JERUSALEM COLLEGE OF ENGINEERING

(An Autonomous Institution)

(Approved by AICTE, Affliated to Anna University

Accredited by NBA and NAAC with 'A' Grade)
Velachery Main Road, Narayanapuram, Pallikaranai, Chennai – 600 100

REGULATIONS 2021

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 variousstreams 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.

<div align="center">***</div>

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**

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	COURSETITLE	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	CATEGORY	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		Professional Elective – VI	PE	3	3	0	0	3
5		Open Elective -IV	OE	3	3	0	0	3
6.	JNC1361	Essence of Indian Traditional Knowledge	NCM	3	3	0	0	0
PRACTICALS								
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 ELECTIVES (PE)

VERTICAL 1: FULL STACK DEVELOPMENT

Sl. No	COURSE CODE	COURSE TITLE	T/P/I	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	JIT1020	APP Development	T	PE	3	3	0	0	3
2.	JIT1021	Cloud Services Management	T	PE	3	3	0	0	3
3.	JIT1022	UI and UX Design	T	PE	3	3	0	0	3

7

Sl. No	COURSE CODE	COURSE TITLE	T/P/I	CATEGORY	CONTACT PERIODS	L	T	P	C
4.	JIT1023	Devops	T	PE	3	3	0	0	3
5.	JIT1024	Web Security and Privacy	T	PE	3	3	0	0	3
6.	JIT1025	MERN Stack development	T	PE	3	3	0	0	3
7.	JIT1026	Software Testing And Automation	T	PE	3	3	0	0	3
8.	JIT1027	No SQL Database	T	PE	3	3	0	0	3

VERTICAL 2 COGNITIVE ENGINEERING

Sl. No	COURSE CODE	COURSE TITLE	T/P/I	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	JIT1028	AI tools and Techniques.	T	PE	3	3	0	0	3
2.	JIT1029	Introduction to Machine Learning	T	PE	3	3	0	0	3
3.	JIT1030	Fundamentals Of Deep learning	T	PE	3	3	0	0	3
4.	JIT1031	Fog Computing	T	PE	3	3	0	0	3
5.	JIT1032	Expert System	T	PE	3	3	0	0	3
6.	JIT1033	Recommender Systems	T	PE	3	3	0	0	3
7.	JIT1034	Game Programming	T	PE	3	3	0	0	3
8.	JIT1035	Agent Based Intelligent Systems	T	PE	3	3	0	0	3

VERTICAL 3: AUTOMATION TOOLS

Sl. No	COURSE CODE	COURSE TITLE	T/P/I	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	JIT1002	Agile Methodology	T	PE	3	3	0	0	3
2.	JIT1023	Devops	T	PE	3	3	0	0	3
3.	JAD1020	Software Testing using Selenium	T	PE	3	3	0	0	3
4.	JAD1021	Pandas For Data Analysis	T	PE	3	3	0	0	3
5.	JAD1022	Data Visualization Using Tableau	T	PE	3	3	0	0	3
6.	JAD1023	Jenkins Automation for Server	T	PE	3	3	0	0	3
7.	JAD1024	Cloud Computing	T	PE	3	3	0	0	3

Sl. No	COURSE CODE	COURSE TITLE	T/P/I	CATEGORY	CONTACT PERIODS	L	T	P	C
		Tools							
8.	JAD1025	Infrastructure Build Tool Using Terraform	T	PE	3	3	0	0	3

VERTICAL 4: IOT

Sl. No	COURSE CODE	COURSE TITLE	T/P/I	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	JIT1036	Internet Of Things: Architecture Protocols And Applications	T	PE	3	3	0	0	3
2.	JIT1037	Programming For IOT Boards	T	PE	3	3	0	0	3
3.	JIT1038	Industrial IoT 4.0	T	PE	3	3	0	0	3
4.	JIT1039	IoT in HealthCare	T	PE	3	3	0	0	3
5.	JIT1040	Robotics in IOT	T	PE	3	3	0	0	3
6.	JIT1041	Mobile Application Development For IOT	T	PE	3	3	0	0	3
7.	JIT1042	Cognitive IOT	T	PE	3	3	0	0	3
8.	JIT1043	Privacy Security for IOT	T	PE	3	3	0	0	3

VERTICAL 5 CYBER SECURITY

Sl. No	COURSE CODE	COURSE TITLE	T/P/I	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	JCB1402	Foundation of Cyber Security	T	PE	3	3	0	0	3
2.	JCB1403	Cryptography and Cryptoanalysis	T	PE	3	3	0	0	3
3.	JCB1501	Cyber Forensics	T	PE	3	3	0	0	3
4.	JCB1502	Intrusion Detection Systems	T	PE	3	3	0	0	3
5.	JCB1503	Hardware Security	T	PE	3	3	0	0	3
6.	JCB1601	Cloud Security	T	PE	3	3	0	0	3
7.	JCB1603	Ethical Hacking	T	PE	3	3	0	0	3
8.	JCB1702	Web Application Security	T	PE	3	3	0	0	3

HUMANITIES AND SOCIAL SCIENCES (HS)

Sl. NO	COURSE CODE	COURSETITLE	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	COURSETITLE	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	COURSETITLE	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

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

Sl. NO	COURSE CODE	COURSETITLE	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.	JBA1711	Entrepreneurship for Engineers	EEC	2	0	0	2	1
8.	JIT1731	Project work – Phase I	EEC	6	0	0	6	3
9.	JIT1832	Project Work Phase 2	EEC	18	0	0	18	9
10.	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.

