills – understanding different accents – reading skills – verbal ability – email writing – professional grooming – leadership qualities – fundamentals of entrepreneurship – career planning – goal setting – future challenges

TOTAL: 30 PERIODS

COURSE OUTCOMES:

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

- Have sufficient knowledge of the skills required for professional development
- Give formal and effective presentations
- Participate actively in group discussions
- Attend job interviews and answer questions confidently and effortlessly
- Emerge as professionals ready for placement

RECOMMENDED SOFTWARE:

- Globearena
- Win English

TEXT BOOKS:

1. Interact English Lab Manual for Undergraduate Students, 2016, Hyderabad: Orient BlackSwan.

REFERENCES:

1. Alex, K, 2019, Soft Skills: Know Yourself and Know the World, New Delhi: S. Chand & Company Limited.
2. Butterfield, Jeff, 2015, Soft Skills for Everyone. New Delhi: Cengage Learning.
3. Kumar, Suresh E et al, 2015, Communication for Professional Success, Hyderabad: Orient BlackSwan.
4. Mitra, Barun K, 2016, Personality Development and Soft Skills, New Delhi: Oxford University Press.
5. Raman, Meenakshi and Sangeeta Sharma, 2014, Professional Communication, Oxford: Oxford University Press.
6. Rizvi, Ashraf, M, 2018, Effective Technical Communication, Chennai: McGraw-Hill Education.

WEB LINKS:

1. <https://www.britishcouncil.in/english/online/resources-websites/moocs>
2. <https://alison.com/courses/communications>
3. <https://in.topresume.com/career-advice/15-free-resources-to-improve-your-presentation-and-speaking-skills>
4. http://www.washington.edu/doing/TeamN/present_tips.html
5. <https://www.softwaretestinghelp.com/how-to-crack-the-gd/>
6. <http://www.oxforddictionaries.com/words/writing-job-applications>
7. http://www.mindtools.com/pages/article/newCDV_34.htm
8. <https://myinterviewpractice.com/>

JCS1511	INTERNET PROGRAMMING LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES:

- To be familiar with Web page design using HTML/XML and style sheets
- To be exposed to creation of user interfaces using Java frames and applets.
- To learn to create dynamic web pages using server-side scripting.
- To learn to write Client Server applications.
- To be familiar with the PHP programming.
- To be exposed to creating applications with AJAX

LIST OF EXPERIMENTS

1. Create a web page with the following using HTML
 - a. To embed a map in a web page
 - b. To fix the hot spots in that map
 - c. Show all the related information when the hot spots are clicked.
2. Create a web page with the following.
 - a. Cascading style sheets.
 - b. Embedded style sheets.
 - c. Inline style sheets. Use our college information for the web pages.
3. Validate the Registration, user login, user profile and payment by credit card pages using JavaScript.
4. Write programs in Java using Servlets:
 - a. To invoke servlets from HTML forms
 - b. Session tracking using hidden form fields and Session tracking for a hit count
5. Write programs in Java to create three-tier applications using servlets for conducting online examination for displaying student mark list. Assume that student information is available in a database which has been stored in a database server.
6. Install TOMCAT web server. Convert the static web pages of programs into dynamic web pages using servlets (or JSP) and cookies. Hint: User's information (user id, password, credit card number) would be stored in web.xml. Each user should have a separate

Shopping Cart.

7. Redo the previous task using JSP by converting the static web pages into dynamic web pages. Create a database with user information and books information. The books catalogue should be dynamically loaded from the database.
8. Create and save an XML document at the server, which contains 10 users Information. Write a Program, which takes user Id as an input and returns the User details by taking the user information from the XML document
9. i. Validate the form using PHP regular expression. ii. PHP stores a form data into database.
10. Write a web service for finding what people think by asking 500 people's opinion for any consumer product.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

- Construct Web pages using HTML/XML and style sheets
- Build dynamic web pages with validation using Java Script objects and by applying different event handling mechanisms
- Develop dynamic web pages using server-side scripting
- Use PHP programming to develop web applications
- Construct web applications using AJAX and web services

WEB LINKS:

1. <https://www.w3schools.com/html/>
2. <https://www.javatpoint.com/php-tutorial>
3. <https://www.javatpoint.com/servlet-tutorial>
4. <https://www.tutorialspoint.com/xml/index.htm>

SOFTWARE REQUIRED:

Dream Weaver or Equivalent, MySQL or Equivalent, Apache Server, WAMP/XAMPP

JIT1514	MOBILE APPLICATIONS DEVELOPMENT LAB	L	T	P	C
		0	0	4	1

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
- To develop simple and location specific applications in android environment

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 makes use of Notification Manager
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)

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

- Develop mobile applications using GUI and Layouts
- Develop mobile applications using Event Listener

- Develop mobile applications using Databases
- Develop mobile applications using RSS Feed, Internal/External Storage, SMS, Multithreading and GPS
- Analyze and discover own mobile app for simple needs

WEB LINKS:

1. https://www.tutorialspoint.com/mobile_development_tutorials.htm
2. <https://developer.android.com/courses>
3. <https://www.javatpoint.com/android-tutorial>

SOFTWARE REQUIRED:

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

JIT1601	INTERNET OF THINGS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To understand Smart Objects and IoT Architectures
- To learn about various IOT-related protocols
- To build simple IoT Systems using Arduino and Raspberry Pi
- To understand data analytics and cloud in the context of IoT
- To develop IoT infrastructure for popular applications

UNIT I FUNDAMENTALS OF IoT

9

Evolution of Internet of Things - Enabling Technologies - IoT Architectures: oneM2M, IoT World Forum (IoTWF) and Alternative IoT models - Simplified IoT Architecture and Core IoT Functional Stack - Fog, Edge and Cloud in IoT - Functional blocks of an IoT ecosystem - Sensors, Actuators, Smart Objects and Connecting Smart Objects

UNIT II IoT PROTOCOLS

9

IoT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4e, 1901.2a, 802.11ah and LoRaWAN - Network Layer: IP versions, Constrained Nodes and Constrained Networks - Optimizing IP for IoT: From 6LoWPAN to 6Lo, Routing over Low Power and Lossy Networks - Application Transport Methods: Supervisory Control and Data Acquisition - Application Layer Protocols: CoAP and MQTT

UNIT III DESIGN AND DEVELOPMENT

9

Design Methodology - Embedded computing logic - Microcontroller, System on Chips - IoT system building blocks - Arduino - Board details, IDE programming - Raspberry Pi - Interfaces and Raspberry Pi with Python Programming

UNIT IV DATA ANALYTICS AND SUPPORTING SERVICES

9

Structured Vs Unstructured Data and Data in Motion Vs Data in Rest - Role of Machine Learning- No SQL Databases - Hadoop Ecosystem - Apache Kafka, Apache Spark - Edge Streaming Analytics and Network Analytics - Xively Cloud for IoT, Python Web Application Framework - Django - AWS for IoT - System Management with NETCONF-YANG

UNIT V CASE STUDIES/INDUSTRIAL APPLICATIONS

9

Cisco IoT system - IBM Watson IoT platform - Manufacturing - Converged Plantwide Ethernet Model (CPwE) - Power Utility Industry -GridBlocks Reference Model - Smart and Connected Cities: Layered architecture, Smart Lighting, Smart Parking Architecture and Smart Traffic Control

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Explain the concept of IoT
- Analyze various protocols for IoT
- Design a PoC of an IoT system using Raspberry Pi/Arduino
- Apply data analytics and use cloud offerings related to IoT
- Analyze applications of IoT in real time scenario

TEXT BOOKS:

1. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, Cisco Press, 2017.

REFERENCES:

1. ArshdeepBahga, Vijay Madiseti, "Internet of Things – A hands-on approach", Universities Press, 2015
2. Olivier Hersent, David Boswarthick, Omar Elloumi, "The Internet of Things – Key applications and Protocol", Wiley, 2012 (for Unit 2).
3. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stamatis, Karnouskos, Stefan Avesand. David Boyle, "From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence", Elsevier, 2014.
4. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), "Architecting the Internet of Things", Springer, 2011.
5. Michael Margolis, "Arduino Cookbook, Recipes to Begin, Expand, and Enhance Your

WEB LINKS:

1. https://onlinecourses.nptel.ac.in/noc17_cs22/course
2. <https://www.coursera.org/specializations/internet-of-things>
3. https://www.cse.wustl.edu/~jain/cse570-15/ftp/iot_prot/index.html

JIT1602	ARTIFICIAL INTELLIGENCE	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To know the underlying structure behind
- To study the techniques of knowledge representation
- To explore the adaption of artificial intelligence techniques intelligence mathematically
- To know the logical implications in computational intelligence
- To know the automated learning techniques
- in real-time scenarios

UNIT I INTELLIGENT AGENTS AND SEARCH TECHNIQUES 9

Agents and Environments – Good Behavior: The Concepts of Rationality – The Nature of Environments – The Structure of Agents – Problem Solving by Search – Uninformed Search – Searching with Costs – Informed State Space Search – Heuristic Search: Greedy – A* Search – Problem Reduction Search – Game Search – Constraint Satisfaction Problems

UNIT II REASONING WITH LOWER ORDER LOGICS 9

Logical Agent – Proposition Logic – Syntax and Semantics – Theorem Proving – Model Checking – Inference in First Order Logic: Forward Chaining – Backward Chaining – Resolution

UNIT III KNOWLEDGE REPRESENTATION 9

Knowledge Representation Issues – Approaches for Knowledge Representation: Simple Relational Knowledge – Inherited Knowledge – Semantic Nets – Frames – Semantic Web – Ontology

UNIT IV AI PLANNING AND NATURAL LANGUAGE PROCESSING 9

Classical Planning – Types – Partial Order Planning – Graph Plan and SAT Plan – Natural Language Processing Basics: Syntax – Semantics – Introduction to Statistical NLP

UNIT V LEARNING AND APPLICATIONS 9

Logical Formulation of Learning – Knowledge in Learning – Explanation-based Learning – Learning

using Relevance Information – Natural Language Toolkit (NLTK) - Application with NLP: Developing a Simple Chatbot – Types of Chatbot.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Apply the search techniques to real-time problems
- Apply the reasoning techniques to real world problems
- Understand the representation of knowledge
- Understand the learning techniques
- Apply AI techniques in developing real world applications

TEXT BOOKS:

1. Stuart J. Russell, Peter Norvig, “Artificial Intelligence - A Modern Approach”, Third Edition, Pearson Publishers, 2015.
2. Elaine Rich, Kevin Knight, Shivashankar B. Nair, “Artificial Intelligence”, Third Edition, Tata McGraw-Hill Education, 2008.

REFERENCES:

1. DheepakKhemani, “A first course in Artificial Intelligence”, McGraw Hill Education Pvt Ltd., NewDelhi, 2013.
2. Steven Bird, Ewan Klein and Edward Loper, “Natural Language Processing with Python”, O’Reilly, 2009, <https://www.nltk.org/book/>.
3. Nils J. Nilsson, “Artificial Intelligence: A New Synthesis”, Morgan Kaufmaan Publishers Inc; Second Edition, 2003.

WEB LINKS:

1. <http://nptel.ac.in/courses/106105079/2>

Mapping of CO with PO/PSO

	Program 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	PSO 1	PSO 2	PSO 3
CO-1	3	3	3	3					2			3	1	3	3
CO-2	3	3	3	3					2			3	1	3	3
CO-3	3	3	3	3					2			3	1	3	3

CO-4	3	3	3	3					2			3	2	3	3
CO-5	3	3	3	3	3				2			3	2	3	3

JCS1603	CRYPTOGRAPHY AND NETWORK SECURITY	L	T	P	C
		2	1	0	3

COURSE OBJECTIVES:

- To understand Cryptography Theories, Algorithms and Systems
- To learn the mathematics concepts in symmetric key cryptography and algorithms
- To acquire knowledge and fundamental ideas of public-key cryptography
- To understand the principles of Message Authentication, Integrity and related algorithms
- To understand necessary Approaches and Techniques to build protection mechanisms in order to secure computer networks

UNIT I INTRODUCTION

9

Security trends - Legal, Ethical and Professional Aspects of Security, Need for Security at Multiple levels, Security Policies - Model of network security – Security attacks, services and mechanisms – OSI security architecture – Classical encryption techniques: substitution techniques, transposition techniques, steganography- Foundations of modern cryptography: perfect security – information theory – product cryptosystem – cryptanalysis.

UNIT II SYMMETRIC KEY CRYPTOGRAPHY

9

MATHEMATICS OF SYMMETRIC KEY CRYPTOGRAPHY: Algebraic structures – Modular arithmetic-Euclid’s algorithm- Congruence and matrices - Groups, Rings, Fields- Finite fields- 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 PUBLIC KEY CRYPTOGRAPHY

9

MATHEMATICS OF ASYMMETRIC KEY CRYPTOGRAPHY: 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 - ElGamal cryptosystem – Elliptic curve arithmetic- Elliptic curve cryptography – Learning honey pot and monitor the honeypot on network using KF Sensor

UNIT IV MESSAGE AUTHENTICATION AND INTEGRITY

9

Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC – SHA – Digital signature and authentication protocols – DSS- Entity Authentication:

Biometrics, Passwords, Challenge Response protocols- Authentication applications - Kerberos, X.509 - Learning secure data storage, secure data transmission and for creating digital signatures using GnuPG.

UNIT V SECURITY PRACTICE AND SYSTEM SECURITY 9

Electronic Mail security – PGP, S/MIME -IP Security-Cutting Edge Web Application Security: Clickjacking - DNS rebinding - Flash security - Java applet security - Single-sign-on solution and security - IPv6 impact on web security. System Security: Intruders – Malicious software – viruses – Firewalls - IoT attack, types of IoT attacks, Threats and Security Solutions.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Understand the fundamentals of networks security, security architecture, threats and vulnerabilities
- Apply the different cryptographic operations of symmetric cryptographic algorithms
- Apply the different cryptographic operations of public key cryptography
- Apply the various Authentication schemes to simulate different applications
- Understand various Security practices and System security standards

TEXT BOOKS:

1. William Stallings, Cryptography and Network Security: Principles and Practice, PHI 8th Edition, 2019
2. Stuttard, Dafydd, and Marcus Pinto. The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws. John Wiley Sons, 2011

REFERENCES:

1. C K Shyamala, N Harini and Dr. T R Padmanabhan: Cryptography and Network Security, Wiley India Pvt.Ltd.
2. Behrouz A. Forouzan, Cryptography and Network Security, Tata McGraw Hill 2007.
3. Charlie Kaufman, Radia Perlman, and Mike Speciner, Network Security: PRIVATE Communication in a PUBLIC World, Prentice Hall, ISBN 0-13-046019-2.
4. Sullivan, Bryan, and Vincent Liu. Web Application Security, A Beginner's Guide. McGraw Hill Professional, 2011.

WEB LINKS:

1. <https://www.tutorialspoint.com/cryptography/index.htm>
2. <https://www.geeksforgeeks.org/cryptography-introduction/>
3. <https://mindmajix.com/cryptography-tutorial>
4. https://www.academia.edu/35766751/Cryptography_tutorial
5. https://www.vssut.ac.in/lecture_notes/lecture1428550736.pdf

Mapping of CO with PO/PSO

	Program Outcomes												PSO		
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CO-3	3	3	3	2	3	2	1	3	2	1	3	2	3	2	3
CO-4	3	2	3	2	3	3	1	3	2	1	3	2	3	3	3
CO-5	3	3	3	2	3	3	1	3	2	1	3	2	3	1	3

JPT1002	TECHNICAL SKILLS AND APTITUDE I	L	T	P	C
		0	0	2	*

COURSE OBJECTIVES:

- To make students analyze and solve problems in technical as well as quantitative aptitude. Enhance the technical skills and basics of programming language
- To make the students understand how to apply the practical knowledge in real time applications
- To make the students think and draw conclusions from different scenarios
- To help the students understand JAVA programming concepts
- To help the students understand concepts and develop new applications in JAVA

UNIT I JAVA FUNDAMENTALS

6

OOP in Java – Characteristics of Java – Java Source-File -Structure – Compilation. Fundamental Programming Structures in Java.

UNIT II ADVANCED JAVA PROGRAMMING

6

Defining classes in Java – constructors, methods -access specifiers – static members - Data Types, Variables, Operators, Control Flow, Arrays , Inheritance – Super classes- sub classes –Protected members – constructors in sub classes- Interfaces –Strings.

UNIT III MATHEMATICAL AND ARITHMETIC PROBLEM SOLVING

6

Crptarithmatic Problem Solving, Logarithms, Trigonometry, Mensuration, Probability, Permutations and Combinations.

UNIT IV LOGICAL REASONING - COGNITIVE THINKING 6

Numerical Ability, English Ability, Gaming, Arrangements, Visual Reasoning, Flowcharts – Visual Reasoning – DI.

UNIT V LOGICAL REASONING - CRITICAL THINKING 6

Logical Sequence, Inferred Meaning, Agree Disagree Psychometric, Statement & Conclusions, Cubes and Cuboids.

COURSE OUTCOMES:

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

- Enhance their knowledge in JAVA concepts and Java Programming
- Gain knowledge in coding using JAVA programming
- Solve complex arithmetic problems practically with real time applications
- Think logically in solving problems, enhance decision making, for difficult situations

TEXT BOOKS:

1. Herbert Schildt, “Java The complete reference”, 8th Edition, McGraw Hill Education, 2011.
2. Cay S. Horstmann, Gary cornell, “Core Java Volume –I Fundamentals”, 9th Edition, Prentice Hall, 2013.
3. Dr. R.S Agrawal, “Quantitative Aptitude” and Non Verbal Reasoning published in 2000.
4. S.Chand – A Modern Approach to Logical Reasoning Published in 2000.