REFERENCES
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.

WEB REFERENCES

1. https://nptel.ac.in/courses/111/108/111108157/
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

		L	T	P	C
JPH1101	**ENGINEERING PHYSICS** **(Common to all B.E /B.Tech Programmes)**	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 – Co ordination 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.

REFERENCES:
1. Halliday, D., Resnick, R. & Walker, J. "Principles of Physics". Wiley, 2015.
2. Serway, R.A. & Jewett, J.W. "Physics for Scientists and Engineers". Cengage Learning,2010.
3. Tipler, P.A. & Mosca, G. "Physics for Scientists and Engineers with Modern Physics'.
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.

WEB SITE REFERENCES:
1.https://nptel.ac.in/courses/115/104/115104109/
2.https://nptel.ac.in/noc/courses/noc18/SEM2/noc18-ce18/
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 – H_2-O_2 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.

Website reference:
1. https://nptel.ac.in/content/storage2/courses/103108100/module2/module2.pdf
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 – Kirchhoff'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 energey 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.

   Website reference:
   1.   https://www.eit.edu.au/
   2. https://nptel.ac.in/courses/105/102/105102088/
   3. https://nptel.ac.in/courses/108/105/108105155/
   4. https://nptel.ac.in/courses/117/103/117103063/
   5. https://nptel.ac.in/courses/108/105/108105153/

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. PradipDey, 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-Hilllishing Company Limited, (2017).

Website Reference :

1. **https://www.javatpoint.com/computer-fundamentals-tutorial**
2. **https://www.geeksforgeeks.org/basics-file-handling-c/**
3. **https://www.studytonight.com/c/string-and-character-array.php**
4. **https://www.tutorialspoint.com/cprogramming/c_functions.htm**
5. **https://www.guru99.com/c-pointers.html**

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

WEBSITE REFERENCES

1. http://www.digimat.in/nptel/courses/video/105107176/L31.html
2. https://www.canterbury.ac.nz/media/documents/science-outreach/chloride_mohr.pdf
3. http://www.mgcub.ac.in/pdf/material/20200428101433e562a8b8e8.pd
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 CDevelop
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 ofhexagonal 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

1. Residential house wiring using switches, fuse, indicator, lamp and energy meter.
2. Fluorescent lamp wiring.
3. Stair case wiring
4. 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

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 brushetc. 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 plumbingworks.
- 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://archieve.org/mechanicalengineeeringworkshoplaboratory**

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

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 andEngineers. Orient Black Swan, Chennai.
2. Dhanavel, S.P. English and Communication Skills for Students of Science and Engineering. OrientBlack 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 LongmanPublishing 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 Communicationfor Non-Native Speakers", 2nd Edition, Wadsworth, 1992.
3. Alley, Michael, "The Craft of Scientific Presentations: Critical Steps to Succeed and Critical Errors toAvoid", 1st Edition, Springer, 2007.
4. Gopalaswamy, Ramesh & Ramesh Mahadevan. ACE of Soft Skills: Attitude, Communication andEtiquette 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:

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 Tc 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, sp^2 and sp^3) - Molecular orbital theory-energy level diagram for H_2, N_2, O_2. Band theory - Salient feature-Application of band theory (conductor, semiconductor, insulator)-Semicondutor- 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 acetic acid adsorbed on charcoal

TOTAL: 60 PERIODS

COURSE OUTCOMES

At the end of the course, the students will 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. 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 theVerilog HDL, VHDL, and SystemVerilog‖, 6th Edition, Pearson Education, 2017.

REFERENCES

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

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

WEBSITE REFERENCES:

1. https://nptel.ac.in/courses/108/105/108105113/
2. http://www.nptelvideos.com/lecture.php?id=93303.
   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 ofengineering 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 ofcycloid –construction of involutes of squad 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 forimportance of multiple views and their placement – First angle projection – layout views
– Developing visualization skills through free hand sketching of multiple views from pictorialviews of objects.

UNIT II   PROJECTION OF POINTS, LINES AND PLANE SURFACES12
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 toboth 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 referenceplane 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 tothe 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 andcylinders 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, 50thEdition,2010

REFERENCES:
1. Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill PublishingCompany 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 EconomyEdition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
4. N S Parthasarathy and Vela Murali, "Engineering Graphics", Oxford University, Press, NewDelhi, 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

		L	T	P	C
JNC1261	**ENVIRONMENTAL SCIENCE** **(Common to all B.E /B.Tech Programmes)**	**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 ofinformation technology in environment and human health.