WEB LINKS:

1. <https://www.indiabix.com/aptitude/questions-and-answers/>
2. <https://m4maths.com/placement-puzzles.php>
3. www.freshers world.com
4. www.careerride.com
5. www.youtube.com/watch/python
6. www.youtube.com/watch/concepts of python
7. <https://stackoverflow.com/>
8. <https://www.w3schools.com/>
9. <https://www.geeksforgeeks.org/>

JIT1612	ARTIFICIAL INTELLIGENCE LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES:

- To provide students with a theoretical and practical base in Artificial Intelligence
- Students will able to Design, Implement, and Analyze simple problem solving technique
- Students will able to identify, formulate, and solve problems

LIST OF EXPERIMENTS

1. Study of Prolog.
2. Write simple fact for the statements using PROLOG.
3. Write predicates One converts centigrade temperatures to Fahrenheit, the other checks if a temperature is below freezing.
4. Write a program to solve the Monkey Banana problem.
5. Write a program in turbo prolog for medical diagnosis and show the advantage and disadvantage of green and red cuts.
6. Write a program to implement factorial, fibonacci of a given number.
7. Write a program to solve 4-Queen problem.
8. Write a program to solve traveling salesman problem.
9. Write a program to solve water jug problem.
10. Implementation of A* Algorithm.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

- Understand the major areas and challenges of AI
- Apply basic AI algorithms to solve problems
- Develop programming solutions for given problem scenario.
- Describe search strategies and solve problems by applying a suitable search method
- Solve the given problem scenario

WEB LINKS:

1. <https://www.tutorialspoint.com/lisp/index.htm>
2. <https://www.swi-prolog.org/>
3. <https://www.tutorialspoint.com/prolog/>
4. <https://www.javatpoint.com/java-tutorial>

SOFTWARE REQUIRED:

LISP/PROLOG/Java / Python / C++

JIT1621	MINI PROJECT	L	T	P	C
		0	0	2	1

COURSE OBJECTIVES:

- To understand real time software development environment
- To develop research skills with new product design ideas
- To develop leadership and ownership capability
- To implement quality programming strategies
- To learn simple software development tools

GUIDELINES

1. Selection of project Title

Project work can be of three types:

- a. Developing solutions for real time problems
- b. System software project
- c. Research level project

2. Project Team

- To achieve the stated objectives, it is imperative that the mini project is done through a team effort with a restriction on minimum 2 and maximum 4 students per team.
- A team leader shall be selected
- Even if students are doing project as teams, each one must independently assigned different modules of the work and must maintain and submit the report on progress on assigned activities

3. Selection of Tools

- Students can choose platform/tools/languages to be utilized to develop their projects.

4. Project Management

- Students should submit fortnightly a progress report, which highlights the indication of percentage of completion of project work.
- Each team should submit 3 copies of project report which should contain of System Requirement specification, Analysis, Design, Coding, testing and Implementation strategies followed in the project.

COURSE OUTCOMES:

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

- Implement the different phases of software project development in real-time.
- Identify challenging opportunities in different domain.
- Generate efficient software programs.
- Encourage collaborative project development.

JCS1701	BIG DATA ANALYTICS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

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

UNIT-I INTRODUCTION TO BIG DATA 9

Evolution of Big data - Best Practices for Big data Analytics - Big data characteristics –Validating the Promotion of the Value of Big Data - Use Cases- Characteristics of Big Data Applications - Perception and Quantification of Value -Understanding Big Data Storage.

UNIT-II CLUSTERING AND CLASSIFICATION 9

Overview of Clustering - K-means - Use Cases - Overview of the Method - Determining the Number of Clusters - Classification: Decision Trees - Overview - Algorithms - Evaluation - Naïve Bayes - Bayes' Theorem - Naïve Bayes Classifier.

UNIT-III ASSOCIATION AND RECOMMENDATION SYSTEM 9

Association Rules - Overview - Apriori Algorithm - Evaluation of Candidate Rules - Applications of Association Rules - Finding Association & finding similarity - Recommendation System: Collaborative Recommendation- Content Based Recommendation - Knowledge Based Recommendation- Hybrid Recommendation.

UNIT-IV HADOOP FILE SYSTEM AND MAP-REDUCE 9

Hadoop Architecture, Internals of Hadoop File Systems. Map-Reduce Programming: Developing Distributed Programs and issues, Developing Map-Reduce programs in Java, Reduce works on HDFS, Examples: Running simple word count Map-Reduce program on the cluster, analyze call data records.

UNIT-V NOSQL DATA MANAGEMENT FOR BIG DATA AND VISUALIZATION 9

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

TOTAL:45 PERIODS

COURSE OUTCOMES

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

- Work with big data tools and its analysis techniques
- Analyze data by utilizing clustering and classification algorithms.
- Learn and apply different mining algorithms and recommendation systems for large volumes of data
- Perform analytics on data streams
- Learn NoSQL databases and management

TEXT BOOKS	
<ol style="list-style-type: none"> 1. David Loshin, "Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph", Morgan Kaufmann/Elsevier Publishers, 2013. 2. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012. 3. EMC Education Services, "Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", Wiley publisher, 2015. 	
REFERENCES	
<ol style="list-style-type: none"> 1. Bart Baesens, "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications", Wiley Publishers, 2015. 2. <u>Dietmar Jannach</u> and <u>Markus Zanker</u>, "Recommender Systems: An Introduction", Cambridge University Press, 2010. 3. Kim H. Pries and Robert Dunnigan, "Big Data Analytics: A Practical Guide for Managers " CRC Press, 2015. 4. Jimmy Lin and Chris Dyer, "Data-Intensive Text Processing with MapReduce", Synthesis Lectures on Human Language Technologies, Vol. 3, No. 1, Pages 1-177, Morgan Claypool publishers, 2010. 	
WEBSITE REFERENCES	

1. <https://www.techtarget.com/searchbusinessanalytics/definition/big-data-analytics>
2. <https://www.studocu.com/in/document/tata-institute-of-social-sciences/big-data-analysis/unit-4-unit-4-notes/11465883>
3. <https://www.analyticssteps.com/blogs/what-big-data-analytics-definition-advantages-and-types>

Mapping of CO with PO/PSO

	Program Outcomes												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO-1	3	3	3	3	3	2	2	2	2	3	1	2	3	3	3
CO-2	3	3	3	3	3	1	2	1	1	2	1	2	3	2	3
CO-3	2	3	3	3	3	1	1	2	2	3	2	2	3	3	3
CO-4	3	3	2	3	3	2	1	1	1	2	1	3	3	2	2
CO-5	3	2	3	3	3	1	1	1	1	3	2	2	3	3	3

JCS1702	Cloud Computing	L	T	P	C
		2	0	2	3

COURSE OBJECTIVES

- To understand the concept of cloud computing.
- To learn the evolution of cloud from the existing technologies.
- To apply the knowledge on the various issues in cloud computing.
- Analyse storage architectures, processes, components and how they relate to virtualization.
- To identify the key aspects of developing applications using a framework.

UNIT-I INTRODUCTION TO CLOUD COMPUTING

9

Introduction to Cloud – Definition and Evolution of Cloud – Underlying Principles of Parallel and Distributed Computing – Cloud Characteristics – Elasticity in Cloud – **Features of Today's Cloud**, On-demand Provisioning.

UNIT-II CLOUD ENABLING TECHNOLOGIES

9

Service Oriented Architecture – REST and Systems of Systems – Web Services – Publish Subscribe Model – **Virtualization Platforms & Techniques** - Basics of Virtualization – Types of Virtualization – Implementation Levels of Virtualization – Virtualization Structures – Tools and

Mechanisms – Virtualization of CPU – Memory – I/O Devices –Virtualization Support and Disaster Recovery.

UNIT-III CLOUD ARCHITECTURE, SERVICES AND STORAGE 9

Layered Cloud Architecture Design – NIST Cloud Computing Reference Architecture – Public, Private and Hybrid Clouds - IaaS – PaaS – SaaS – Architectural Design Challenges – Cloud Storage – Storage-as-a-Service – Advantages of Cloud Storage – Cloud Storage Providers – **Google Cloud, Amazon S3, Windows Azure, IBM Cloud.**

UNIT-IV RESOURCE MANAGEMENT AND SECURITY IN CLOUD

9

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

UNIT-V CLOUD TECHNOLOGIES AND ADVANCEMENTS 9

Hadoop – MapReduce in Google Cloud Platform– Virtual Box -- Google App Engine – Programming Environment for Google App Engine – **Cloud Computing Development Tools.**– Open Stack, **SaltStack , AWS Cloud Development Kit (AWS CDK) , Windows Azure SDK** – Federation in the Cloud – Four Levels of Federation – Federated Services and Applications – Future of Federation.

TOTAL: 45 PERIODS

COURSE OUTCOMES

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

- Describe the main concepts, key technologies, strengths and limitations of cloud computing.
- Classify 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.
- Recognize various Cloud Technologies and Advancements

TEXT BOOKS	
1. Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.	
2. Sunilkumar Manvi, Gopal K. Shyam,"Cloud Computing: Concepts and Technologies", CRC Press, Taylor & Francis Publishers, 2021.	
REFERENCES	
1. Rajiv Misra, Yashwant Singh Patel , "Cloud and Distributed Computing: Algorithms and Systems", WILEY Publishers, 2020.	
2. Rittinghouse, John W., and James F. Ransome, —Cloud Computing: Implementation, Management and Security, CRC Press, 2017.	
3. Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi, —Mastering Cloud	

<p>Computingl, Tata Mcgraw Hill, 2013.</p> <p>4. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing - A Practical Approachl, Tata Mcgraw Hill, 2009.</p> <p>5. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud: Transactional Systems for EC2 and Beyond (Theory in Practice), O'Reilly, 2009.</p>
WEBSITE REFERENCES
<p>1. https://nptel.ac.in/courses/101/104/106105167</p> <p>2. https://www.coursera.org/learn/introduction-to-cloud</p> <p>3. https://www.ibm.com/in-en/cloud/learn/soa</p> <p>4. https://www.geeksforgeeks.org/rest-api-architectural-constraints/</p> <p>5. https://aws.amazon.com/pub-sub-messaging/</p>

Mapping of CO with PO/PSO

	Program Outcomes												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO-1	3	3	2	-	2	3	-	-	-	-	-	2	3	2	-
CO-2	3	3	2	-	2	3	-	-	-	-	-	2	3	2	-
CO-3	3	3	3	-	3	3	-	-	-	-	-	3	3	2	-
CO-4	3	3	3	-	3	3	-	-	-	-	-	3	3	1	-
CO-5	2	2	3	3	3	2	-	-	-	-	-	3	3	1	-

JNC1361	ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE				L	T	P	C
					2	0	0	0

COURSE OBJECTIVES:

- To facilitate the students with the concepts of Indian traditional knowledge and to make them understand the Importance of roots of knowledge system.

UNIT I INTRODUCTION TO TRADITIONAL KNOWLEDGE 6

Define traditional knowledge (TK), nature and characteristics, scope and importance, kinds of traditional knowledge, the physical and social contexts in which traditional knowledge develop, the historical impact of social change on traditional knowledge systems. Indigenous Knowledge (IK), characteristics, traditional knowledge vis-à-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge vis-à-vis formal knowledge

UNIT II PROTECTION OF TRADITIONAL KNOWLEDGE 6

The need for protecting traditional knowledge Significance of TK Protection, value of TK in global economy, Role of Government to harness TK.

UNIT III LEGAL FRAME WORK AND TK

6

A: The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmer's Rights Act, 2001 (PPVFR Act);

B: The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016. Geographical indicators act 2003.

UNIT IV TRADITIONAL KNOWLEDGE AND INTELLECTUAL PROPERTY 6

Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Certain non IPR mechanisms of traditional knowledge protection, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, global legal FORA for increasing protection of Indian Traditional Knowledge.

UNIT V TRADITIONAL KNOWLEDGE IN DIFFERENT SECTORS6

Traditional knowledge and engineering, Traditional medicine system, TK and biotechnology, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

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

To understand the concept of Traditional knowledge and its importance

To know the need and importance of protecting traditional knowledge.

To know the various enactments related to the protection of traditional knowledge.

To understand the concepts of Intellectual property to protect the traditional knowledge.

To know the applications of traditional knowledge in various fields.

REFERENCE BOOKS:

T1. Amit Jha, "Traditional Knowledge System in India", 2009.

T2. Basanta Kumar Mohanta and Vipin Kumar Singh, "Traditional Knowledge System and Technology in India", Pratibha Prakashan, 2012.

T3. Amit Jha, "Traditional Knowledge System in India", Atlantic publishers, 2002

T4. Kapil Kapoor, Michel Danino, "Knowledge Traditions and Practices of India"

WEBSITE REFERENCES:

1. <https://www.youtube.com/watch?v=LZP1StpYEPM>
2. <http://nptel.ac.in/courses/121106003/>

	Program Outcomes												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO-1	-	-	1	1	1	1	1	-	-	-	-	-	1	1	1
CO-2	-	-	1	1	1	1	1	-	-	-	-	-	1	1	1
CO-3	-	-	1	1	1	1	1	-	-	-	-	-	1	1	1
CO-4	-	-	1	1	1	1	1	-	-	-	-	-	1	1	1
CO-5	-	-	1	1	1	1	1	-	-	-	-	-	1	1	1

JCS1711	DATA ANALYTICS LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES

- To implement Map Reduce programs for processing big data
- To realize storage of big data using H base, Mongo DB.
- To analyse big data using linear models.
- To analyze big data using machine learning techniques such as SVM / Decision tree classifications.
- To implement clustering algorithms.

LIST OF EXPERIMENTS

Hadoop

1. Install, configure and run Hadoop and HDFS
2. Implement word count / frequency programs using MapReduce
3. Implement an MR program that processes a weather dataset

R

4. Implement Linear and logistic Regression
5. Implement SVM / Decision tree classification techniques
6. Implement clustering techniques
7. Visualize data using any plotting framework
8. Implement an application that stores big data in Hbase / MongoDB / Pig using Hadoop / R.

TOTAL: 60 PERIODS

COURSE OUTCOMES

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

- Process big data using Hadoop framework
- Build and apply linear and logistic regression models
- Perform data analysis with machine learning methods
- Perform graphical data analysis
- Learning Hadoop and R frameworks

LIST OF SOFTWARE

Hadoop YARN
R Package Hbase
MongoDB

Mapping of CO with PO/PSO

	Program Outcomes												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO-1	3	2	-	3	-	-	-	-	1	2	-	-	2	1	-
CO-2	3	3	-	2	-	-	-	-	1	3	-	-	1	1	-
CO-3	2	3	2	2	-	-	-	-	-	3	-	-	2	1	-
CO-4	2	2	1	2	-	-	-	-	1	3	-	-	1	1	-
CO-5	1	2	1	1	-	-	-	-	3	3	-	-	1	1	-

JGE1701	PROFESSIONAL READINESS FOR INNOVATION, EMPLOYABILITY AND ENTREPRENEURSHIP	L	T	P	C
		0	0	6	3

COURSE OBJECTIVES:

- To empower students with overall Professional and Technical skills required to solve a real world problem.
- To mentor the students to approach a solution through various stages of Ideation, Research, Design Thinking, Workflows, Architecture and building a prototype in keeping with the end-user and client needs.
- To provide experiential learning to enhance the Entrepreneurship and employability skills of the students.

This course is a four months immersive program to keep up with the industry demand and to have critical thinking, team based project experience and timely delivery of modules in a project that solves world problems using emerging technologies.

To prepare the students with digital skills for the future, the Experiential Project Based Learning is introduced to give them hands-on experience using digital technologies on open-source platforms with an end-to-end journey to solve a problem. By the end of this course, the student understands the approach to solve a problem with team collaboration with mentoring from Industry and faculties. This is an EEC category course offered as an elective, under the type, “Experiential Project Based Learning”.

Highlights of this course:

- Students undergo training on emerging technologies
- Students develop solutions for real-world use cases
- Students work with mentors to learn and use industry best practices
- Students access and use Self-Learning courses on various technologies, approaches and methodologies
- Collaborate in teams with other students working on the same topic
- Have a dedicated mentor to guide

COURSE OUTCOMES:

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

- Upskill in emerging technologies and apply to real industry-level use cases
- Understand agile development process
- Develop career readiness competencies, Team Skills / Leadership qualities
- Develop Time management, Project management skills and Communication Skills
- Use Critical Thinking for innovative Problem Solving
- Develop entrepreneurship skills to independently work on products

The course will involve 40-50 hours of technical training, and 40-50 hours of project development

JIT1731	Project work – Phase I	L	T	P	C
		0	0	6	3

COURSE OBJECTIVES:

- To identify a specific problem for the present need of the society and collecting information related to the same through detailed literature survey.
- To develop the methodology to solve the identified problem.
- To design, analyze and simulate the chosen problem using the software package.
- To train the students in preparing project reports and to face reviews and viva-voce examination.

METHOD OF EVALUATION:

The students in a group of 3 to 4 work on a topic approved by the Head of the Department under

the guidance of a faculty member, prepare a comprehensive project report after completing the work to the satisfaction of the supervisor. The progress of the project is evaluated based on a minimum of three reviews. The review committee is constituted by the Head of the Department. The project work is evaluated based on oral presentation and the project report, jointly by external and internal examiners.

Total Peroids:90 hours

COURSE OUTCOMES:

On completion of the phase - 1 project work, the students will be able to

- Analyze and formulate the problem
- Identify the methodology needed to solve the problem.
- Identify the tools and techniques required to solve the problem.
- Work with team mates to acquire the required material needed to find solutions to the chosen problem.
- Effectively communicate the outcomes of the findings.

JNC1861	INDIAN CONSTITUTION	L	T	P	C
		2	0	0	0

COURSE OBJECTIVES:

- To understand the importance of Indian constitution, Administration, Concept and Development of Human Rights, election commission.

UNIT I INTRODUCTION TO INDIAN CONSTITUTION 9

Constitution’ meaning of the term, Indian Constitution- Sources and constitutional history, Features- Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy

UNIT II UNION GOVERNMENT AND ITS ADMINISTRATION 9

Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions; **State Government and its Administration** Governor: Role and Position, CM and Council of ministers, State Secretariat: Organization, Structure and Functions

UNIT III 9

A: Local Administration District’s Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation,

B: Pachayati raj: Introduction, PRI: Zila Pachayat, Elected officials and their roles, CEO Zila Pachayat: Position and role, Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

UNIT IV CONCEPT AND DEVELOPMENT OF HUMAN RIGHTS 9

Meaning Scope and Development of Human Rights, United Nations and Human Rights – UNHCR, UDHR 1948, ICCPR 1996 and ICESCR 1966, Human Rights in India: Protection of Human Rights Act, 1993 (NHRC and SHRC), First, Second and Third Generation Human Rights, Judicial Activism and Human Rights.

UNIT V**ELECTION COMMISSION****9**

Election Commission- Role and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women.

TOTAL: 45 PERIODS**COURSE OUTCOMES:****At the end of the course, the student will be able to:**

- Know the sources, features and principles of Indian Constitution.
- Learn about Union Government, State government and its administration.
- Get acquainted with Local administration and Pachayati Raj.
- Be aware of basic concepts and developments of Human Rights.
- Gain knowledge on roles and functioning of Election Commission.

REFERENCES:

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd. New Delhi
2. SubashKashyap, Indian Constitution, National Book Trust
3. J.A. Siwach, Dynamics of Indian Government & Politics
4. D.C. Gupta, Indian Government and Politics
5. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)
6. J.C. Johari, Indian Government and Politics Hans
7. J. Raj Indian Government and Politics
8. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd. New Delhi
9. Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Right), Challenges to Civil Rights Guarantees in India, Oxford University Press 2012

E-RESOURCES:

1. nptel.ac.in/courses/109104074/8
2. nptel.ac.in/courses/109104045/
3. nptel.ac.in/courses/101104065/
4. www.hss.iitb.ac.in/en/lecture-details
5. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution.

JIT1851	COMPREHENSION AND TECHNICAL SEMINAR	L	T	P	C
		0	0	2	1

Mode of Evaluation: Internal**(Maximum Marks: 100)**

Split Up: **Comprehension – 50 Marks**
 Technical Seminar – 50 Marks

EVALUATION OF COMPREHENSION (50 MARKS)

- Two contact periods will be allocated every week for this paper in the timetable.
- Each week there shall be a discussion on a particular domain, relating to the branch of study, followed by a MCQ test.
- Marks awarded for comprehension shall be an average of all tests, converted to 50 marks

EVALUATION OF TECHNICAL SEMINAR (50 MARKS)

- Each student shall be given a technical topic to make a presentation.
- Marks out of 50 shall be awarded based on the attributes given below.

Total Peroids:30 hours

COURSE OUTCOMES:

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

- Consolidate all the engineering concepts acquired in the course of study.
- Enrich their technical knowledge.
- Prepare and present technological developments.
- Communicate effectively the concepts related to the various topics.
- Face the interviews with confidence during the placement drives.

JIT1832	Project work – Phase II	L	T	P	C
		0	0	18	9

COURSE OBJECTIVES:

- To develop the ability to solve a specific problem related to their subject expertise.
- To develop the methodology to solve the identified problem.
- To design, analyze and implement the chosen problem using the hardware components.
- To validate the simulation, hardware results with the theoretical results.
- To train the students in preparing project reports and to face reviews and viva-voce examination.

METHOD OF EVALUATION:

The students in a group of 3 to 4 work on a topic approved by the Head of the Department under the guidance of a faculty member, prepare a comprehensive project report after completing the work to the satisfaction of the supervisor. The progress of the project is evaluated based on a

minimum of three reviews. The review committee is constituted by the Head of the Department. The project work is evaluated based on oral presentation and the project report, jointly by external and internal examiners.

Total Peroids:270 hours

COURSE OUTCOMES:

On Completion of the project work, the student will be able to

- Apply the technical knowledge acquired for solving real world problems.
- Develop skills such as self learning, critical thinking, problem solving, project management and finance.
- Apply modern tools and techniques.
- Work with team mates and collectively work towards the success of the project.
- Communicate effectively to present the outcomes of the project both in written and oral forms.

OPEN ELECTIVE 1

IV SEMESTER

JIT9001	INTRODUCTION TO INFORMATION SYSTEM	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To learn the components of Networks and be familiar with Mobile Computing
- To learn the tools for creating websites and types of server
- To gain knowledge on Client-side Scripting languages
- To be familiar with PHP and File handling on Server-side Scripting languages
- To understand how application use-cases applied in Information Technology

UNIT I NETWORKING ESSENTIALS

9

Fundamental computer network concepts - Types of computer networks - Network layers - TCP/IP model – Basic Principles of W-LAN - Ethernet - Network Routing - Switching – Network components – Fundamentals of Mobile Computing – Cellphone working principles – Voice calls – SMS

UNIT II 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 III CLIENT SIDE CONCEPTS 9

HTML – CSS – Need for Scripting languages - Types of scripting languages - Client side scripting
- Variables and Data Types-Statements-Operators-Literals-Functions-Objects-Arrays

UNIT IV SERVER SIDE CONCEPTS 9

Server side scripting - PHP - Working principle of PHP - PHP Variables - Constants - Operators –
Flow Control and Looping - Arrays - Strings - Functions - File Handling – Introduction to Cookies

UNIT V APPLICATION ESSENTIALS 9

Creation of simple interactive applications - Simple database applications –Introduction to
Multimedia applications – Basic Design of information systems – Personal Information System –
Introduction to Information retrieval system - Social networking and its applications

TOTAL : 45 PERIODS

COURSE OUTCOMES

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

- Articulate the Network concepts and analyze the functions of Mobile Computing
- Understand the website design and deployment of application sites on server.
- Design and deploy the Client side scripting.
- Design and deploy the Server side scripting.
- Develop the web application and social networking application system.

TEXT BOOKS

1. James F. Kurose, “Computer Networking: A Top-Down Approach”, Seventh Edition, Pearson, 2017.
2. Robin Nixon, “Learning PHP, MySQL & JavaScript”, 5th Edition, O'REILLY, 2018.

REFERENCES

1. Herbert Schildt, “Java™: The Complete Reference”, Tenth Edition, McGraw Hill, 2017.
2. Thomas A. Powell, “HTML & CSS: The Complete Reference”, Fifth Edition, McGraw Hill 2017.
3. Steven Holzner, “PHP: The Complete Reference”, 1st Edition, McGraw Hill, 2017.

WEBSITE LINKS

1. www.networkworld.com
2. <https://developer.mozilla.org/>

JIT9002	BASICS OF DATABASE SYSTEM	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To learn the fundamentals of data models and to represent a database system using ER diagrams
- To construct simple and moderately advanced database queries using SQL
- To be familiar with Database programming and ODBC
- To understand various Normalization techniques
- To have an introductory knowledge about database security concepts

UNIT I DBMS AND CONCEPTUAL DATA MODELING 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 9

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 9

Database programming with function calls – Stored procedures - Views – Triggers – Embedded SQL – ODBC connectivity with front end tools – Implementation using ODBC/JDBC – 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 IN DATABASE 9

Database security issues – Discretionary access control – Role based access – Encryption and Public

key infrastructures – Challenges. – Distribute database – Architecture, Data Storage – Transaction Processing – Fundamentals in No SQL – Basics of Graph Databases and its applications.

TOTAL : 45 PERIODS

COURSE OUTCOMES

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

- Understand basic database concepts and operation of the data models
- Write a simple, complex query using SQL and create PL/SQL Procedures, Functions
- Query the relational database and write programs with database connectivity
- Design a database for any real time application
- Understand the concepts of advanced databases and database securities

TEXT BOOKS

1. RamezElmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, Seventh Edition, Pearson, 2017.
2. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, Seventh Edition, Tata McGraw Hill, 2019.

REFERENCES

1. C.J.Date, A.Kannan, S.Swamynathan, “An Introduction to Database Systems”, Eighth Edition, Pearson Education, 2003.
2. Raghu Ramakrishnan, “Database Management Systems”, Fourth Edition, McGraw-Hill College Publications, 2015.

WEBSITE LINKS

1. <https://www.javatpoint.com/dbms-tutorial>
2. <https://www.tutorialcup.com/dbms>
3. <https://www.w3schools.in/dbms/>
4. <https://www.tutorialspoint.com/dbms/index.htm>

JIT9003	JAVA PROGRAMMING FUNDAMENTALS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To understand basic concepts of Java
- To know the principles of packages, inheritance and interfaces
- To define exceptions and use of I/O streams in java
- To develop a java application with event handling techniques in java
- To design and build simple GUI programming.

UNIT I INTRODUCTION ON OOPS IN JAVA 9

Object oriented programming concepts in Java– objects – classes – methods and messages – abstraction and encapsulation –access specifiers – data types – conditional statements-looping statements.

UNIT II ARRAYS AND CLASS HIERARCHY 9

Arrays – Strings - Packages -- Inheritance – class hierarchy –polymorphism – dynamic binding – final keyword - Interfaces– inner classes- I/O Streams

UNIT III EXCEPTION HANDLING AND THREADS IN JAVA 9

Exception handling – Exception hierarchy – throwing and catching –Multi threaded programming – interrupting threads – thread states – thread properties.

UNIT IV WORKING WITH GUI PROGRAMMING 9

Graphics programming – Frame – Components – working with 2D shapes- Using color, fonts, and images.

UNIT V EVENT DRIVEN PROGRAMMING IN JAVA 9

Basics of event handling – event handlers – adapter classes – actions – mouse events –AWT event hierarchy – introduction to Swing –Swing Components

TOTAL : 45 PERIODS

COURSE OUTCOMES

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

- Develop Java programs using OOP CONCEPTS
- Develop Java programs with the concept's inheritance and interfaces
- Build Java applications using exceptions

- Develop Java applications with 2D CONCEPTS
- Develop interactive Java programs using swings

TEXT BOOKS

1. Herbert Schildt, “Java The complete reference”, 11th Edition, McGraw Hill Education, 2011.
2. Cay S. Horstmann, Gary cornell, “Core Java Volume –I Fundamentals”, 9th Edition, Prentice Hall, 2013.

REFERENCES

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

WEB SITE REFERENCE

1. www.javatutorial.com
2. www.javatpoint.com

PROFESSIONAL ELECTIVE -I

JIT1001	GRAPHICS AND MULTIMEDIA	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To appreciate illumination and color models
- To understand the two-dimensional graphics and their transformations
- To understand the three-dimensional graphics and their transformations
- To become familiar with understand multimedia concepts
- To become familiar with Blender Graphics

UNIT I ILLUMINATION AND COLOR MODELS

9

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

UNIT II TWO-DIMENSIONAL GRAPHICS

9

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

UNIT III THREE-DIMENSIONAL GRAPHICS

9

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

UNIT IV MULTIMEDIA SYSTEM DESIGN & MULTIMEDIA FILE HANDLING

9

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

UNIT V HYPERMEDIA

9

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

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Apply Illumination and color models
- Apply two dimensional transformations and clipping techniques
- Apply three dimensional transformations
- Understood Different types of Multimedia File Format
- Design Basic 3d Scenes using Blender

TEXT BOOKS:

1. Donald Hearn and Pauline Baker M, “Computer Graphics”, Prentice Hall, New Delhi, 2007 [UNIT I – III]
2. Andleigh, P. K and Kiran Thakrar, “Multimedia Systems and Design”, PHI, 2003. [UNIT IV, V]

REFERENCES:

1. Judith Jeffcoate, “Multimedia in practice: Technology and Applications”, PHI, 1998.
2. Foley, Vandam, Feiner and Hughes, “Computer Graphics: Principles and Practice”, 2nd Edition, Pearson Education, 2003.
3. Jeffrey McConnell, “Computer Graphics: Theory into Practice”, Jones and Bartlett Publishers, 2006.

WEB LINKS:

1. <https://www.blender.org/support/tutorials/>
2. <https://nptel.ac.in/courses/106/103/106103224/>
3. <https://nptel.ac.in/courses/106/102/106102063/>
4. <https://nptel.ac.in/courses/106/102/106102065/>
5. <https://nptel.ac.in/courses/106/106/106106090/>

JIT1002	AGILE METHODOLOGIES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- Understand the basic concepts of Agile Software Process
- Comprehend various Agile Methodologies
- Develop Agile Software Process
- Apply principles of Agile Testing
- Understand metrics used in Agile

UNIT I INTRODUCTION 9

Software is new product development- Iterative and Evolutionary Methods- Agile Development – Case Study: Perform a comparative Study between Traditional / Heavy weight Methodologies with Agile Methodology

UNIT II AGILE AND ITS SIGNIFICANCE 9

Agile Story: Evolutionary delivery -Scrum Demo- Planning game, -Sprint back log- adaptive planning - Agile Motivation – Problems with The Waterfall - Research Evidence Scrum: Method Overview -Life cycle phases and Work product roles

UNIT III AGILE METHODOLOGY 9

Extreme Programming: Method Overview -Life cycle phases and Work product roles - Unified process: Method Overview -Life cycle phases and Work product roles- EVO: Method Overview -Life cycle phases and Work product roles -Case Study: Student group must collaborate and report together along with assigned batch members. Collect the requirements from the client and adopt the suitable agile practice method

UNIT IV AGILE PRACTICES 9

Agile Project management - Agile Environment -. Agile Requirements - Case Study – Practices: At the end of each sprint of automated and acceptance tests

UNIT V AGILITY AND QUALITY ASSURANCE 9

Agile product development – Agile Metrics – Feature Driven Development (FDD)- Agile approach to Quality Assurance -Test Driven Development – Agile approach in Global Software Development

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Differentiate agile methodologies and Non –agile methodologies
- Describe the various practices followed in Agile Software Process
- Select suitable agile approach for the projects
- Understand Agile Environment
- Apply agile metrics to projects

TEXT BOOKS:

1. Craig Larman, “Agile and Iterative Development – A Manager’s Guide”, Pearson Education, 2006.
2. Elisabeth Hendrickson Quality Tree Software Inc, “Agile Testing”, 2008.

REFERENCES:

1. Chetankumar Patel, MuthuRamachandran, Story Card Maturity Model (SMM): A Process Improvement Framework for Agile Requirements Engineering Practices, Journal of Software, Academy Publishers, Vol 4, No 5 (2009), 422-435, Jul 2009. E. Capriolo, D Wampler, and J. Rutherglen, "Programming Hive", O'Reilley, 2012.
2. David J. Anderson; Eli Schragenheim, Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results, Prentice Hall, 2003.

WEB LINKS:

1. <https://www.guru99.com/agile-scrum-extreme-testing.html>
2. <https://www.infoworld.com/article/3237508/what-is-agile-methodology-modern-software-development-explained.html>
3. <https://www.simplilearn.com/tutorials/agile-scrum-tutorial/what-is-agile>

JEC1004	FUNDAMENTALS OF NANOSCIENCE	L	T	P	C
		3	0	0	3

PREREQUISITE:

- Engineering Physics

COURSE OBJECTIVES:

- To learn about the basics of nanomaterial science
- To understand the general preparation methods
- To know about the various nanomaterials
- To understand the different characterization techniques
- To understand the applications of nanoscience

UNIT I INTRODUCTION

9

Nanoscale Science and Technology- Implications for Physics, Chemistry, Biology and Engineering- Classifications of nanostructured materials- nano particles- quantum dots, nanowires ultra-thin films- multilayered materials. Length Scales involved and effect on properties: Electronic and Optical 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, Ultrasonification, Mechanical Milling, Colloidal routes, Self-assembly, Vapour phase deposition, MOCVD, DC and RF Sputtering methods, Evaporation, Molecular Beam Epitaxy, Atomic Layer Epitaxy, MOMBE

UNIT III NANOMATERIALS

9

Nanoforms of Carbon - Buckminster fullerene- graphene and carbon nanotube, Single wall carbon Nanotubes (SWCNT) - methods of synthesis(arc growth, laser ablation, CVD routes, Plasma CVD), Nanometal oxides-ZnO, TiO₂, MgO, ZrO₂, NiO, Nano alumina, CaO, AgTiO₂, Ferrites, Nano clays- functionalization and applications-Quantum wires, Quantum dots-preparation, properties and applications

UNIT IV CHARACTERIZATION TECHNIQUES

9

X-ray diffraction technique, Scanning Electron Microscopy - environmental techniques, Transmission Electron Microscopy including high-resolution imaging, Surface Analysis techniques - AFM, SPM, STM - Nanoindentation-thermogravimetric analysis of nanomaterials

UNIT V APPLICATIONS

9

Nano InfoTech: Information storage- Nano computer, molecular switch, super chip, nanocrystal, Nano biotechnology: nanoprobes in medical diagnostics and biotechnology, Nanomedicines, Targeted drug

delivery, Bioimaging - Micro Electro Mechanical Systems (MEMS), Nano ElectroMechanical Systems (NEMS)- Nano sensors, nano crystalline silver for bacterial inhibition, Nanoparticles for sun barrier products - In Photostat, printing, solar cell, battery

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- To review about science of nanomaterials
- To demonstrate the preparation methods of nanomaterials
- To analyze the characteristics of nanomaterials
- To analyze the characterization techniques
- To design various nanoscience applications

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 Characterization of surfaces & Interfaces”, 2nd edition, Weinheim Cambridge, Wiley-VCH, 2000.

REFERENCES:

1. G Timp, “Nanotechnology”, AIP press/Springer, 1999.
2. AkhleshLakhtakia, “The Hand Book of Nano Technology, Nanometer Structure, Theory, Modeling and Simulations”, Prentice-Hall of India (P) Ltd, New Delhi, 2007.
3. Guozhong Cao, “Nanostructures and Nanomaterials”, Imperial College press, 2004.
4. T Pradeep, “Nano: The Essentials”, McGraw-Hill Education, 2007.