TEXT BOOKS:

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

REFERENCES:

1. Dharmendra S. Sengar, ͺEnvironmental law', Prentice hall of India PVT LTD,New Delhi, 2007.
2. Erach Bharucha, ―Textbook of Environmental Studies‖, Universities Press (I) PVT, LTD,Hydrabad, 2015.
3. Rajagopalan, R, ͺEnvironmental 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

		L	**T**	**P**	**C**
JGE1211	**PYTHON PROGRAMMING LABORATORY** (Common to all B.E /B.Tech Programmes)	**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 rang
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 an 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 representingcompound
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.electronicsforyou.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

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 pathproblems
- 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 ComputerScience", 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", 4thEdition, 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.

2. YashavantKanetkar, "Understanding Pointers in C & C++", 5th Revised & Updated Edition, BPB Publications,2018.

REFERENCES

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

WEBSITE LINKS

1. https://nptel.ac.in/courses/106/102/106102064/
2. https://www.hackerearth.com/practice/data-structures/arrays/1-d/tutorial/
3. https://www.geeksforgeeks.org/data-structures/
4. 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	P O 6	P O 7	PO8	P O 9	PO 10	P O 11	PO 12	PSO 1	PSO2	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

		L	**T**	**P**	**C**
JCS1302	**DATABASE MANAGEMENT SYSTEMS**	**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 ArchitectureIntroduction 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 RecoverySave 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 – DataStorage – 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		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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

	L	**T**	**P**	**C**

JCS1303   **COMPUTER ARCHITECTURE**

L	**T**	**P**	**C**
3	**0**	**0**	**3**

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 AddressingModes

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   PARALLELISIM   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 CachePerformance – 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.

REFERENCES

1. V. Carl Hamacher, Zvonko G. Varanesic 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.

WEBSITE LINKS

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

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	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 specifies -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.

WEB REFERENCES
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 | | |
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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

71

- 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.

WEBSITE LINKS

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. Necaise,"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

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 lifeproblems
- 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.

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

WEB REFERENCES
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

	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	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

		L	T	P	C
JCS1402	**OPERATING SYSTEMS**	**3**	**0**	**0**	**3**

COURSE OBJECTIVES
- To study the basic concepts, structure and functions of operating systems
- To learn process management concepts such asprocess scheduling, CPU scheduling, semaphores and deadlocks etc.
- To learn various memory management concepts
- To understand the file storagehandling 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 Dhamdhere, "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

	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	-	3	3	3
CO-2	3	3	3	-	-	-	-	-	3	3	-	2	3	3	3
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

		L	**T**	**P**	**C**
JPT1001	**SOFT SKILLS AND APTITUDE II**	**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	-	-

		L	**T**	**P**	**C**
JCS1411	**NETWORKS LABORATORY**	**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 Dhamdhere, "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-filesystem-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

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	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		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO-1	3	3	3	-	-	-	-	2	3	3	-	3	2	3	1
CO-2	3	3	3	-	-	-	-	3	3	3	-	3	3	3	3
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 onTesting – 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=qiyMyyYqZVY
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		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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

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 Agarval, Qing and An Zeng, "Introduction to Wireless and Mobile systems",Thomson Asia Pvt Ltd, 2005.
2. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, "Principles of Mobile Computing", Springer, 2003.
3. William.C.Y.Lee,"Mobile Cellular Telecommunications-Analog and Digital Systems", Second Edition,TataMcGraw Hill Edition ,2006.
4. C.K.Toh, "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		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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 APTITUTE 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
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/

		L	**T**	**P**	**C**
JHS1511	**PROFESSIONAL COMMUNICATION**	**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-andspeaking-skills
4. http://www.washington.edu/doit/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/

		L	**T**	**P**	**C**
JCS1511	**INTERNET PROGRAMMING LABORATORY**	**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 Architece turand 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 Rasperry 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 Madisetti, "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

Projects", 2nd Edition, O'Reilly Media, 2011.

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		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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. BehrouzA.Foruzan, 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		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO-1	3	3	3	3	3	3	1	3	1	1	3	2	3	2	1
CO-2	3	3	3	2	3	2	1	3	2	1	3	2	3	2	1
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 ARITHMATIC
                   PROBLEM SOLVING   6

Crptoarithmatic 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.

		L	T	P	C
JCS1701	**BIG DATA ANALYTICS**	**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   9
BIG DATA AND VISUALIZATION

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 largevolumesof data
- Perform analytics on data streams
- Learn NoSQL databases and management

TEXT BOOKS	
1. David Loshin, "Big Data Analytics: From Strategic Planning to Enterprise Integration withTools, Techniques, NoSQL, and Graph", Morgan Kaufmann/El sevier 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	
1. Bart Baesens, "Analytics in a Big Data World: The Essential Guide to Data Science and itsApplications", Wiley Publishers, 2015. 2. Dietmar Jannach and Markus Zanker, "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	

Computing‖, Tata Mcgraw Hill, 2013.
4. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing - A Practical Approach‖, Tata Mcgraw Hill, 2009.
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.