WEB LINKS:

1. <https://www.youtube.com/watch?v=qUEbxTkPIWI> Dr. KanteshBalani& Dr. Anandh Subramaniam, IIT Kanpur
2. <https://nptel.ac.in/courses/118/102/118102003/#> Prof. Ashok K Ganguli, IIT Delhi
3. [https://nptel.ac.in/courses/118104008/Dr.KanteshBalani&Dr.AnandhSubramaniam,IIT Kanpur](https://nptel.ac.in/courses/118104008/Dr.KanteshBalani&Dr.AnandhSubramaniam,IITKanpur)
4. <https://www.youtube.com/watch?v=IFYs3XDu4fQ> Dr. P. Gopinath, IIT Roorkee
5. <https://nptel.ac.in/courses/108/108/108108113/Prof.HardikJeetendraPandya>, IISC Bangalore

JCS1001	COMPUTER HARDWARE AND INTERFACING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To understand and introduce issues related to CPU and memory
- To learn the components on the motherboard and Power management
- To acquire knowledge and fundamental ideas of different storage media
- To understand the features of different I/O peripheral devices and their interfaces
- To understand concepts of various Bus Architectures

UNIT I CPU AND MEMORY

9

CPU essentials – processor modes – modern CPU concepts – Architectural performance features – the Intel’s CPU – CPU over clocking – over clocking requirements –over clocking the system – over clocking the Intel processors – Essential memory concepts – memory organizations – memory packages – modules – logical memory organizations – memory considerations – memory types – memory techniques – selecting and installing memory

UNIT II MOTHER BOARDS

9

Active motherboards – sockets and slots – Intel D850GB – Pentium4 mother board – expansion slots – form factor – upgrading a mother board – chipsets – north bridge – south bridge – CMOS – CMOS optimization tactics – configuring the standard CMOS setup – motherboard BIOS – POST – BIOS features – BIOS and Boot sequences – BIOS shortcomings and compatibility issues – power supplies and power management – concepts of switching regulation – potential power problems – power management.

UNIT III STORAGE DEVICES

9

The floppy drive – magnetic storage – magnetic recording principles – data and disk organization – floppy drive – hard drive – data organization and hard drive – sector layout – IDE drive standard and features – Hard drive electronics – CD-ROM drive – construction – CDRom electronics – DVD-ROM – DVD media – DVD drive and decoder.

UNIT IV I/O PERIPHERALS

9

Parallel port – signals and timing diagram – IEEE1284 modes – asynchronous communication - serial port signals – video adapters – graphic accelerators – 3D graphics accelerator issues – DirectX – mice – modems – keyboards – sound boards – audio bench marks.

UNIT V BUS ARCHITECTURE

9

Buses – Industry standard architecture (ISA), peripheral component Interconnect (PCI) – Accelerated

Graphics port (AGP) – plug-and-play devices – SCSI concepts – USB architecture- GPU Architecture – case study on architectures used for Artificial Intelligence and Machine learning- Case study on NVM, RDMA-capable (remote direct memory access) networks.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Understand the fundamentals of processor modes, CPU working and memory
- Examine the different Motherboards operations and power management
- Understand the different storage devices and features
- Analyze the various I/O Peripherals and communications
- Understand the Bus Architecture and related components

TEXT BOOKS:

1. Stephen J. Bigelow, “Trouble Shooting, maintaining and Repairing PCs”, Tata McGraw-Hill, New Delhi, 2001.

REFERENCES:

1. Craig Zacker & John Rourke, “The complete reference: PC hardware”, Tata McGraw-Hill, New Delhi, 2001.
2. Mike Meyers, “Introduction to PC Hardware and Troubleshooting”, Tata McGraw-Hill, New Delhi, 2003.
3. B. Govindarajulu, “IBM PC and Clones hardware trouble shooting and maintenance”, Tata McGraw-Hill, New Delhi, 2002.
4. COMPUTER HARDWARE: Installation, Interfacing, Troubleshooting and Maintenance K. L. JAMES, PHI Learning Pvt. Ltd., 03-Jun-2013.
5. Embedded Linux: Hardware, Software, and Interfacing (Sams White Books) Paperback – 7 March 2002 by Craig Hollabaugh Ph.D.

WEB LINKS:

1. https://www.tutorialspoint.com/computer_fundamentals/computer_hardware.htm
2. <https://computerhardwarecomponentsandfunctions.wordpress.com>
3. <https://courses.lumenlearning.com/zeliite115/chapter/reading-bus/>
4. <https://tyrocity.com/topic/bus-architecture/>
5. <https://www.slideshare.net/rayrenz/computer-hardware-parts-functions>

JCS1002	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 Understand the types of Marketing
- To Build an Own E-Commerce using Open Source Frameworks

UNIT I INTRODUCTION TO E-COMMERCE AND TECHNOLOGY INFRASTRUCTURE 9

Foundations of Electronic Commerce -The scope of E commerce -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 Requirement Analysis, System Design, Building the system, Testing the system, Implementation and Maintenance, Optimize Web Performance – 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 – Types of Electronic payment systems – Digital token based system – Smart cards – Credit card based system

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 – Marketing Research -Ethical, Social, Political Issues in E-Commerce

UNIT V PROJECT CASE STUDY 9

Case Study: Identify Key components, strategy, B2B, B2C, C2B. 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, Big Commerce Magento or Open cart

TOTAL: 45 PERIODS

COURSE OUTCOMES:

On Successful completion of the course, Students will be able to:

- Design Website using HTML CSS and JS
- Design Responsive Sites
- Manage security in environment
- Understand business concepts
- Manage, Maintain and Support Web Apps

TEXT BOOKS:

1. Kenneth C.Laudon, Carol Guercio Traver, "E-Commerce", Pearson, 15th Edition, 2019

REFERENCES:

1. RobbertRavensbergen, "Building E-Commerce Solutions with WooCommerce", PACKT, 2nd Edition, 2015

WEB LINKS:

1. <http://docs.opencart.com/>
2. <http://devdocs.magento.com/>
3. <http://doc.prestashop.com/display/PS15/Developer+tutorials>

PROFESSIONAL ELECTIVE -II

JCS1601	COMPILER DESIGN	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To know about various phases of the compiler and tokenization
- To learn about the techniques for parsing
- To understand the ways of intermediate representation
- To have an idea about generating assembly code
- To have a brief understanding of code optimization techniques

UNIT I INTRODUCTION AND LEXICAL ANALYSIS 9

Language Processors – Structure of a Compiler – Role of Lexical Analyser – Specification of Tokens – Recognition of Tokens – Lex – Finite Automata – Construction of NFA from Regular Expression – NFA to DFA – Direct Conversion of Regular Expression to DFA – Minimization of DFA.

UNIT II SYNTAX ANALYSIS 9

Role of Parser – Error Handling – Error-Recovery Strategies – Context-Free Grammars – Recursive-Descent Parser – Predictive Parser – Shift-Reduce Parser – Simple LR Parser – Canonical LR parser – LALR Parser – Yacc.

UNIT III INTERMEDIATE-CODE GENERATION 9

Syntax-Directed Definitions – Evaluation Orders for SDDs – Applications of Syntax-Directed Translation – DAG – Three-Address Code – Types and Declarations – Translation of Expressions – Type Checking – Backpatching.

UNIT IV RUN-TIME ENVIRONMENT AND CODE GENERATION 9

Storage Organization – Stack Allocation of Space – Access to Nonlocal Data on Stack – Heap Management – Issues in the Design of Code Generator – The Target Machine – Addresses in the Target Code – Basic Blocks and Flow Graphs – A Simple Code Generator.

UNIT V CODE OPTIMIZATION 9

Principal Sources of Optimization – Optimization of Basic Blocks – Peephole Optimization – Register Allocation – Loops in Flow Graphs – Introduction to Global Data-flow Analysis – Code Improving Transformations.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Develop a lexical analyser for recognizing tokens.
- Construct parsers with an understanding of context-free grammar.
- Translate the source program into intermediate code.
- Understand accessing of variables and data and the algorithm that generate code.
- Analyze and understand code optimization.

TEXT BOOKS:

1. Alfred V. Aho, Monica S. Lam, Ravi Sethi and Jeffrey D. Ullman, Compilers: Principles, Techniques, & Tools, Second Edition, Pearson Education, 2007.
2. Torben Ægidius Mogensen, Introduction to Compiler Design, Second Edition, Springer, 2017.

REFERENCES:

1. Alfred V. Aho, Ravi Sethi and Jeffrey D. Ullman, Compilers: Principles, Techniques, and Tools, Pearson Education, 2001.
2. J.E. Hopcroft, R. Motwani and J.D. Ullman, Introduction to Automata Theory, Languages and Computations, Second Edition, Pearson Education, 2003.
3. Keith Cooper and Linda Torczon, Engineering a Compiler, Second Edition, Elsevier, 2011.
4. Santanu Chattopadhyay, Compiler Design, PHI, 2005.

WEB LINKS:

1. <https://holub.com/compiler/>
2. <https://nptel.ac.in/courses/106/108/106108113/>
3. <https://www.javatpoint.com/compiler-tutorial>
4. https://www.tutorialspoint.com/compiler_design/index.htm
5. <https://www3.nd.edu/~dthain/compilerbook/>

JCS1007	AUGMENTED REALITY AND VIRTUAL REALITY	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To understand the basic concept and framework of augmented reality
- To learn the techniques of augmented reality
- To learn classification and application of AR in a real time environment
- To understand the fundamentals of Virtual Reality Environment
- To study about the applications of Virtual reality

UNIT I AUGMENTED REALITY 9

History of Augmented Reality-Characteristics -Issues & Challenges –The SDK’s and Tool’s used to build Augmented Reality applications -Advantages and Disadvantages of AR.-Future scope of Augmented Reality.

UNIT II TECHNIQUES FOR AUGMENTED REALITY 9

Components of Augmented Reality- architecture - Augmented Reality systems and functionality- Techniques of Augmented Reality -Augmented reality working planes- infinite carving planes-laser carving- laser colouring- texture map capture -surface of revolution.

UNIT III CLASSIFICATIONS AND APPLICATIONS 9

Projection based Augmented Reality -Non-interactive Augmented Reality - interactive Augmented Reality - Location Based Augmented Reality - Recognition Based Augmented Reality - Augmented Reality Working on Different Devices-Applications of Augmented Reality in real Time environment- Applications- Medical Training and Retail- Open source tools- Google’s AR core, DroidAR.

UNIT IV VIRTUAL REALITY 9

Fundamental Concept and Components of Virtual Reality- Primary features and present development on VR- Requirement and benefits of VR- Computer graphics - Real time computer graphics- Scientific Landmark 3D Computer Graphics Flight Simulation- Virtual environment

UNIT V TECHNIQUES AND APPLICATIONS OF VIRTUAL REALITY 9

VR Database-Tessellated Data, LODs-Lights and Cameras- Cullers, Occluder -Scripts- Graphical user interface-Control Panel-VR Toolkits- Software for VR- Available OS and Examples- Applications- Automotive Industry and Healthcare- Open source tools - GuriVR, Openspace 3D

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Summarize the Augmented Reality basic Concepts
- Differentiate the techniques of Augmented reality and the applications
- Classify the Augmented Reality Methods and aware of the real time applications of Augmented Reality
- Apply the knowledge in VR Environment
- Design Virtual Reality applications
- Explain the challenges faced by implementation of Augmented Reality and Virtual Reality

TEXT BOOKS:

1. “Analyzing the Social Web”, Jennifer Golbeck, Morgan Kauffmann.
2. Anand R., “Augmented and Virtual Reality”, Khanna Publishing House, Delhi.

REFERENCES:

1. Burdea, G. C. and P. Coffet. Virtual Reality Technology, Second Edition. Wiley-IEEE Press, 2003/2006.
2. Alan B. Craig, Understanding Augmented Reality, Concepts and Applications, Morgan Kaufmann, 2013.
3. Alan Craig, William Sherman and Jeffrey Will, Developing Virtual Reality Applications, Foundations of Effective Design, Morgan Kaufmann, 2009.
4. John Vince, “Virtual Reality Systems “, Pearson Education Asia, 2007
5. William R. Sherman, Alan B. Craig, “Understanding Virtual Reality: Interface, Application and Design”, Morgan Kaufmann, 2008.

WEB LINKS:

1. www.vresources.org
2. www.vrac.iastate.edu
3. www.w3.org/MarkUp/VRM

JIT1003	EMBEDDED SYSTEMS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To learn the architecture and programming of ARM processor
- To become familiar with the embedded computing platform design and analysis
- To get thorough knowledge in interfacing concepts
- To design an embedded system and to develop programs

UNIT I INTRODUCTION TO EMBEDDED

COMPUTING AND ARM PROCESSORS

9

Complex systems and microprocessors – Embedded system design process – Design example: Model train controller- Instruction sets preliminaries - ARM Processor – CPU: programming input and output- supervisor mode, exceptions and traps – Co-processors- Memory system mechanisms – CPU performance- CPU power consumption.

UNIT II EMBEDDED COMPUTING PLATFORM DESIGN

9

The CPU Bus-Memory devices and systems – Designing with computing platforms – consumer electronics architecture – platform-level performance analysis - Components for embedded programs- Models of programs- Assembly, linking and loading – compilation techniques- Program level performance analysis – Software performance optimization – Program level energy and power analysis and optimization – Analysis and optimization of program size- Program validation and testing.

UNIT III SENSOR INTERFACING WITH ARDUINO

9

Basics of hardware design and functions of basic passive components-sensors and actuators-Arduino code - library file for sensor interfacing-construction of basic applications

UNIT IV EMBEDDED FIRMWARE

9

Reset Circuit, Brown-out Protection Circuit-Oscillator Unit - Real Time Clock-Watchdog Timer - Embedded Firmware Design Approaches and Development Languages.

UNIT V EMBEDDED C PROGRAMMING

9

Introduction-Creating 'hardware delays' using Timer 0 and Timer 1-Reading Switches-Adding Structure to the code-Generating a minimum and maximum delay-Example: Creating a portable hardware delay-Timeout Mechanisms-Creating loop timeouts-Testing loop timeouts- hardware timeouts-Testing a hardware timeout

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Describe the architecture and programming of ARM processor
- Explain the concepts of embedded systems
- Understand the Concepts of peripherals and interfacing of sensors
- Capable of using the system design techniques to develop firmware
- Illustrate the code for constructing a system

TEXT BOOKS:

1. Marilyn Wolf, "Computers as Components - Principles of Embedded Computing System Design", Third Edition —Morgan Kaufmann Publisher (An imprint from Elsevier), 2012. (Unit I & II)
2. <https://www.coursera.org/learn/interface-with-arduino#syllabus> (Unit III)
3. Michael J. Pont, "Embedded C", 2nd Edition, Pearson Education, 2008.(Unit IV & V)

REFERENCES:

1. Shibu K.V, "Introduction to Embedded Systems", McGraw Hill.2014
2. Jonathan W.Valvano, "Embedded Microcomputer Systems Real Time Interfacing", Third Edition Cengage Learning, 2012
3. Raj Kamal, "Embedded Systems-Architecture, Programming and Design", 3rd edition,TMH.2015
4. Lyla, "Embedded Systems", Pearson, 2013
5. David E. Simon, "An Embedded Software Primer", Pearson Education,2000.

JIT1004	SOCIAL NETWORK ANALYSIS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To understand the concept of semantic web and related applications
- To learn knowledge representation using ontology
- To learn about extraction and mining communities
- To understand human behaviour in social web and related communities
- To learn visualization of social networks

UNIT I INTRODUCTION

9

Introduction to Semantic Web: Limitations of current Web - Development of Semantic Web - Emergence of the Social Web - Social Network analysis: Development of Social Network Analysis - Key concepts and measures in network analysis - Electronic sources for network analysis: Electronic discussion networks, Blogs and online communities - Web-based networks - Applications of Social Network Analysis.

UNIT II MODELLING,AGGREGATING ANDKNOWLEDGEREPRESENTATION

9

Ontology and their role in the Semantic Web: Ontology-based knowledge Representation – Ontology languages for the Semantic Web: Resource Description Framework - Web Ontology Language - Modelling and aggregating social network data: State-of-the-art in network data representation - Ontological representation of social individuals - Ontological representation of social relationships - Aggregating and reasoning with social network data - Advanced representations.

UNIT III EXTRACTIONANDMININGCOMMUNITIES INWEBSOCIALNETWORKS

9

Extracting evolution of Web Community from a Series of Web Archive - Detecting communities in social networks - Definition of community - Evaluating communities - Methods for community detection and mining - Applications of community mining algorithms - Tools for detecting communities social network infrastructures and communities - Decentralized online social networks - Multi-Relational characterization of dynamic social network communities.

UNIT IV PREDICTING HUMAN BEHAVIOUR AND PRIVACY ISSUES

9

Understanding and predicting human behaviour for social communities - User data management - Inference and Distribution - Enabling new human experiences - Reality mining - Context – Awareness - Privacy in online social networks - Trust in online environment - Trust models based on subjective logic - Trust network analysis - Trust transitivity analysis - Combining trust and reputation – Trust derivation based on trust comparisons - Attack spectrum and countermeasures.

UNIT V VISUALIZATION AND APPLICATIONS OF SOCIAL NETWORKS

9

Graph theory - Centrality - Clustering - Node-Edge Diagrams - Matrix representation - Visualizing online social networks, Visualizing social networks with matrix-based representations - Matrix and Node-Link Diagrams - Hybrid representations - Applications - Cover networks - Community welfare - Collaboration networks - Co-Citation networks.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Develop semantic web related applications
- Represent knowledge using ontology
- Apply mining communities in web social networks
- Predict human behaviour in social web and related communities
- Visualize social networks

TEXT BOOKS:

1. Peter Mika, “Social Networks and the Semantic Web”, First Edition, Springer 2007.
2. Borko Furht, “Handbook of Social Network Technologies and Applications”, 1st Edition, Springer, 2010.

REFERENCES:

1. Guandong Xu, Yanchun Zhang and Lin Li, “Web Mining and Social Networking – Techniques and applications”, First Edition, Springer, 2011.
2. Dion Goh and Schubert Foo, “Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively”, IGI Global Snippet, 2008.
3. Max Chevalier, Christine Julien and Chantal Soulé-Dupuy, “Collaborative and Social Information Retrieval and Access: Techniques for Improved user Modelling”, IGI Global Snippet, 2009.
4. John G. Breslin, Alexander Passant and Stefan Decker, “The Social Semantic Web”, Springer, 2009.

WEB LINKS:

1. <https://www.youtube.com/watch?v=d6bi0QTaX5Y>
2. <https://nptel.ac.in/courses/106/106/106106169/>
3. <https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-cs32/>

JCS1009	DATA WAREHOUSING AND DATA MINING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To learn data warehouse concepts, architecture, business analysis and tools
- To study the methodology of engineering legacy databases for data warehousing and data mining to derive business rules for decision support systems
- 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

UNIT I INTRODUCTION TO DATA WAREHOUSING 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 INTRODUCTION TO DATA MINING 9

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

UNIT III MINING FREQUENT PATTERN AND ASSOCIATION 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 APPLICATION AND FUTURE TRENDS IN DATA MINING

9

Financial Data Analysis -Retail and Telecommunication Industries - Biological Data Analysis- Intrusion Detection and Prevention - Recommender Systems –Multimedia Data mining-Ubiquitous Data Mining - Introduction to WEKA-The Explorer – Getting started, Exploring the explorer, Learning algorithms- Display the results

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- 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
- Able to identify the application area of algorithms, and apply them

TEXT BOOKS:

1. Jiawei Han and Micheline Kamber, Data Mining Concepts and Techniques, Third Edition, Elsevier, 2012.
2. Paulraj Ponniah, “Data Warehousing: Fundamentals for IT Professionals”, Wiley India.

REFERENCES:

1. Alex Berson and Stephen J.Smith, Data Warehousing, Data Mining and OLAP, Tata McGraw – Hill Edition, 35th Reprint 2016.
2. K.P. Soman, Shyam Diwakar and V. Ajay, Insight into Data Mining Theory and Practice, Eastern Economy Edition, Prentice Hall of India, 2006.
3. Ian H.Witten and Eibe Frank, Data Mining: Practical Machine Learning Tools and Techniques, Elsevier, Second Edition.
4. S. Sumathi and S.N. Sivanandam ,Introduction to Data Mining and its Applications; <https://doi.org/10.1007/978-3-540-34351>

WEB LINKS:

1. https://www.tutorialspoint.com/dwh/dwh_data_warehousing.htm
2. <https://www.guru99.com/data-warehouse-architecture.html>
3. <https://docs.oracle.com/database/121/DMCON/toc.htm>
4. https://www.tutorialspoint.com/data_mining/dm_applications_trends.htm

JIT1005	ENTERPRISE RESOURCE PLANNING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To understand the business process of an enterprise
- To study the Business process management and Functional Modules
- To grasp the activities of ERP project management cycle
- To understand the emerging trends in ERP developments

UNIT I INTRODUCTION 9

Overview of enterprise systems – Evolution - Reasons to go for ERP- Risks and benefits - Structure of ERP- Fundamental technology - Issues to be consider in planning design and implementation of cross functional integrated ERP systems

UNIT II ERP SOLUTIONS AND FUNCTIONAL MODULES 9

Overview of ERP software solutions- small, medium and large enterprise vendor solutions, BPR, and best business practices - Business process Management, How ERP is related with BPR, Functional modules.

UNIT III ERP IMPLEMENTATION 9

Planning Evaluation and selection of ERP systems - Implementation life cycle - ERP implementation, Methodology and Frame work- Training – Data Migration. People Organization in implementation Consultants, Vendors and Employees-Role of Vendors in ERP Implementation

UNIT IV POST IMPLEMENTATION 9

Maintenance of ERP- Organizational and Industrial Impact-Success and Failure factors of ERP Implementation-Useful Guidelines for ERP Implementation

UNIT V ADVANCED LEARNING 9

Extended ERP systems and ERP add-ons -CRM, SCM, Business analytics- Future trends in ERP systems-web enabled, Wireless technologies, cloud computing

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Knowledge of ERP system

- Discuss the ERP solution and Functional modules
- Apply knowledge on ERP implementation
- Apply knowledge on Post implementation
- Awareness of core and extended modules of ERP

TEXT BOOKS:

1. Vinod Kumar Garg and N.K. Venkitakrishnan, “Enterprise Resource Planning— Concepts and Practice”, 2nd Edition, PHI, 2017.

REFERENCES:

1. Alexis Leon, “Enterprise Resource Planning Demystified”, 3rd Edition, Tata McGraw-Hill Publishing Company Ltd., 2019.
2. Mahadeo Jaiswal and Ganesh Vanapalli, first edition, ERP Macmillan India, 2013.
3. Summer, ERP, Pearson Education, 2016.
4. Sinha P. Magal and Jeffery Word, Essentials of Business Process and Information System, Wiley India, 2012.

WEB LINKS:

1. <https://www.gartner.com/en/information-technology/glossary/enterprise-resource-planning-erp>
2. <https://www.coursera.org/lecture/advanced-manufacturing-enterprise/enterprise-resource-planning-erp-MAUTK>
3. <https://nptel.ac.in/courses/110/105/110105083/>

JIT1006	BLOCK CHAIN TECHNOLOGY	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To understand Blockchain’s fundamental components, and examine decentralization using blockchain
- To explain how cryptocurrency works, from when a transaction is created to when it is considered part of the Blockchain
- To explain the components of Ethereum and Programming Languages for Ethereum
- To study the basics of Hyperledger and Web3
- To know about alternative Blockchains and Blockchain projects in different domains

UNIT I INTRODUCTION TO BLOCKCHAIN

9

History of Blockchain – Types of Blockchain – Consensus – Decentralization using Blockchain – Blockchain and Full Ecosystem Decentralization – Platforms for Decentralization.

UNIT II INTRODUCTION TO CRYPTOCURRENCY 9

Bitcoin – Digital Keys and Addresses – Transactions – Mining – Bitcoin Networks and Payments – Wallets – Alternative Coins – Theoretical Limitations – Bitcoin limitations – Name coin – Prime coin – Zcash – Smart Contracts – Ricardian Contracts.

UNIT III ETHEREUM 9

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

UNIT IV WEB3 AND HYPERLEDGER 9

Introduction to Web3 – Contract Deployment – POST Requests – Development Frameworks – Hyperledger as a Protocol – The Reference Architecture – Hyperledger Fabric – Distributed Ledger – Corda.

UNIT V ALTERNATIVE BLOCKCHAINS AND NEXT sEMERGING TRENDS 9

Kadena – Ripple – Rootstock – Quorum – Tendermint – Scalability – Privacy – Other Challenges – Blockchain Research – Notable Projects – Miscellaneous Tools.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Understand the technology components of Blockchain and how it works behind the scenes
- Identify different approaches to developing decentralized applications
- Understand Bitcoin and its limitations by comparing with other alternative coins
- Devise solution using the Ethereum model
- Understand and use Hyperledger and its development framework
- Track alternative Blockchains and emerging trends in Blockchain

TEXT BOOKS:

1. Imran Bashir, “Mastering Blockchain: Distributed Ledger Technology, Decentralization and Smart Contracts Explained”, Second Edition, Packt Publishing, 2018.

REFERENCES:

1. ArshdeepBahga, Vijay Madiseti, “Blockchain Applications: A Hands on Approach” VPT, 2017.
2. Andreas Antonopoulos, Satoshi Nakamoto, “Mastering Bitcoin”, O’Reilly, 2014.
3. Roger Wattenhofer, “The Science of the Blockchain” CreateSpace

- Independent Publishing, 2016.
4. Alex Leverington, “Ethereum Programming” Packt Publishing, 2017.
 5. A. Narayanan, J. Bonneau, E. Felten, A. Miller, S. Goldfeder, “Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction”, Princeton University Press, 2016.

WEB LINKS:

1. <https://www.tutorialspoint.com/blockchain/index.htm>
2. <https://www.w3schools.in/category/blockchain-tutorial/>
3. <https://www.investopedia.com/news/how-bitcoin-works/>
4. <https://ethereum.org/en/>
5. <https://besu.hyperledger.org/en/1.3.8/HowTo/Develop-Dapps/Use-web3js/>

JIT1007	MACHINE LEARNING TECHNIQUES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To understand the basic concepts of machine learning and probability theory
- To appreciate supervised learning and their applications
- To understand unsupervised learning like clustering and EM algorithms
- To understand the theoretical and practical aspects of probabilistic graphical models
- To learn other learning aspects such as reinforcement learning, representation learning, deep learning, neural networks and other technologies

UNIT I INTRODUCTION

9

Machine Learning – Types of Machine Learning – Supervised Learning – Unsupervised Learning – Basic Concepts in Machine Learning – Machine Learning Process – Weight Space – Testing Machine Learning Algorithms – A Brief Review of Probability Theory – Turning Data into Probabilities – The Bias-Variance Tradeoff.

Suggested Activities:

Installing Python and exploring the packages required for machine learning including numpy, scikit-learn, and matplotlib, IPythonhmmptk and pgmpy.

UNIT II SUPERVISED LEARNING

9

Linear Models for Regression – Linear Basis Function Models – The Bias-Variance Decomposition – Bayesian Linear Regression – Common Regression Algorithms – Simple Linear Regression – Multiple Linear Regression – Linear Models for Classification – Discriminant Functions – Probabilistic Generative Models – Probabilistic Discriminative Models – Laplace Approximation – Bayesian Logistic Regression – Common Classification Algorithms – k-Nearest Neighbors – Decision Trees – Random Forest model – Support Vector Machines.

Suggested Activities:

Collection of data from different recourses and summarize the data.

Build linear, multi-linear, logistic regression model to predict the data.

UNIT III UNSUPERVISED LEARNING 9

Mixture Models and EM – K-Means Clustering – Dirichlet Process Mixture Models – Spectral Clustering – Hierarchical Clustering – The Curse of Dimensionality – Dimensionality Reduction – Principal Component Analysis – Latent Variable Models(LVM) – Latent Dirichlet Allocation (LDA).

UNIT IV GRAPHICAL MODELS 9

Bayesian Networks – Conditional Independence – Markov Random Fields – Learning – Naive Bayes Classifiers – Markov Model – Hidden Markov Model.

Suggested Activities:

Implementation of Naive Bayes classifier for credit card analysis.

Implement HMM for an application.

UNIT V ADVANCED LEARNING 9

Reinforcement Learning – Representation Learning – Neural Networks – Active Learning – Ensemble Learning – Bootstrap Aggregation – Boosting – Gradient Boosting Machines – Deep Learning.

Suggested Activities:

Implement bagging approach for credit card analysis.

TOTAL: 45 PERIODS

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

- Choose and implement classification or regression algorithms for an application using an open source tool
- Implement probabilistic discriminative and generative algorithms for an application and analyze the results
- Use a tool to implement typical clustering algorithms for different types of applications
- Design and implement an HMM for a sequence model type of application
- Implement appropriate learning algorithms for any real time application using an open source tool
- Identify applications suitable for different types of machine learning with suitable justification

TEXT BOOKS:

1. EthemAlpaydin, “Introduction to Machine Learning”, Third Edition, Prentice Hall of India, 2015.

REFERENCES:

1. Christopher Bishop, “Pattern Recognition and Machine Learning”, Springer, 2006.
2. Kevin P. Murphy, “Machine Learning: A Probabilistic Perspective”, MIT Press, 2012.
3. Stephen Marsland, “Machine Learning – An Algorithmic Perspective”, Second Edition, CRC Press, 2014.
4. Tom Mitchell, “Machine Learning”, McGraw-Hill, 2017.
5. Trevor Hastie, Robert Tibshirani, Jerome Friedman, “The Elements of Statistical Learning”, Second Edition, Springer, 2008.

- Fabio Nelli, “Python Data Analytics with Pandas, Numpy, and Matplotlib”, Second Edition, Apress, 2018.

WEB LINKS:

- <https://data-flair.training/blogs/machine-learning-tutorial/>
- <https://www.javatpoint.com/machine-learning>
- <https://www.guru99.com/machine-learning-tutorial.html>
- https://www.tutorialspoint.com/machine_learning_with_python/index.htm

JCS1010	CYBER SECURITY AND DIGITAL FORENSICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To learn computer forensics
- To become familiar with forensics tools
- To learn to analyze and validate forensics data
- To learn ethical hacking
- To learn ethical hacking in web

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.

Suggested Activities:

Installing Autopsy tools for conducting hard drive investigations.

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

COURSE OUTCOMES:

At the end of the course, the students will 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

TEXT BOOKS:

1. Bill Nelson, Amelia Phillips, Frank Enfinger, Christopher Steuart, “Computer Forensics and Investigations”, Cengage Learning, India Edition, 2016.
2. CEH official Certified 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.

JIT1008	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 web services Extensions
- To learn service oriented analysis and design for developing SOA based applications

UNIT I XML

9

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

UNIT II SERVICE ORIENTED ARCHITECTURE (SOA) BASICS

9

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

UNIT III WEB SERVICES (WS) AND STANDARDS

9

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

UNIT IV WEB SERVICES EXTENSIONS

9

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

UNIT V SERVICE ORIENTED ANALYSIS AND DESIGN

9

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

COURSE OUTCOMES:

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

- Understand XML technologies
- Understand service orientation, benefits of SOA
- Understand web services and WS standards
- Use web services extensions to develop solutions
- Understand and apply service modeling, service oriented analysis and design for application development

TEXT BOOKS:

1. Thomas Erl, “Service Oriented Architecture: Concepts, Technology, and Design”, Pearson Education, 2005.
2. Sandeep Chatterjee and James Webber, “Developing Enterprise Web Services: An Architect's Guide”, Prentice Hall, 2004.

REFERENCES:

1. James McGovern, Sameer Tyagi, Michael E Stevens, Sunil Mathew, “Java Web Services Architecture”, Elsevier, 2003.
2. Ron Schmelzer et al. “XML and Web Services”, Pearson Education, 2002.

3. Frank P.Coyle, “XML, Web Services and the Data Revolution”, Pearson Education 2002.

WEB LINKS:

<http://www.digimat.in/nptel/courses/video/106101007/>

JIT1009	NATURAL LANGUAGE PROCESSING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To learn the fundamentals of natural language processing
- To understand an innovative application using NLP components
- 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

UNIT I INTRODUCTION TO NLP 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 9

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 9

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)

Suggested Activities:

Installing Natural Language Toolkit (NLTK) Python tools or OpenNLP to explore the data.

TOTAL: 45 PERIODS

COURSE OUTCOMES:**At the end 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 different types of NLP applications

TEXT BOOKS:

1. Daniel Jurafsky and James H. Martin, "Speech and Language Processing", 2nd Edition, Prentice Hall, 2008.
2. Christopher D. Manning and Hinrich Schuetze, "Foundations of Statistical Natural Language Processing", MIT Press, 1999.
3. Steven Bird, Ewan Klein and Edward Loper, "Natural Language Processing with Python", O'Reilly Media; 1 edition, 2009
4. Roland R. Hausser, "Foundations of Computational Linguistics: Human- Computer Communication in Natural Language", MIT Press, 2011.

REFERENCES:

1. Pierre M. Nugues, An Introduction to Language Processing with Perl and Prolog: An Outline of Theories, Implementation, and Application with Special Consideration of English, French, and German (Cognitive Technologies) Softcover reprint, 2010
2. James Allen, Natural Language Understanding, Addison Wesley; 2 edition 1994
3. NLTK – Natural Language Tool Kit - <http://www.nltk.org/>

WEB LINKS:

1. https://www.tutorialspoint.com/natural_language_processing/index.htm
2. <https://www.javatpoint.com/nlp>
3. <https://www.geeksforgeeks.org/introduction-to-natural-language-processing/>

JIT1010	QUANTUM COMPUTING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To know the background of classical computing and quantum computing
- To learn the fundamental concepts behind quantum computation
- To study the details of quantum mechanics and the relation to Computer Science
- To gain knowledge about the basic hardware and mathematical models of quantum computation
- To learn the basics of quantum information and the theory behind it

UNIT I FUNDAMENTAL CONCEPTS

9

Global Perspectives – Quantum Bits – Quantum Computation – Quantum Algorithms – Experimental Quantum Information Processing – Quantum Information.

UNIT II QUANTUM MECHANICS AND OVERVIEW OF COMPUTATIONAL MODELS

9

Quantum Mechanics: Linear Algebra – Postulates of Quantum Mechanics – Application: Superdense Coding – Density Operator – The Schmidt Decomposition and Purifications – EPR and the Bell Inequality – Computational Models: Turing Machines – Circuits – Analysis of Computational Problems.

UNIT III QUANTUM COMPUTATION

9

Quantum Circuits: Quantum Algorithms – Universal Quantum Gates – Quantum Circuit Model of Computation – Simulation – Quantum Fourier Transform and Applications – Quantum Search Algorithms – Quantum Computers

UNIT IV QUANTUM INFORMATION

9

Quantum Noise and Quantum Operations: Classical Noise and Markov processes – Quantum Operations – Examples – Applications – Distance Measures for Quantum Information – Quantum Error Correction – Entropy

UNIT V QUANTUM INFORMATION THEORY

9

Quantum States and Accessible Information – Data Compression – Classical Information Over Noisy Quantum Channels – Quantum Information Over Noisy Quantum Channels – Entanglement as a Physical Resource – Quantum Cryptography

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Understand the basics of quantum computing
- Understand the background of Quantum Mechanics
- Analyse the computation models
- Model the circuits using quantum computation
- Understand the quantum operations such as noise and error–correction.

TEXT BOOK:

1. Michael A. Nielsen, Issac L. Chuang, “Quantum Computation and Quantum Information”, Tenth Edition, Cambridge University Press, 2010.

REFERENCES:

1. Scott Aaronson, “Quantum Computing Since Democritus”, Cambridge University Press, 2013.
2. N. David Mermin, “Quantum Computer Science: An Introduction”, Cambridge University Press, 2007.