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	-

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   6
PROPERTY
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, MichelDanino, "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

		L	T	P	C
JCS1711	DATA ANALYTICS LABORATORY	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 treeclassifications.
- 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

H adoopYARN
R PackageHbase
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	-

		L	T	P	C
JIT1731	**Project work – Phase I**	**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

		L	T	P	C
JIT9001	**INTRODUCTION TO INFORMATION SYSTEM**	**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/

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

JIT9004	FUNDAMENTALS OF KNOWLEDGE BASED 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

Introductionn - 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	BASICS OF MULTIMEDIA APPLICATION 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-ZZlGA
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 andRasberry 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. ArshdeepBahga, Vijay Madisetti, "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 Ho¨ller, 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 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 lAYERS   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

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

		L	**T**	**P**	**C**
JIT9009	**INTRODUCTION TO ARTIFICIAL INTELLIGENCE/**	**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 firstorder 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

OPEN ELECTIVE-IV

		L	T	P	C
JIT9010	**Fundamentals of CloudComputing**	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 - laaS – PaaS – SaaS –Architectural Design Challenges – Cloud Storage.

UNIT IV RESOURCE MANAGEMENT AND SECURITY IN CLOUD   9

Inter Cloud Resource Management – Resource Provisioning Methods – Security Overview – Cloud Security Challenges – Data Security –Application Security – Virtual Machine Security.

UNIT V CASE STUDIES   9

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	-

		L	T	P	C
JIT9011	**INTRODUCTION TO CYBER SECURITY**	**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	

REFERENCES	
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.	

WEBSITE REFERENCES	
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	
1. **T1**Virtual Reality Technology, Gregory C. Burdea& Philippe Coiffet, John, 2nd Edition, 2013 Wiley & Sons, Inc., ISBN: 978-0-471-36089-6	
2. **T2**Grigore C. Burdea, Philippe Coiffet , "Virtual Reality Technology", Wiley Interscience, 2nd Edition, 2006. ISBN: 978-0-471-36089-6	

REFERENCES	
T1 Alan B. Craig, "Understanding Augmented Reality", Concepts and Applications, Morgan Kaufmann,1st Edition, 2013 ISBN: 9780240824086 **T2** Oliver Bimber and Ramesh Raskar, Spatial Augmented Reality: Merging Real and Virtual Worlds, 2005.ISBN 1-56881-230-2 **T3** The Fourth Transformation: How Augmented Reality & Artificial Intelligence Will Change Everything, Robert Scoble & Shel Israel, Patrick Brewster Press; 1 edition, 2016 **T4** Learning Virtual Reality: Developing Immersive Experiences and Applications for Desktop, Web, and Mobile, Tony Parisi, O'Reilly Media; 1 edition, 2015	

WEBSITE REFERENCES	
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			

****(only for 2022-2026)

		L	T	P	C
JGE1309	**TAMILS AND TECHNOLOGY**	3	0	0	1

COURSE OBJECTIVES:
- To learn about the concept of weaving and ceramic technology.
- To have knowledge of design and construction technology.
- To be familiar with manufacturing technology.
- To appreciate the emergence of agriculture and irrigation technology.
- To identify the key aspects of scientific Tamil and Tamil computing.

UNIT I WEAVING AND CERAMIC TECHNOLOGY
Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.

UNIT II DESIGN AND CONSTRUCTION TECHNOLOGY
Designing and Structural construction House & Designs in household materials during Sangam Age – Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram – Sculptures and Temples of Mamallapuram – Great Temples of Cholas and other worship places – Temples of Nayaka Period – Type study (Madurai Meenakshi Temple)-Thirumalai Nayakar Mahal – Chetti Nadu Houses, Indo – Saracenic architecture at Madras during British Period.

UNIT III MANUFACTURING TECHNOLOGY
Art of Ship Building – Metallurgical studies – Iron industry – Iron smelting, steel -Copper and goldCoins as source of history – Minting of Coins – Beads making-industries Stone beads -Glass beads – Terracotta beads -Shell beads/ bone beats – Archeological evidences – Gem stone types described in Silappathikaram.

UNIT IV AGRICULTURE AND IRRIGATION TECHNOLOGY

Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry – Wells designed for cattle use – Agriculture and Agro Processing – Knowledge of Sea – Fisheries – Pearl – Conche diving – Ancient Knowledge of Ocean – Knowledge Specific Society.

UNIT V SCIENTIFIC TAMIL & TAMIL COMPUTING

Development of Scientific Tamil – Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.

TOTAL: 15

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலாறு மக்களும் பண்பாடும் - கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).

2. கணினித் தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).

3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)

4. பொருநை - ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)

5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL - (in print)

6. Social Life of the Tamils The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.

7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).

8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)

9. Keeladi 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by:

Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)

11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)

12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) - Reference Book

COURSE OUTCOMES:

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

• Articulate the main concepts, key technologies, strengths, and limitations of weaving and ceramic technology.

• Learn the key and enabling technologies that help in the development of design and construction technology.

• Develop the ability to understand manufacture technology.

• Explain the concept of agriculture and irrigation technology.

• Be able to gain knowledge on scientific Tamil and Tamil computing.

CO - PO MAPPINGS:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
							Program Outcomes						**Program Specific Outcome**	
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

PROFESSIONAL ELECTIVES (PE)

VERTICAL 1:FULL STACK DEVELOPMENT

Sl. No	COURSE CODE	COURSE TITLE	T/P/I	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	JIT1020	APP Development	T	PE	3	3	0	0	3
2.	JIT1021	Cloud Services Management	T	PE	3	3	0	0	3
3.	JIT1022	UI and UX Design	T	PE	3	3	0	0	3
4.	JIT1023	Devops	T	PE	3	3	0	0	3
5.	JIT1024	Web Security and Privacy	T	PE	3	3	0	0	3
6.	JIT1025	MERN Stack development	T	PE	3	3	0	0	3
7.	JIT1026	Software Testing And Automation	T	PE	3	3	0	0	3
8.	JIT1027	No SQL Database	T	PE	3	3	0	0	3

VERTICAL 2 COGNITIVE ENGINEERING

Sl. No	COURSE CODE	COURSE TITLE	T/P/I	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	JIT1028	AI tools and Techniques.	T	PE	3	3	0	0	3
2.	JIT1029	Introduction to Machine Learning	T	PE	3	3	0	0	3
3.	JIT1030	Fundamentals Of Deep learning	T	PE	3	3	0	0	3
4.	JIT1031	Fog Computing	T	PE	3	3	0	0	3
5.	JIT1032	Expert System	T	PE	3	3	0	0	3
6.	JIT1033	Recommender Systems	T	PE	3	3	0	0	3
7.	JIT1034	Game Programming	T	PE	3	3	0	0	3
8.	JIT1035	Agent Based Intelligent Systems	T	PE	3	3	0	0	3

VERTICAL 3: AUTOMATION TOOLS

Sl. No	COURSE CODE	COURSE TITLE	T/P/I	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	JIT1002	Agile Methodology	T	PE	3	3	0	0	3
2.	JIT1023	Devops	T	PE	3	3	0	0	3
3.	JAD1020	Software Testing using Selenium	T	PE	3	3	0	0	3
4.	JAD1021	Pandas For Data Analysis	T	PE	3	3	0	0	3
5.	JAD1022	Data Visualization Using Tableau	T	PE	3	3	0	0	3
6.	JAD1023	Jenkins Automation for Server	T	PE	3	3	0	0	3
7.	JAD1024	Cloud Computing Tools	T	PE	3	3	0	0	3
8.	JAD1025	Infrastructure Build Tool Using Terraform	T	PE	3	3	0	0	3

VERTICAL 4: IOT

Sl. No	COURSE CODE	COURSE TITLE	T/P/I	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	JIT1036	Internet Of Things: Architecture Protocols And Applications	T	PE	3	3	0	0	3
2.	JIT1037	Programming For IOT Boards	T	PE	3	3	0	0	3
3.	JIT1038	Industrial IoT 4.0	T	PE	3	3	0	0	3
4.	JIT1039	IoT in HealthCare	T	PE	3	3	0	0	3
5.	JIT1040	Robotics in IOT	T	PE	3	3	0	0	3
6.	JIT1041	Mobile Application Development For IOT	T	PE	3	3	0	0	3
7.	JIT1042	Cognitive IOT	T	PE	3	3	0	0	3
8.	JIT1043	Privacy Security for IOT	T	PE	3	3	0	0	3

VERTICAL 5 CYBER SECURITY

Sl. No	COURSE CODE	COURSE TITLE	T/P/I	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	JCB1402	Foundation of Cyber Security	T	PE	3	3	0	0	3
2.	JCB1403	Cryptography and Cryptoanalysis	T	PE	3	3	0	0	3
3.	JCB1501	Cyber Forensics	T	PE	3	3	0	0	3
4.	JCB1502	Intrusion Detection Systems	T	PE	3	3	0	0	3
5.	JCB1503	Hardware Security	T	PE	3	3	0	0	3
6.	JCB1601	Cloud Security	T	PE	3	3	0	0	3
7.	JCB1603	Ethical Hacking	T	PE	3	3	0	0	3
8.	JCB1702	Web Application Security	T	PE	3	3	0	0	3

JIT1020	APP DEVELOPMENT	L	T	P	C
		2	0	2	3

COURSE OBJECTIVES

- To learn development of web applications with basic GUI Components
- To develop cross-platform applications with event handling
- To develop applications with location and data storage capabilities
- To develop web applications with database access
- To learn non-functional characteristics of app frameworks

UNIT-I FUNDAMENTALS OF MOBILE AND WEB APPLICATION DEVELOPMENT   6

Basics of Web and Mobile application development, Native App, Hybrid App, Cross-platform App, What is Progressive Web App, Responsive Web design

UNIT-II APP DEVELOPMENT USING JAVA   6

Native Web App, Benefits of Native App, Scenarios to create Native App, Tools for creating Native App, Cons of Native App, Popular Native App Dev elopment Frameworks, Java & Kotlin for Android, Swift & Objective-C for iOS