WEBLINKS:

1. https://onlinecourses.nptel.ac.in/noc21_cs103
2. <https://www.khanacademy.org/math/linear-algebra>
3. https://onlinecourses.nptel.ac.in/noc19_cy31/preview

JIT9004	FUNDAMENTALSOFKNOWLEDGEBASED SYSTEM	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To learn the basics of Knowledge-Based Systems
- To understand developing knowledge Based Systems
- To learn to Knowledge Management
- To understand fuzzy Logic and Agent-Based Systems
- To learn Genetic Algorithms and Soft Computing

UNIT I INTRODUCTION TO KNOWLEDGE-BASED SYSTEMS 9

Natural and Artificial Intelligence- Natural and Artificial Intelligence- Application- Data Pyramid and Computer-Based Systems-Categories of KBS- Difficulties- Architecture- Types of Knowledge-Components- Knowledge-Based Shell

UNIT II DEVELOPING KNOWLEDGE-BASED SYSTEMS 9

Nature of Knowledge- Difficulties in KBS Development- Development Model- Knowledge Acquisition-

Techniques for Knowledge Acquisition- Sharing Knowledge- Dealing with Multiple Experts- Issues with Knowledge Acquisition- Knowledge Representation- Factual Knowledge- Procedural Knowledge- Knowledge-Based System Tools

UNIT III KNOWLEDGE MANAGEMENT 9

Introduction - Perspectives KM- Drives Knowledge Management- Evolution of Knowledge Management- Elements of KM- KM Process - Tools and Technologies- Measures- Organization- Roles and Responsibilities –KM Models - K-Commerce

UNIT IV FUZZY LOGIC AND AGENT-BASED SYSTEMS 9

Introduction- Fuzzy Logic and Bivalued Logic- Membership Functions- Operations – Types of Fuzzy Functions - Linguistic Variables—Relationships- Propositions- Inference- Rules-- Fuzzy Control System- Fuzzy Rule-Based System- Rule-Based Systems-Types- Agent-Based Systems Introduction - Characteristics of Agents- Agent Typologies- Multiagent Systems

UNIT V GENETIC ALGORITHMS AND SOFT COMPUTING SYSTEMS 9

Genetic Algorithms Introduction- Basic Operators- Function- Schema- Ordering Problems- Island-Based Genetic Algorithms -Introduction to Soft Computing- Constituents -Characteristics- Neuro-Fuzzy Systems- Genetic-Fuzzy Systems- Neuro-Genetic Systems- Chaos Theory- Rough Set Theory- Applications

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Understand a Natural and Artificial Intelligence
- Apply Knowledge Acquisition using Knowledge Based Tools
- Understand Knowledge Management Roles and Responsibilities
- Design fuzzy Logic Rule Based Systems
- Solve Genetic Algorithms based Problems

TEXT BOOK:

1. Rajendra Arvind Akerkar ,Priti Srinivas Sajja, "Knowledge-Based Systems" JONES AND BARTLETT PUBLISHERS
2. PROF. KBL. SRIVASTAVA, "Knowledge Management", NPTEL, IIT Kharagpur, July,2021

REFERENCES:

1. Ronald J. Brachman, Hector J. Levesque, “Knowledge Representation and Reasoning”, Morgan Kaufmann, 2004.
2. Deepak Khemani,“A First Course in Artificial Intelligence”, McGraw Hill Education (India), 2013.

WEBLINKS:

1. <https://nptel.ac.in/courses/110/105/110105076/>
2. https://onlinecourses.nptel.ac.in/noc21_cs26/

JIT9005	BASICSOFMULTIMEDIAAPPLICATION PRACTICES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To learn the basics and Fundamentals of Multimedia
- To introduce Multimedia components and Tools
- To learn about different types of media format
- To understand how Multimedia can be incorporated
- To understand how to manipulate multimedia systems

UNIT I MULTI MEDIA FUNDAMENTALS AND TOOLS 9

Multimedia, Multimedia Objects, Multimedia in business and work, Multimedia hardware, Memory & Storage devices, Communication devices. Presentation tools, object generation which includes video sound; image capturing, Authoring tools, card and page based authoring tools.

UNIT II SOUND/AUDIO 9

Perception of sound, hearing sensitivity, frequency range, sound- wave length, the speed of sound. measuring the sound, musical sounds, noise signal, dynamic range, pitch, harmonics-equalization reverberation time, Sound isolation and room acoustics- treatments- studio layout –room dimensions. The Basic set-up of recording system; The production chain and responsibilities. Microphones types - phantom power, noise, choosing the right mike; Mixing console; Input devices; Output devices; Audio Publishing

UNIT III GRAPHICS /IMAGE AND VIDEO 9

image file formats and how and where it is used, Principles of animation,2D and 3D animation, Morphing, Kinematics, tweening, Motion capture, character animation, modeling, special effects, and compositing, Video Conferencing, Web Streaming, Video Streaming, Internet Telephony - Virtual Reality - Artificial intelligence. different types of video camera including Handy Camera, Tape Formats, Analog Editing, Editing Equipment's and Consoles, Video Signal, Video Format, Video Lights - Types and Functions. Uses of Tripod- Types. Clapboard- Usage. Light meter. Other Useful Accessories

UNIT IV MOTION PICTURE 9

analogue and Digital camera, About lenses-viewing and monitoring - ENG-EFP - Types of Films - various storage media - Types of lights - video lights - cine lights – reflectors - Digital Video Camera- Types Format-Major Components, Operation and Functions? Aperture Shutter. Focusing Methods.

Focal Length. Depth of Field

UNIT V POST PRODUCTION AND CONTEMPORARY ISSUES 9

post production setup like Architecture of a sound card, various video standards, capturing card - Media systems - Linear editing, Nonlinear editing Video mixers and its functions, effects – plugins; Various display devices - personal, retail, corporate - LCD - Plasma - Media servers- Streaming - Graphic cards - video games - various mobile devices - narrow casting protocols - personal casting devices. Emerging Fields in Multimedia Technology

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Define what Multimedia is and how that works
- Understand multimedia components using various tools and techniques
- Analyze and interpret Multimedia data
- Discuss about different types of media format and their properties
- Justify the right way of manipulating multimedia systems

TEXT BOOK:

1. Tay Vaughan, Multimedia: Making it Work 9th Edition, McGraw-Hill Education, 2014

REFERENCES:

1. Ranjan Parekh, Principles of Multimedia, 2nd Edition, McGraw Hill Education, 2013.

WEBLINKS:

1. <https://www.tutorialspoint.com/multimedia/index.htm>
2. https://jianhua.cis.k.hosei.ac.jp/course/mm/Lecture_Note.html

JIT9006	MOBILE APPLICATION PRACTICES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- Understand system requirements for mobile applications
- Generate suitable design using specific mobile development frameworks
- Generate mobile application design
- Implement the design using Android mobile development framework
- Implement the design using IOS mobile development framework

UNIT I INTRODUCTION

9

Introduction to mobile applications – Embedded systems - Market and business drivers for mobile applications – Publishing and delivery of mobile applications – Requirements gathering and validation for mobile applications

UNIT II BASIC DESIGN

9

Introduction – Basics of embedded systems design – Embedded OS - Design constraints for mobile applications, both hardware and software related – Architecting mobile applications – user interfaces for mobile applications – touch events and gestures – Achieving quality constraints – performance, usability, security, availability and modifiability.

UNIT III ADVANCED DESIGN

9

Designing applications with multimedia and web access capabilities – Integration with GPS and social media networking applications – Accessing applications hosted in a cloud computing environment – Design patterns for mobile applications.

UNIT IV ANDROID

9

Introduction – Establishing the development environment – Android architecture – Activities and views – Interacting with UI – Persisting data using SQLite – Packaging and deployment – Interaction with server-side applications – Using Google Maps, GPS and Wi-Fi – Integration with social media applications.

UNIT V IOS

9

Introduction to Objective C – iOS features – UI implementation – Touch frameworks – Data persistence using Core Data and SQLite – Location aware applications using Core Location and Map Kit – Integrating calendar and address book with social media application – Using Wi-Fi - iPhone marketplace.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Describe the requirements for mobile applications

- Explain the challenges in mobile application design and development
- Develop design for mobile applications for specific requirements
- Implement the design using Android SDK
- Implement the design using Objective C and iOS

REFERENCES:

1. Jeff McWherter and Scott Gowell, "Professional Mobile Application Development" Wrox, 2012
2. Charlie Collins, Michael Galpin and Matthias Kappler, "Android in Practice" DreamTech, 2012
3. James Dovey and Ash Furrow, "Beginning Objective C", Apress, 2012
4. David Mark, Jack Nutting, Jeff LaMarche and Frederic Olsson, "Beginning iOS 6 Development: Exploring the iOS SDK", Apress, 2013.

WEBLINKS:

1. <http://developer.android.com/develop/index.html>
2. <https://www.youtube.com/watch?v=bOiCw-ZZIGA>
3. <https://www.youtube.com/watch?v=jlmtPhMVong>

JIT9007	INTRODUCTION TO IOT	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To understand the basic concepts of IoT
- To learn the basics of IoT Protocols
- To be familiar with the development of IoT
- To know about the data analytics and supporting devices
- To gain knowledge about the applications in various domains

UNIT I INTRODUCTION

9

Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT.

UNIT II IoT PROTOCOLS

9

IoT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4e, 1901.2a, 802.11ah and LoRaWAN – Network Layer: IP versions, Constrained Nodes and Constrained Networks – Optimizing IP for IoT: From 6LoWPAN to 6Lo, Routing over Low Power and Lossy Networks – Application Transport Methods: Supervisory Control and Data Acquisition – Application Layer Protocols: CoAP and MQTT

UNIT III DESIGN AND DEVELOPMENT

9

Introduction to Python, Introduction to different IoT tools, Developing applications through IoT tools,

Implementing IoT concepts with python and Raspberry Pi.

UNIT IV DATA ANALYTICS AND SUPPORTING SERVICES 9

Structured Vs Unstructured Data and Data in Motion Vs Data in Rest – Role of Machine Learning – No SQL Databases – Hadoop Ecosystem – Apache Kafka, Apache Spark – Edge Streaming Analytics and Network Analytics – Xively Cloud for IoT, Python Web Application Framework – Django – AWS for IoT – System Management with NETCONF-YANG

UNIT V CHALLENGES AND APPLICATIONS 9

Design challenges, Development challenges, Security challenge, Home automation, Industry applications, Surveillance applications, Other IoT applications

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Explain the basics of IoT
- Understand the Protocols of IoT
- Understand the procedure to design and develop using IoT tools
- Explain the data analytics and other supporting devices
- Understand the challenges and various applications of IoT

TEXT BOOK:

1. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, "IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things", Cisco Press, 2017.

REFERENCES:

1. Arshdeep Bahga, Vijay Madiseti, "Internet of Things – A hands-on approach", Universities Press, 2015
2. Olivier Hersent, David Boswarthick, Omar Elloumi, "The Internet of Things – Key applications and Protocols", Wiley, 2012 (for Unit 2).
3. Jan Hoeller, Vlasios Tsiatsis, Catherine Mulligan, Stamatis, Karnouskos, Stefan Avesand. David Boyle, "From Machine-to-Machine to the Internet of Things – Introduction to a New Age of Intelligence", Elsevier, 2014.
4. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), "Architecting the Internet of Things", Springer, 2011.
5. Michael Margolis, Arduino Cookbook, "Recipes to Begin, Expand, and Enhance Your Projects", 2nd Edition, O'Reilly Media, 2011.

WEB LINKS:

1. <https://www.raspberrypi.org/>
2. <https://nptel.ac.in/courses/106/105/106105166/>

JIT9008	SOFTWARE DESIGN AND DEVELOPMENT	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- Knowledge of basic SW engineering methods and practices, and their appropriate application
- Describe software engineering layered technology and Process frame work
- Understanding of different software architectural styles
- Understanding of Software modelling using UML

UNIT I INTRODUCTION TO SOFTWARE DESIGN 9

Overviews of Object-Oriented Software Design, Surveys of software design methods, Software design quality (Cohesion and Coupling), Design by contract

UNIT II SOFTWARE MODELING 9

Software modeling using UML, Class Diagram, Sequence Diagram, Package Diagram, Deployment Diagram

UNIT III SOFTWARE DESIGN 9

Software Architectural Styles and Design Patterns, Peter Coad's Collaboration Patterns, Software Architecture Styles (Model-View-Controller Style, Layered Design), Design Patterns (Factory Method, Observer, Strategy, State, Decorator, Singleton)

UNIT IV IAYERS 9

Layered Design, Presentation Layer (Web UI Design), Business Logic Layer, Data Service Layer, O/R Mapping, Relational Database Design (ERD)

UNIT V DEVELOPMENT ENVIRONMENT 9

Integrated Development Environment, Web Services Implementations

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Explain the fundamentals of Software Design and Development
- Explain software engineering layered technology and Process frame work
- Explain the different software architectural styles
- Explain the Software modelling using UML

TEXT BOOK:

1. Roger S. Pressman, Software Engineering – A Practitioner's Approach, Mcgraw-Hill,

- 2004.
2. Bernd Bruegge and Allen H. Dutoit, Object-Oriented Software Engineering: Using UML, Patterns and Java, 2nd Edition, Prentice Hall, 2003.

REFERENCES:

1. Steven T. Albin, The Art of Software Architecture: Design Methods and Techniques,
2. John Wiley & Sons, Inc., 2003. Elisabeth Freeman, Eric Freeman, Bert Bates, Kathy Sierra, Head First Design Patterns, O'Reilly Media, Inc., 2004.
3. Eric Braude, Software Design – From Programming to Architecture, John Wiley & Sons, Inc., 2004.

WEBLINKS:

1. https://www.tutorialspoint.com/software_engineering/software_design_basics.htm
2. <https://www.javatpoint.com/software-engineering-software-design>

JIT9009	INTRODUCTION TO ARTIFICIAL INTELLIGENCE	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To learn the basics of Intelligent agents
- To understand represent and process knowledge
- To learn to planning and act
- To understand reason under uncertainty
- To learn from experiences

UNIT I PROBLEM SOLVING 9

Introduction – Agents – Problem formulation – uninformed search strategies – heuristics – informed search strategies – constraint satisfaction

UNIT II LOGICAL REASONING 9

Logical agents – propositional logic – inferences – first-order logic – inferences in first order logic – forward chaining – backward chaining – unification – resolution

UNIT III PLANNING 9

Planning with state-space search – partial-order planning – planning graphs – planning and acting in the real world

UNIT IV UNCERTAIN KNOWLEDGE AND REASONING 9

Uncertainty – review of probability - probabilistic Reasoning – Bayesian networks – inferences in Bayesian networks – Temporal models – Hidden Markov models

UNIT V LEARNING 9

Learning from observation - Inductive learning – Decision trees – Explanation based learning – Statistical Learning methods - Reinforcement Learning

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Represent a problem using first order and predicate logic
- Provide the apt agent strategy to solve a given problem
- Design software agents to solve a problem
- Design applications that use Artificial Intelligence
- Explain the basic of Learning

TEXT BOOK:

1. S. Russel and P. Norvig, “Artificial Intelligence – A Modern Approach”, Second Edition, Pearson Education, 2003.

REFERENCES:

1. David Poole, Alan Mackworth, Randy Goebel, “Computational Intelligence: a logical approach”, Oxford University Press, 2004.
2. G. Luger, “Artificial Intelligence: Structures and Strategies for complex problem solving”, Fourth Edition, Pearson Education, 2002.
3. J. Nilsson, “Artificial Intelligence: A new Synthesis”, Elsevier Publishers, 1998.

WEBLINKS:

1. <https://www.guru99.com/artificial-intelligence-tutorial.html>
2. <https://www.javatpoint.com/artificial-intelligence-tutorial>
3. https://www.tutorialspoint.com/artificial_intelligence/index.html

PROFESSIONAL ELECTIVE –IV

JIT1012	SOFTWARE PROJECT MANAGEMENT	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

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

UNIT I PROJECT EVALUATION AND PROJECT PLANNING

9

Importance of Software Project Management – Activities - Methodologies – Categorization of Software Projects – Setting objectives – Management Principles – Management Control – Project portfolio

Management – Cost-benefit evaluation technology – Risk evaluation – Strategic program Management – Stepwise Project Planning.

UNIT II PROJECT LIFE CYCLE AND EFFORT ESTIMATION 9

Software process and Process Models – Choice of Process models - Rapid Application development– Agile methods – Dynamic System Development Method – Extreme Programming– Managing interactive processes – Basics of Software estimation – Effort and Cost estimation techniques –COSMIC Full function points - COCOMO II - a Parametric Productivity Model.

UNIT III ACTIVITY PLANNING AND RISK MANAGEMENT 9

Objectives of Activity planning – Project schedules – Activities – Sequencing and scheduling – Network Planning models – Formulating Network Model – Forward Pass & Backward Pass techniques – Critical path (CRM) method – Risk identification – Assessment – Risk Planning –Risk Management – – PERT technique – Monte Carlo simulation – Resource Allocation – Creation of critical paths – Cost schedules.

UNIT IV PROJECT MANAGEMENT AND CONTROL 9

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

UNIT V STAFFING IN SOFTWARE PROJECTS 9

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

TOTAL 45 PERIODS

COURSE OUTCOMES:

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

- Understand Project Management principles while developing software.
- Gain extensive knowledge about the basic project management concepts, framework and the process models.
- Obtain adequate knowledge about software process models and software effort estimation techniques.
- Estimate the risks involved in various project activities.
- Define the checkpoints, project reporting structure, project progress and tracking mechanisms using project management principles.

- Learn staff selection process and the issues related to people management

TEXT BOOK:

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

REFERENCES:

1. Robert K. Wysocki —Effective Software Project Management— Wiley Publication, 2011.
2. Walker Royce: —Software Project Management— Addison-Wesley, 1998.
3. Gopaldaswamy Ramesh, —Managing Global Software Projects— McGraw Hill Education (India), Fourteenth Reprint 2013.

MAPPING WITH CO & PO

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	2	3	-	2	-	2	-	2	2	-	2	1	3	-	2
CO2	2	3	-	2	2	1	-	1	-	1	2	-	-	2	-	-
CO3	2	-	1	-	1	1	-	-	1	1	-	1	2	-	-	2
CO4	2	2	-	2	-	2	1	-	-	2	2	-	-	-	1	-
CO5	2	-	-	1	1	-	1	-	-	1	1	-	2	1	-	2

JIT1013	INFORMATION MANAGEMENT	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To expose students with the basics of managing the information
- To explore the various aspects of database design and modelling,
- To examine the basic issues in information governance and information integration
- To understand the overview of information architecture.