UNIT-III HYBRID APP DEVELOPMENT   6

Hybrid Web App, Benefits of Hybrid App, Criteria for creating Native App, Tools for creating Hybrid App, Cons of Hybrid App, Popular Hybrid App Development Frameworks

UNIT-IV CROSS-PLATFORM APP DEVELOPMENT   6

What is Cross-platform App, Benefits of Cross-platform App, Criteria for creating Cross-platform App, Tools for creating Cross-platform App, Cons of Cross-platform App, Popular Cross- platform App Development Frameworks, Flutter, Xamarin, React-Native, Basics of React Native and Native Components

UNIT-V NON-FUNCTIONAL CHARACTERISTICS OF APP FRAMEWORKS   6

Comparison of different App frameworks, Build Performance, App Performance, Debugging capabilities, Time to Market, Maintainability, Ease of Development, UI/UX, Reusability

TOTAL: 30 PERIODS

PRACTICAL EXERCISES:

1. Using react native, build a cross platform application for a BMI calculator.
2. Build a cross platform application for a simple expense manager which allows entering expenses and income on each day and displays category wise weekly income and expense.
3. Develop a cross platform application to convert units from imperial system to metric system (km to miles, kg to pounds etc.,)
4. Design and develop a cross platform application for day to day task (to-do) management.

5.Design an android application using Cordova for a user login screen with username, password, reset button and a submit button. Also, include header image and a label. Use layout managers.

6.Design and develop an android application using Apache Cordova to find and display the current location of the user.

7.Write programs using Java to create Android application having Databases

● For a simple library application.

● For displaying books available, books lend, book reservation. Assume that student information is available in a database which has been stored in a database server.

TOTAL: 60 PERIODS

COURSE OUTCOMES
Upon completion of the course, the students will be able to:
- Develop Native applications with GUI Components.
- Develop hybrid applications with basic event handling.
- Implement cross-platform applications with location and data storage capabilities.
- Implement cross platform applications with basic GUI and event handling.
- Develop web applications with cloud database access.

TEXT BOOKS

1. Head First Android Development, Dawn Griffiths, O'Reilly, 1st edition, 2015
2. Apache Cordova in Action, Raymond K. Camden, Manning. 2015
3. Full Stack React Native: Create beautiful mobile apps with JavaScript and React Native, Anthony Accomazzo, Houssein Djirdeh, Sophia Shoemaker, Devin Abbott, FullStack publishing

REFERENCES

1. Android Programming for Beginners, John Horton, Packt Publishing, 2nd Edition , 2018
2. Building Cross-Platform Mobile and Web Apps for Engineers and Scientists: An Active Learning Approach, International Edition , Matt Triff, Pawan Lingras, Rucha Lingras , CENGAGE Learning, 2016
3. React Native Cookbook, Daniel Ward, Packt Publishing, 2nd Edition

WEBSITE REFERENCES
- https://www.geeksforgeeks.org/web-development/
- https://www.startechup.com/blog/app-development-with-java/
- https://www.turing.com/resources/hybrid-mobile-app-development
- https://www.browserstack.com/guide/build-cross-platform-mobile-apps
- https://www.geeksforgeeks.org/non-functional-requirements-in-software-engineering/

Mapping of CO with PO

	Program Outcomes											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO-1	3	3	1	1	1	-	-	-	2	1	3	2
CO-2	3	1	2	3	2	-	-	-	1	2	3	1
CO-3	1	1	3	1	3	-	-	-	3	3	1	1
CO-4	1	1	1	2	3	-	-	-	2	3	3	1
CO-5	1	3	3	2	2	-	-	-	1	3	1	2
Avg	1.8	1.8	2	1.8	2.2	-	-	-	1.8	2.4	2.2	1.4

JIT1021	CLOUD SERVICES MANAGEMENT	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To introduce Cloud Service Management terminology, definition & concepts
- To compare and contrast cloud service management with traditional IT service management
- To identify strategies to reduce risk and eliminate issues associated with adoption of cloud services
- To Select appropriate structures for designing, deploying and running cloud-based services in a business environment
- To illustrate the benefits and drive the adoption of cloud-based services to solve real world problems

UNIT-I   CLOUD SERVICE MANAGEMENT FUNDAMENTALS   9
Cloud Ecosystem, The Essential Characteristics, Basics of Information Technology Service Management and Cloud Service Management, Service Perspectives, Cloud Service Models, Cloud Service Deployment Models

UNIT-II CLOUD SERVICES STRATEGY   9
Cloud Strategy Fundamentals, Cloud Strategy Management Framework, Cloud Policy, Key Driver for Adoption, Risk Management, IT Capacity and Utilization, Demand and Capacity matching, Demand Queueing, Change Management, Cloud Service Architecture

UNIT-III CLOUD SERVICE MANAGEMENT   9
Cloud Service Reference Model, Cloud Service LifeCycle, Basics of Cloud Service Design, Dealing with Legacy Systems and Services, Benchmarking of Cloud Services, Cloud Service

Capacity Planning, Cloud Service Deployment and Migration, Cloud Marketplace, Cloud Service Operations Management

UNIT-IV   CLOUD SERVICE ECONOMICS   9

Pricing models for Cloud Services, Freemium, Pay Per Reservation, Pay per User, Subscription based Charging, Procurement of Cloud-based Services, Capex vs Opex Shift, Cloud service Charging, Cloud Cost Models

UNIT-V   CLOUD SERVICE GOVERNANCE & VALUE   9

IT Governance Definition, Cloud Governance Definition, Cloud Governance Framework, Cloud Governance Structure, Cloud Governance Considerations, Cloud Service Model Risk Matrix, Understanding Value of Cloud Services, Measuring the value of Cloud Services, Balanced Scorecard, Total Cost of Ownership

TOTAL: 45 PERIODS

COURSE OUTCOMES
Upon completion of the course, the students will be able to:
- Exhibit cloud-design skills to build and automate business solutions using cloud technologies.
- Possess Strong theoretical foundation leading to excellence and excitement towards adoption of cloud-based services
- Solve the real world problems using Cloud services and technologies
- Analyse the cloud service economics Cloud Cost Models
- Explain the various cloud service governance and its values

TEXT BOOKS

1. Cloud Service Management and Governance: Smart Service Management in Cloud Era by Enamul Haque, Enel Publications 2020
2. Cloud Computing: Concepts, Technology & Architecture by Thomas Erl, Ricardo Puttini, Zaigham Mohammad 2013
3. Cloud Computing Design Patterns by Thomas Erl, Robert Cope, Amin Naserpour 2015

REFERENCES
1. Economics of Cloud Computing by Praveen Ayyappa, LAP Lambert Academic Publishing 2020
2. Mastering Cloud Computing Foundations and Applications Programming Rajkumar Buyya, Christian Vechhiola, S. Thamarai Selvi 2013

WEBSITE REFERENCES
- https://cloud.google.com/learn/what-is-cloud-management
- https://learn.microsoft.com/en-us/azure/cloud-adoption-framework/organize/cloud-strategy
- https://www.geeksforgeeks.org/economics-of-cloud-computing/
- https://www.isaca.org/resources/news-and-trends/newsletters/atisaca /2021/ volume-3/building-cloud-governance-from-the-basics

Mapping of CO with PO

	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	3	3	1	1	1	-	-	-	2	1	3	2
CO-2	3	1	2	3	2	-	-	-	1	2	3	1
CO-3	1	1	3	1	3	-	-	-	3	3	1	1
CO-4	1	1	1	2	3	-	-	-	2	3	3	1
CO-5	1	3	3	2	2	-	-	-	1	3	1	2
Avg	1.8	1.8	2	1.8	2.2	-	-	-	1.8	2.4	2.2	1.4

JIT1022	UI AND UX DESIGN	L	T	P	C
		2	0	2	3

COURSE OBJECTIVES:
- To provide a sound knowledge in UI & UX
- To understand the need for UI and UX
- To understand the various Research Methods used in Design
- To explore the various Tools used in UI & UX
- Creating a wireframe and prototype

UNIT I FOUNDATIONS OF DESIGN   **6**

UI vs. UX Design - Core Stages of Design Thinking - Divergent and Convergent Thinking - Brainstorming and Game storming - Observational Empathy

UNIT II FOUNDATIONS OF UI DESIGN   **6**

Visual and UI Principles - UI Elements and Patterns - Interaction Behaviors and Principles – Branding - Style Guides

UNIT III FOUNDATIONS OF UX DESIGN   **6**

Introduction to User Experience - Understanding User Experience - Defining the UX Design Process and its Methodology - Research in User Experience Design - Tools and Method used for Research - User Needs and its Goals - Know about Business Goals

UNIT IV WIREFRAMING, PROTOTYPING AND TESTING   **6**

Sketching Principles - Sketching Red Routes - Responsive Design – Wireframing - Creating Wireflows - Building a Prototype - Building High-Fidelity Mockups - Designing Efficiently with Tools - Interaction Patterns - Conducting Usability Tests - Synthesizing Test Findings - Prototype Iteration

UNIT V RESEARCH, DESIGNING, IDEATING, & INFORMATION ARCHITECTURE
6

Identifying and Writing Problem Statements - Identifying Appropriate Research Methods - Creating Personas - Solution Ideation - Creating User Stories - Creating Scenarios - Flow Diagrams - Flow Mapping - Information Architecture

TOTAL:30 PERIODS

LIST OF EXPERIMENTS

1. Designing a Responsive layout for an societal application
2. Exploring various UI Interaction Patterns
3. Developing an interface with proper UI Style Guides
4. Developing Wireflow diagram for application using open source software
5. Exploring various open source collaborative interface Platform
6. Hands on Design Thinking Process for a new product
7. Brainstorming feature for proposed product
8. Defining the Look and Feel of the new Project
9. Create a Sample Pattern Library for that product (Mood board, Fonts, Colors based on UI principles)
10. Identify a customer problem to solve

TOTAL: 60 PERIODS

COURSE OUTCOMES:
On completion of the course, the students will be able to:
- Build UI for user Applications
- Evaluate UX design of any product or application
- Demonstrate UX Skills in product development
- Implement Sketching principles
- Create Wireframe and Prototype

TEXT BOOKS
1. Joel Marsh, "UX for Beginners", O'Reilly , 2022
2. Jon Yablonski, "Laws of UX using Psychology to Design Better Product & Services" O'Reilly 2021

REFERENCES
1. Jenifer Tidwell, Charles Brewer, Aynne Valencia, "Designing Interface" 3 rd Edition , O'Reilly 2020
2. Steve Schoger, Adam Wathan "Refactoring UI", 2018
3. Steve Krug, "Don't Make Me Think, Revisited: A Commonsense Approach to Web & Mobile", Third Edition, 2015

WEBSITE REFERENCES

- https://www.nngroup.com/articles/
- https://www.interaction-design.org/literature.