UNIT I DATABASE MODELLING, MANAGEMENT AND DEVELOPMENT 9

Database design and modelling - Business Rules and Relationship; Java database Connectivity (JDBC), Database connection Manager, Stored Procedures. Trends in Big Data systems including NoSQL - Hadoop HDFS, MapReduce, Hive, and enhancements.

UNIT II DATA SECURITY AND PRIVACY 9

Program Security, Malicious code and controls against threats; OS level protection; Security – Firewalls, Network Security Intrusion detection systems. Data Privacy principles. Data Privacy Laws and compliance.

UNIT III INFORMATION GOVERNANCE 9

Master Data Management (MDM) – Overview, Need for MDM, Privacy, regulatory requirements and compliance. Data Governance – Synchronization and data quality management.

UNIT IV INFORMATION ARCHITECTURE 9

Principles of Information architecture and framework, Organizing information, Navigation systems and Labelling systems, Conceptual design, Granularity of Content.

UNIT V INFORMATION LIFECYCLE MANAGEMENT 9

Data retention policies; Confidential and Sensitive data handling, lifecycle management costs.

Archivedata using Hadoop; Testing and delivering big data applications for performance and functionality; Challenges with data administration;

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Cover core relational database topics including logical and physical design and modeling
- Design and implement a complex information system that meets regulatory requirements;
- define and manage an organization's key master data entities
- Design, Create and maintain data warehouses.
- Learn recent advances in NOSQL , Big Data and related tools.

TEXT BOOKS:

1. Alex Berson, Larry Dubov MASTER DATA MANAGEMENT AND DATA GOVERNANCE, 2/E, Tata McGraw Hill, 2011
2. Security in Computing, 4/E, Charles P. Pfleeger, Shari Lawrence Pfleeger, Prentice Hall; 2006
3. Information Architecture for the World Wide Web; Peter Morville, Louis Rosenfeld ; O'Reilly Media; 1998

REFERENCES:

1. Jeffrey A. Hoffer, Heikki Topi, V Ramesh - MODERN DATABASE MANAGEMENT, 10 Edition, PEARSON, 2012

2. <http://nosql-database.org/> Next Gen databases that are distributed, open source and scalable.
3. <http://ibm.com/big-data> - Four dimensions of big data and other ebooks on Big Data Analytics
4. Inside Cyber Warfare: Mapping the Cyber Underworld- Jeffrey Carr, O'Reilly Media; Second Edition 2011

PROFESSIONAL ELECTIVE –V

JIT1014	DEEP LEARNING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To understand the basic ideas and concepts of Machine Learning.
- To study the concepts of deep learning.
- Understanding of CNN and RNN to model for real world applications.
- To introduce Deep Generative Models.
- Understanding the various challenges involved in designing deep learning algorithms for varied applications.

UNIT-I INTRODUCTION

9

Introduction to Deep Learning – Historical Trends in Deep Learning – Machine Learning Basics: Learning Algorithms – Capacity, Overfitting and Underfitting - Hyperparameters And Validation Sets - Estimators, Bias and Variance – Maximum Likelihood Estimation – Bayesian Statistics – Supervised Learning Algorithms – Unsupervised Learning Algorithms – Building a Machine Learning Algorithm – Challenges Motivating Deep Learning.

UNIT-II DEEP NETWORKS

9

Deep Feedforward Networks: Gradient-Based Learning – Hidden Units – Architecture Design Back-Propagation and Other Differentiation Algorithms – Regularization for Deep Learning: Parameter Norm Penalties – Regularization and Under-Constrained Problems – Dataset Augmentation - Semi-Supervised Learning – Multitask Learning – Early Stopping – Optimization for Training Deep Models: How Learning Differs from pure Optimization – Challenges in Neural Network Optimization – Basic Algorithms – Optimization Strategies and Meta-Algorithms.

UNIT-III CONVOLUTIONAL NETWORKS AND SEQUENCE

MODELLING

9

Convolutional Networks: The Convolution Operation - Variants of the Basic Convolution Function - Structured Outputs - Data Types - Efficient Convolution Algorithms - Random or Unsupervised Features - Sequence Modelling: Recurrent Neural Networks – Bidirectional RNNs – Deep Recurrent Networks – Recursive Neural Networks.

UNIT-IV DEEP GENERATIVE MODELS

9

Deep Generative Models: Boltzmann Machines - Restricted Boltzmann Machines - Deep Belief Networks- Deep Boltzmann Machines – Boltzmann Machines for Real-Valued Data – Convolutional Boltzmann Machines – Boltzmann Machines for Structured or Sequential Outputs - Back-Propagation through Random Operations – Directed Generative Nets – Generative Stochastic Networks – Evaluating Generative Models.

UNIT-V APPLICATIONS AND DEEP LEARNING RESEARCH 9

Applications: Large-Scale Deep Learning - Computer Vision - Speech Recognition - Natural Language Processing - Other Applications – Deep Learning Research : Monte Carlo Methods.

TOTAL: 45 PERIODS

COURSE OUTCOMES

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

- Understand basics of Machine Learning.
- Understand the concepts of Deep Learning.
- Know about CNN and RNN to model for real world applications.
- Design and implement Deep Generative Models.
- Explore the deep learning applications.

TEXT BOOKS	
1. Ian J. Goodfellow, Yoshua Bengio, Aaron Courville, “Deep Learning”, MIT Press, 2017.	
2. Ragav Venkatesan, Baoxin Li, “Convolutional Neural Networks in Visual Computing”, CRC Press, 2018.	
REFERENCES	
1. Deng & Yu, Deep Learning: Methods and Applications, Now Publishers, 2013.	
2. Michael Nielsen, Neural Networks and Deep Learning, Determination Press, 2015	
3. Ragav Venkatesan, Baoxin Li, “Convolutional Neural Networks in Visual Computing”, CRC Press, 2018.	
4. Nikhil Buduma, “Fundamentals of Deep Learning: Designing Next-Generation Machine Intelligence Algorithms”, O’Reilly publications, 2019.	
WEBSITE REFERENCES	
1. https://www.youtube.com/watch?v=4TC5s_xNKSs	
2. https://www.javatpoint.com/deep-learning	
3. https://nptel.ac.in/courses/106106201	
4. https://www.youtube.com/watch?v=VyWAyY2CF9c	

Mapping of CO with PO/PSO

	Program Outcomes												PSO	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO-1	3	2		1	3			3		2	2		3	2
CO-2	2		3			3	1		2		3	2	2	3
CO-3	1	3		3	2		3	2	3	1		2	1	2
CO-4		3	1		3	2				3	2		3	2
CO-5	2		2	2		3	1		3		2	1	2	3

JCS1012	ADHOC SENSOR NETWORK	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- Understand the design issues in ad hoc and sensor networks.
- Learn the different types of MAC protocols.
- Be familiar with different types of adhoc routing protocols.
- Learn the architecture and protocols of wireless sensor networks.
- Understand the WSN routing, Localization and QOS concepts.

UNIT-I INTRODUCTION

9

Fundamentals of Wireless Communication Technology – The Electromagnetic Spectrum – Radio propagation Mechanisms – Characteristics of the Wireless Channel -mobile ad hoc networks (MANETs) and wireless sensor networks (WSNs) : concepts and architectures. Applications of Ad Hoc and Sensor networks. Design Challenges in Ad hoc and Sensor Networks.

UNIT-II MAC PROTOCOLS FOR AD HOC WIRELESS NETWORKS

9

Issues in designing a MAC Protocol- Classification of MAC Protocols- Contention based protocols-Contention based protocols with Reservation Mechanisms- Contention based protocols with Scheduling Mechanisms – Multi channel MAC-IEEE 802.11.

UNIT-III ROUTING PROTOCOLS AND TRANSPORT LAYER IN AD HOC WIRELESS NETWORKS

9

Issues in designing a routing and Transport Layer protocol for Ad hoc networks- proactive routing, reactive routing (on-demand), hybrid routing- Classification of Transport Layer solutions-TCP over Ad hoc wireless Networks.

UNIT-IV WIRELESS SENSOR NETWORKS (WSNS) AND MAC PROTOCOLS

9

Single node architecture: hardware and software components of a sensor node – WSN Network architecture: typical network architectures-data relaying and aggregation strategies - MAC layer protocols: self-organizing, Hybrid TDMA/FDMA and CSMA based MAC-

UNIT-V WSN ROUTING, LOCALIZATION & QOS**9**

Issues in WSN routing – OLSR- Localization – Indoor and Sensor Network Localization-absolute and relative localization, triangulation-QOS in WSN-Energy Efficient Design-Synchronization-Transport Layer issues.

TOTAL: 45 PERIODS**COURSE OUTCOMES**

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

- Explain the concepts, network architectures and applications of ad hoc and wireless sensor networks
- Analyze the protocol design issues of ad hoc and sensor networks
- Design routing protocols for ad hoc and wireless sensor networks with respect to some protocol design issues
- Understand the architecture and protocols of wireless sensor networks.
- Evaluate the QoS related performance measurements of ad hoc and sensor networks

TEXT BOOKS	
1. C. Siva Ram Murthy, and B. S. Manoj, “Ad Hoc Wireless Networks: Architectures and Protocols “, Prentice Hall Professional Technical Reference, 2008.	
REFERENCES	
2. Carlos De Morais Cordeiro, Dharma Prakash Agrawal “Ad Hoc & Sensor Networks: Theory and Applications”, World Scientific Publishing Company, 2006.	
3. Feng Zhao and Leonides Guibas, “Wireless Sensor Networks”, Elsevier Publication – 2002.	
4. Holger Karl and Andreas Willig “Protocols and Architectures for Wireless Sensor Networks”, Wiley, 2005	
5. Kazem Sohraby, Daniel Minoli, & Taieb Znati, “Wireless Sensor Networks-Technology, Protocols, and Applications”, John Wiley, 2007.	
6. Anna Hac, “Wireless Sensor Network Designs”, John Wiley, 2003.	
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1. https://www.youtube.com/watch?v=W9oCYSXkir4	
2. https://nptel.ac.in/courses/106105160	
3. https://www.youtube.com/watch?v=vcaz99NogS4	

Mapping of CO with PO/PSO

	Program Outcomes												PSO	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO-1	2		2	1		3		2		2		2	2	3
CO-2		3			2		2		1		2		2	2
CO-3	3		2		3	2		3		2		2	1	3
CO-4	2	1		3		2	1			1		2	3	2
CO-5		1			3		2		2		3		3	2

JIT1016	DATA VISUALIZATION AND DATA SECURITY	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To introduce visual perception and core skills for visual analysis
- To understand the programming of Python
- To understand visualization for distribution analysis
- To understand visualization for multivariate analysis
- To understand security software and their policies

UNIT-I INTRODUCTION

9

Why Is Data Visualization Important? Data Visualization in Business Decision- Data Visualization Techniques- making abstract data visible – building blocks of information visualization – analytical interaction – analytical navigation – optimal quantitative scales – reference lines and regions – trellises and crosstabs – multiple concurrent views – focus and context – details on demand – over-plotting reduction – analytical patterns – pattern examples

UNIT-II DATA COLLECTION STRUCTURES

9

Fundamentals of Python Programming Technique-Data Cleaning and Manipulation Technique- Lists-Dictionaries-Tuples-Series-Data Frames-Panels-File I/O Processing – Regular Expressions

UNIT-III DATA FORMATTING AND DATA VISUALIZATION

9

Data Exploring and Analysis: Series Data Structures-Data Frame Data Structures-Data Analysis- Data Visualization: Direct plotting, Seaborn Plotting System, Matplotlib Plot.

UNIT-IV SECURITY SOFTWARE AND POLICIES

9

Virus Scanners-Firewalls-Antispyware-Intrusion-Detection Software-Security Policies: User policies, System Administration Policies-Defining Access Control-Development Policies-Standards, Guidelines and Procedures

UNIT-V CYBER DETECTIVE AND FORENSICS

9

General Searches-Court records and Criminal Checks-Introduction to Forensics- General Guidelines-Finding evidence on PC-Finding evidence in system logs- Extraction of deleted files-Operating System Utilities

TOTAL: 45 PERIODS

COURSE OUTCOMES

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

- Explain principles of visual perception
- Apply core skills for visual analysis
- Apply visualization techniques for various data analysis tasks
- Learn about the software and policies on Data security
- Learn about forensics and operating system utilities

TEXT BOOKS	
<ol style="list-style-type: none">1. "Data Analysis and Visualization Using Python" by Dr. Ossama Embarak2. "Computer security fundamentals" by Chuck Easttom -P	
REFERENCES	
<ol style="list-style-type: none">1. Stephen Few, "Now you see it: Simple Visualization techniques for quantitative analysis", Analytics Press, 2009.2. Stephen Few, "Information dashboard design: The effective visual communication of data", O'Reilly, 20063. Edward R. Tufte, "The visual display of quantitative information", Second Edition, Graphics Press, 20014. Nathan Yau, "Data Points: Visualization that means something", Wiley, 20135. Ben Fry, "Visualizing data: Exploring and explaining data with the processing environment", O'Reilly, 20086. Gert H. N. Laursen and Jesper Thorlund, "Business Analytics for Managers: Taking business intelligence beyond reporting", Wiley, 2010	
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<ol style="list-style-type: none">1. https://www.tableau.com/sites/default/files/media/designing-great-visualizations.pdfT22. https://flowingdata.com/2017/01/24/one-dataset-visualized-25-ways/	

Mapping of CO with PO/PSO

	Program Outcomes												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO-1	2		2	1		3		2		2		2	2	3	2
CO-2		3			2		2		1		2		2	2	
CO-3	3		2		3	2		3		2		2	1	3	3
CO-4	2	1		3		2	1			1		2	3	2	2
CO-5		1			3		2		2		3		3	2	

JIT1017	FOUNDATION SKILLS IN INTEGRATED PRODUCT DEVELOPMENT	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To understand the global trends and development methodologies of various types of products and services
- To conceptualize, prototype and develop product management plan
- To understand requirement engineering for new product development and convert them into design specification
- To understand system modeling for system, sub-system and their interfaces
- To develop documentation, test specifications

UNIT 1 FUNDAMENTALS OF PRODUCT DEVELOPMENT

9

Global Trends Analysis and Product decision – Social Trends – Technical Trends- Economical Trends – Environmental Trends – Political/Policy Trends – Introduction to Product Development Methodologies and Management – Overview of Products and Services – Types of Product Development – Overview of Product Development methodologies – Product Life Cycle – Product Development Planning and Management.

UNIT II REQUIREMENTS AND SYSTEM DESIGN

9

Requirement Engineering – Types of Requirements – Requirement Engineering – traceability Matrix and Analysis – Requirement Management – System Design & Modeling – Introduction to System Modeling System Optimization – System Specification – Sub-System Design – Interface Design.

UNIT III DESIGN AND TESTING**9**

Conceptualization – Industrial Design and User Interface Design – Introduction to Concept generation Techniques – Challenges in Integration of Engineering Disciplines – Concept Screening & Evaluation – Detailed Design – Component Design and Verification – Mechanical, Electronics and Software Subsystems – High Level Design/Low Level Design of S/W Program – Types of Prototypes, S/W Testing- Hardware Schematic, Component design, Layout and Hardware Testing – Prototyping – Introduction to Rapid Prototyping and Rapid Manufacturing – System Integration, Testing, Certification and Documentation

UNIT IV SUSTENANCE ENGINEERING AND END-OF-LIFE (EOL) SUPPORT**9**

Introduction to Product verification processes and stages – Introduction to Product Validation processes and stages – Product Testing Standards and Certification – Product Documentation – Sustainance - Maintenance and Repair – Enhancements – Product EoL – Obsolescence Management – Configuration Management – EoL Disposal

UNIT V BUSINESS DYNAMICS – ENGINEERING SERVICES INDUSTRY**9**

The Industry – Engineering Services Industry – Product Development in Industry versus Academia –The IPD Essentials – Introduction to Vertical Specific Product Development processes - Manufacturing/Purchase and Assembly of Systems – Integration of Mechanical, Embedded and Software Systems – Product Development Trade-offs – Intellectual Property Rights and Confidentiality – Security and Configuration Management.

TOTAL: 45 PERIODS**COURSE OUTCOMES**

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

- Define, formulate and analyze a problem
- Solve specific problems independently or as part of a team
- Gain knowledge of the Innovation & Product Development process in the Business Context
- Work independently as well as in teams
- Manage a project from start to finish

TEXT BOOKS	
	<ol style="list-style-type: none"> 1. Book specially prepared by NASSCOM as per the MoU. 2. Karl T Ulrich and Stephen D Eppinger, “Product Design and Development”, Tata McGraw Hill, Fifth Edition, 2011. 3. John W Newstorm and Keith Davis, “Organizational Behavior”, Tata McGraw Hill, Eleventh Edition, 2005.

REFERENCES	
4. Hiriappa B,- Corporate Strategy Managing the Business, Author House, 2013. 5. Peter F Drucker, People and Performance Butterworth – Heinemann [Elsevier], Oxford, 2004. 6. Vinod Kumar Garg and Venkita Krishnan N K, —Enterprise Resource Planning – Concepts, Second Edition, Prentice Hall, 2003. 7. Mark S Sanders and Ernest J McCormick, “Human Factors in Engineering and Design”, McGraw Hill Education, Seventh Edition, 2013	
WEBSITE REFERENCES	

Mapping of CO with PO/PSO

	Program Outcomes												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO-1	2		2	1		3		2		2		2	2	3	2
CO-2		3			2		2		1		2		2	2	
CO-3	3		2		3	2		3		2		2	1	3	3
CO-4	2	1		3		2	1			1		2	3	2	2
CO-5		1			3		2		2		3		3	2	

JCS1011	BUSINESS INTELLIGENCE	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES: The students should be made to

- Be exposed with the basic rudiments of business intelligence system
- Understand the delivery of knowledge in respect of Business Intelligence
- Understand the modeling aspects behind Business Intelligence
- Understand of the business intelligence life cycle and the techniques used in it
- Be exposed with different data analysis tools and techniques

UNIT -I BUSINESS INTELLIGENCE

9

Effective and timely decisions – Data, information and knowledge – Role of mathematical

models – Business intelligence architectures: Cycle of a business intelligence analysis – Enabling factors in business intelligence projects – Development of a business intelligence system – Ethics and business intelligence.

UNIT-II KNOWLEDGE DELIVERY 9

The business intelligence user types, Standard reports, Interactive Analysis and Ad Hoc Querying, Parameterized Reports and Self-Service Reporting, dimensional analysis, Alerts/Notifications, Visualization: Charts, Graphs, Widgets, Scorecards and Dashboards, Geographic Visualization, Integrated Analytics, Considerations: Optimizing the Presentation for the Right Message.

UNIT-III EFFICIENCY 9

Efficiency measures – The CCR model: Definition of target objectives- Peer groups – Identification of good operating practices; cross efficiency analysis – virtual inputs and outputs – Other models. Pattern matching – cluster analysis, outlier analysis.

UNIT-IV BUSINESS INTELLIGENCE APPLICATIONS 9

Graphs - Definition – Representation of Graph – Types of graph – Breadth-first traversal– Depth-first traversal – Topological Sort – Applications of graphs-Shortest path algorithm– Dijkstra’s algorithm-Minimum spanning trees-Prim’s Algorithm-Kruskal’s Algorithm

UNIT-V FUTURE OF BUSINESS INTELLIGENCE 9

Future of business intelligence – Emerging Technologies, Machine Learning, Predicting the Future, BI Search & Text Analytics – Advanced Visualization – Rich Report, Future beyond Technology.

TOTAL: 45 PERIODS

COURSE OUTCOMES

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

- Explain the fundamentals of business intelligence.
- Link data mining with business intelligence.
- Apply various modeling techniques.
- Explain the data analysis and knowledge delivery stages.
- Apply business intelligence methods to various situations.

TEXT BOOKS	
1. Efraim Turban, Ramesh Sharda, Dursun Delen, “Decision Support and Business Intelligence Systems”, 9th Edition, Pearson 2013. 2. T2	
REFERENCES	

1. Larissa T. Moss, S. Atre, “Business Intelligence Roadmap: The Complete Project Lifecycle of Decision Making”, Addison Wesley, 2003.
2. Carlo Verzellis, “Business Intelligence: Data Mining and Optimization for Decision Making”, Wiley Publications, 2009.
3. David Loshin Morgan, Kaufman, “Business Intelligence: The Savvy Manager’s Guide”, Second Edition, 2012.
4. Cindi Howson, “Successful Business Intelligence: Secrets to Making BI a Killer App”, McGraw-Hill, 2007
5. Ralph Kimball , Margy Ross , Warren Thornthwaite, Joy Mundy, Bob Becker, “The Data Warehouse Lifecycle Toolkit”, Wiley Publication Inc.,2007.

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1. https://www.tutorialspoint.com/management_information_system/business_intelligence_system.htm
2. <https://www.javatpoint.com/power-bi>
3. <https://www.geeksforgeeks.org/what-is-business-intelligence/>
4. <https://www.geeksforgeeks.org/why-business-intelligencebi-is-important/>

Mapping of CO with PO/PSO

	Program Outcomes												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO-1	2		2	1		3		2		2		2	2	3	2
CO-2		3			2		2		1		2		2	2	
CO-3	3		2		3	2		3		2		2	1	3	3
CO-4	2	1		3		2	1			1		2	3	2	2
CO-5		1			3		2		2		3		3	2	

JIT1019	Free and Open Source Software	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

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

- Understand Exposure to the context and operation of free and open source software (FOSS) communities and associated software projects.
- Demonstrate the installation of Linux by hard disk partitioning and process of working with files.
- Analyze shell programming by working with variables, control structures and scripting.
- Learn some important FOSS tools and techniques
- Develop Open Source Database by configuring MYSQL Server and connecting to MYSQL with PHP

UNIT -I OPEN-SOURCE SOFTWARE OVERVIEW 9

Introduction – Need and Advantage of Open-Source Software – Foss- Free Software Movement –Open Source Movement- Open Source Licensing Certification-OSS Development Model-Run a Free Software Project-Comparing OSS with other Software-OSS Licenses

UNIT-II OPEN SOURCE OPERATING SYSTEM 9

Linux Installation and Hardware Configuration – Boot Process-The Linux Loader (LILO) - The Grand Unified Bootloader (GRUB) - Dual-Booting Linux and other Operating System - Boot-Time Kernel Options- X Windows System Configuration-System Administration – Backup and Restore Procedures Strategies for keeping a Secure Server.

UNIT-III SHELL PROGRAMMING 9

Bash Shell Scripting, Executing Script, Working with Variables and Input, Using Control Structures, Handling signals, creating functions, working sed and gawk, working with web using shell script: Downloading web page, Converting Web page content to a text file, parsing data, working cURL.

UNIT-IV PROGRAMMING TOOLS AND TECHNIQUES 9

Usage of design Tools like Argo UML or equivalent, Version Control Systems like Git or equivalent, – Bug Tracking Systems- Package Management Systems

UNIT-V OPEN SOURCE DATABASE AND APPLICATION 9

MySQL: Configuring MySQL Server, working with MySQL Databases, MySQL Tables, SQL Commands – INSERT, SELECT, UPDATE, REPLACE, DELETE. Date and Time functions in MySQL. PHP – MySQL

Application Development: Connecting to MySQL with PHP, Inserting data with PHP, Retrieving data with PHP.

TOTAL:45 PERIODS

COURSE OUTCOMES:

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

- Using the context and operation of free and open source software (FOSS) communities and associated software projects
- Able to do the installation of Linux by hard disk partitioning and process of working with files
- Using shell programming by working with variables, control structures and scripting
- Use important FOSS tools and techniques
- Able to do Open Source Database by configuring MYSQL Server and connecting to MYSQL with PHP

TEXT BOOKS	
<ol style="list-style-type: none">1. Evi Nemeth, Garth Snyder, Trent R. Hein, Ben Whaley and Dan Mackin , “UNIX and Linux System Administration Handbook “, 5th Edition, Addison-Wesley Professional, 2017.2. Julie C Meloni, “PHP, MySQL and Apache”, Sixth Edition, Pearson Education, 2017.3. Prof. Dayan and Ambawade, Deven Shah, “Linux Labs And Open Source Technologies”, Dream Tech Press, 2014. T2	
REFERENCES	
<ol style="list-style-type: none">1. Wale Soyinka, Linux Administration- A beginner’s Guide, Tata McGraw Hills, 20122. Fadi P. Deek and James A. M. McHugh, Open Source Technology and Policy, Cambridge University Press, 20073. Andrew M. St. Laurent, “Understanding Open Source and Free Software Licensing”, O’Reilly Media, 2004.4. Ellen Siever, Stephen Figgins, Robert Love, Arnold Robbins, “Linux in a Nutshell”, Sixth Edition, O’Reilly Media, 2009.	
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<ol style="list-style-type: none">1. https://opensource.com/resources/what-open-source2. https://www.ibm.com/topics/open-source3. https://www.shellscript.sh/4. https://www.redhat.com/en/topics/open-source/	

Mapping of CO with PO/PSO

	Program Outcomes												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO-1	2		2	1		3		2		2		2	2	3	2
CO-2		3			2		2		1		2		2	2	
CO-3	3		2		3	2		3		2		2	1	3	3
CO-4	2	1		3		2	1			1		2	3	2	2
CO-5	2	1		3		2	1			1		2	3	2	2

OPEN ELECTIVE-IV

JIT9010	Fundamentals of 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.
- To identify the key aspects of developing applications using a framework.

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, Application Virtualization.

UNIT III CLOUD ARCHITECTURE, SERVICES AND STORAGE 9

NIST Cloud Computing Reference Architecture – Public, Private and Hybrid Clouds - IaaS – 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**

Hadoop – MapReduce – Virtual Box -Google App Engine(GAE) – GAE Architecture – Functional Modules of GAE – Amazon Web Services(AWS) – GAE Applications – Cloud Software Environments– Eucalyptus – Open Nebula –Open Stack.

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.
- Be able to install and use current cloud technologies..

TEXT BOOKS	
T1 1. Buyya R., Broberg J., Goscinski A., “Cloud Computing: Principles and Paradigm”, First Edition, John Wiley & Sons, 2011.	
T2 Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.	
T3 Rittenhouse, John W., and James F. Ransome, “Cloud Computing: Implementation, Management, And Security”, CRC Press, 2017.	
REFERENCES	
T1 Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi, Mastering Cloud Computing, Tata Mcgraw Hill, 2013.	
T2 Toby Velte, Anthony Velte, Robert Elsenpeter, “Cloud Computing – A Practical Approach, Tata Mcgraw Hill, 2009.	
T3 George Reese, “Cloud Application Architectures: Building Applications and Infrastructure in the Cloud: Transactional Systems for EC2 and Beyond (Theory in Practice), OReilly, 2009.	
WEBSITE REFERENCES	

1. <https://nptel.ac.in/courses/101/104/106105167>
2. <https://www.coursera.org/learn/introduction-to-cloud>
3. <https://www.ibm.com/in-en/cloud/learn/soa>
4. <https://www.geeksforgeeks.org/rest-api-architectural-constraints/>
5. <https://aws.amazon.com/pub-sub-messaging/>

Mapping of CO with PO/PSO

	Program Outcomes												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO-1	3	3	2	-	2	3	-	-	-	-	-	2	3	2	-
CO-2	3	3	2	-	2	3	-	-	-	-	-	2	3	2	-
CO-3	3	3	3	-	3	3	-	-	-	-	-	3	3	2	-
CO-4	3	3	3	-	3	3	-	-	-	-	-	3	3	1	-
CO-5	2	2	3	3	3	2	-	-	-	-	-	3	3	1	-

JIT9011	INTRODUCTION TO CYBER SECURITY	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- Build a basis to understand foundations of cryptography
- Formally understand the notions related to security authentication and privacy.
- Applications of probability distributions and fuzzy sets.
- An introduction to algebraic foundations for cryptography and coding theory

UNIT-I CYBER SECURITY FUNDAMENTALS

9

Basics and Concepts of Network and Security -Symmetric Encryption-The Domain Name System (DNS)-Firewalls-Virtualization-Radio-Frequency Identification-Microsoft Windows Security Principles-Windows Tokens-Window Messaging-Windows Program Execution-The Windows Firewall

UNIT-II ATTACKER TECHNIQUES AND EXPLOITATION

9

Proxies-Tunnelling Techniques-Fraud Techniques-Threat Infrastructure-Techniques to Gain a Foothold-Stack-Based Buffer Overflows-Format String Vulnerabilities-SQL Injection-Malicious PDF Files-Race Conditions-Web Exploit Tools-Misdirection, Reconnaissance, and Disruption Methods

UNIT-III MALICIOUS CODE

9

Self-Replicating Malicious Code-Evading Detection and Elevating Privileges-Obfuscation-Virtual Machine Obfuscation-Persistent Software Techniques-Rootkits-Spyware-Attacks against Privileged User Accounts and Escalation of Privileges-Virtual Machine Detection-Stealing Information and Exploitation-Man-in-the-Middle Attacks-DLL Injection

UNIT-IV DEFENSE AND ANALYSIS TECHNIQUES **9**
 Memory Forensics-Honeypots-Malicious Code Naming-Automated Malicious
 Code Analysis Systems-Intrusion Detection Systems

UNIT-V CYBER ETHICS AND LAWS **9**
 Introduction to Cyber Laws - E-Commerce and E-Governance - Certifying Authority and
 Controller - Offences under IT Act- Computer Offences and its penalty under IT Act 2000
 - Intellectual Property Rights in Cyberspace.

TOTAL: 45 PERIODS

COURSE OUTCOMES

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

- Understand the broad set of technical, social & political aspects of Cyber Security.
- Understand the importance of ethical hacking tool.
- Implementing ethical hacking tools in an organization.
- Apply security principles to system design.
- Apply methods for authentication, access control, intrusion detection and prevention and conduct research in Cyber Security

TEXT BOOKS	
1. “Cyber Security Essentials” by James Graham,Richard Howard and Ryan Olson of CRC Press-An AUERBACH BOOK	
2. “Cyber Security: Analytics, Technology and Automation” Martti Lehto Pekka Neittaanmäki Editors-Volume 78-Springer.	
3. Cyber Law By Bare Act, Govt of India, It Act 2000	
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1. Cybersecurity : the beginner's guide : a comprehensive guide to getting started in cybersecurity Erdal Ozkaya author.Birmingham : Packt , 2019	
2. Personal cybersecurity : how to avoid and recover from cybercrime Marvin Waschke author.Berkeley, CA : Apress : Imprint: Apress , 2017.	
3. Cybersecurity : protecting your identity and data Mary-Lane Kamberg 1948- author.New York, New York : Rosen Central , 2018.	
4. Nina Godbole, Sumit Belapure, “Cyber Security”, Willey, 2011.	
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1. https://www.csis.org/news/cybersecurity-agenda-45th-president	
2. https://www.aztechit.co.uk/download-cyber-security-ebook	

Mapping of CO with PO/PSO

	Program Outcomes												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO-1	3	3	2	-	2	3	-	-	-	-	-	2	3	2	-
CO-2	3	3	2	-	2	3	-	-	-	-	-	2	3	2	-
CO-3	3	3	3	-	3	3	-	-	-	-	-	3	3	2	-
CO-4	3	3	3	-	3	3	-	-	-	-	-	3	3	1	-
CO-5	2	2	3	3	3	2	-	-	-	-	-	3	3	1	-

JIT9012	Essentials of Virtual System Reality	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To understand geometric modeling and Virtual environment
- To study about Virtual Hardware and Software
- To develop Virtual Reality applications
- To understand virtual reality, augmented reality and using them to build engineering applications
- To know the intricacies of these platform to develop PDA applications with better optimality

UNIT-I INTRODUCTION

9

The three I's of virtual reality, commercial VR technology and the five classic components of a VR system. Virtual Reality and Virtual Environment: Introduction, Computer graphics, Real time computer graphics, Flight Simulation, Virtual environment requirement, benefits of virtual reality, Historical development of VR, Scientific Landmark.

UNIT-II VR ON THE WEB & VR ON THE MOBILE:

9

Three-dimensional position (Trackers, Navigation, and Gesture Interfaces) trackers, navigation and manipulation, interfaces and gesture interfaces. -Graphics displays, sound displays & haptic feedback
Primary features and present development on VR.

UNIT-III AUGMENTED AND MIXED REALITY:

9

Taxonomy, technology and features of augmented reality, difference between AR and VR, Challenges with AR, AR systems and functionality, Augmented reality methods, visualization techniques for augmented reality. wireless displays in educational augmented reality applications, mobile projection interfaces, marker-less tracking for augmented reality, enhancing interactivity in AR environments, evaluating AR systems.

UNIT-IV VR DEVELOPMENT PROCESS**9**

Geometric modeling, kinematics modeling, physical modeling, behavior modeling, model management
 Scientific Landmark 3D Computer Graphics Flight Simulation- Virtual environment

UNIT V- TECHNIQUES AND APPLICATIONS OF VIRTUAL REALITY**9**

VR Database-Tessellated Data, LODs-Lights and Cameras- Cullers, Occluder -Scripts- Graphical user interface-Control Panel-VR Toolkits- Software for VR- Available OS and Examples- Applications- Automotive Industry and Healthcare- Open source tools - GuriVR, Openspace 3D

TOTAL: 45 PERIODS**COURSE OUTCOMES**

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

- Adopt various principles and concepts of virtual reality and its application.
- Apply appropriate method of geometric modelling
- Formulate virtual environment for a given engineering problem and VR simulation for problem situation
- Analyse various VR software in a structured manner and prepare report as per the technical standards
- Identify problem statements and function as a member of an engineering design team.

TEXT BOOKS	
<ol style="list-style-type: none"> 1. T1Virtual Reality Technology, Gregory C. Burdea& Philippe Coiffet, John, 2nd Edition, 2013 Wiley & Sons, Inc., ISBN: 978-0-471-36089-6 2. T2Grigore C. Burdea, Philippe Coiffet , “Virtual Reality Technology”, Wiley Interscience, 2nd Edition, 2006. ISBN: 978-0-471-36089-6 	
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<p>T1 Alan B. Craig, “Understanding Augmented Reality”, Concepts and Applications, Morgan Kaufmann, 1st Edition, 2013 ISBN: 9780240824086</p> <p>T2 Oliver Bimber and Ramesh Raskar, Spatial Augmented Reality: Merging Real and Virtual Worlds, 2005. ISBN 1-56881-230-2</p> <p>T3 The Fourth Transformation: How Augmented Reality & Artificial Intelligence Will Change Everything, Robert Scoble & Shel Israel, Patrick Brewster Press; 1 edition, 2016</p> <p>T4 Learning Virtual Reality: Developing Immersive Experiences and Applications for Desktop, Web, and Mobile, Tony Parisi, O’Reilly Media; 1 edition, 2015</p>	
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<ol style="list-style-type: none"> 3. https://www.futurelearn.com/info/blog/virtual-reality-education-immersive-learning 4. https://immersionvr.co.uk/about-360vr/vr-for-education/ 5. https://online.lsu.edu/newsroom/articles/how-virtual-reality-changing-education/ 6. https://www.analyticssteps.com/blogs/5-applications-virtual-reality-education 	

Mapping of CO with PO/PSO

	Program Outcomes												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO-1	3	1	2	1	3	2	1	1	1	1	1	2			
CO-2	2	2	3	1	3	2	1	1	2	2	1	1			
CO-3	3	2	2	1	3	1	1	1	1	1	1	1			
CO-4	2	1	3	2	3	2	1	1	1	1	1	1			
CO-5	2	1	3	2	3	2	1	1	1	1	1	1			