Mapping of CO with PO

	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	3	1	1	3	1	-	-	-	3	3	2	1
CO-2	2	3	1	3	2	-	-	-	1	2	2	2
CO-3	1	3	3	2	2	-	-	-	2	3	1	2
CO-4	1	2	3	3	1	-	-	-	3	2	1	3
CO-5	1	2	3	2	1	-	-	-	2	1	1	1
Avg	1.6	2.2	2.2	2.6	1.4	-	-	-	2.2	2.2	1.4	1.8

JIT1023	DEVOPS	L	T	P	C
		2	0	2	3

COURSE OBJECTIVES

- To introduce DevOps terminology, definition & concepts.
- To understand the different Version control tools.
- To understand the concepts of Continuous Integration and Testing.
- To understand Configuration management using Ansible.
- Illustrate the benefits and drive the adoption of cloud-based Dev ops tools to solve real world problems

UNIT I   INTRODUCTION TO DEVOPS   6

Devops Essentials - Introduction To AWS, GCP, Azure - Version control systems: Git and Github.

UNIT II   COMPILE AND BUILD USING MAVEN & GRADLE   6

Introduction, Installation of Maven, POM files, Maven Build lifecycle, Build phases (compile build, test, package) Maven Profiles, Maven repositories (local, central, global), Maven plugins, Maven create and build Artificats, Dependency management, Installation of Gradle, Understand build using Gradle

UNIT III   CONTINUOUS INTEGRATION USING JENKINS   6

Install & Configure Jenkins, Jenkins Architecture Overview, Creating a Jenkins Job, Configuring a

Jenkins job, Introduction to Plugins, Adding Plugins to Jenkins, Commonly used plugins (Git Plugin, Parameter Plugin, HTML Publisher, Copy Artifact and Extended choice parameters). Configuring Jenkins to work with java, Git and Maven, Creating a Jenkins Build and Jenkins workspace.

UNIT IV   CONFIGURATION MANAGEMENT USING ANSIBLE   6

Ansible Introduction, Installation, Ansible master/slave configuration, YAML basics, Ansible modules, Ansible Inventory files, Ansible playbooks, Ansible Roles, adhoc commands in ansible

UNIT V   BUILDING DEVOPS PIPELINES USING AZURE   6

Create Github Account, Create Repository, Create Azure Organization, Create a new pipeline, Build a sample code, Modify azure-pipelines.yaml file

COURSE OUTCOMES:

- Understand different actions performed through Version control tools like Git.
- Perform Continuous Integration and Continuous Testing and Continuous Deployment using Jenkins by building and automating test cases using Maven & Gradle.
- Ability to Perform Automated Continuous Deployment
- Ability to do configuration management using Ansible
- Understand to leverage Cloud-based DevOps tools using Azure DevOps

TOTAL: 45 PERIODS

TEXT BOOKS
1. Roberto Vormittag, "A Practical Guide to Git and GitHub for Windows Users: From Beginner to Expert in Easy Step-By-Step Exercises", Second Edition, Kindle Edition, 2016.
2. Jason Cannon, "Linux for Beginners: An Introduction to the Linux Operating System and Command Line", Kindle Edition, 2014

REFERENCES
1. Hands-On Azure Devops: Cicd Implementation For Mobile, Hybrid, And Web Applications Using Azure Devops And Microsoft Azure: CICD Implementation for ... DevOps and Microsoft Azure (English Edition) Paperback – 1 January 2020 by Mitesh Soni
2. Jeff Geerling, "Ansible for DevOps: Server and configuration management for humans", First Edition, 2015.
3. David Johnson, "Ansible for DevOps: Everything You Need to Know to Use Ansible for DevOps", Second Edition, 2016.
4. Mariot Tsitoara, "Ansible 6. Beginning Git and GitHub: A Comprehensive Guide to Version Control, Project Management, and Teamwork for the New Developer", Second Edition, 2019.
5. https://www.jenkins.io/user-handbook.pdf
6. https://maven.apache.org/guides/getting-started/

	Program Outcomes											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO-1	**3**	**1**	**1**	**3**	**1**	**-**	**-**	**-**	**3**	**3**	**2**	**1**
CO-2	**2**	**3**	**1**	**3**	**2**	**-**	**-**	**-**	**1**	**2**	**2**	**2**
CO-3	**1**	**3**	**3**	**2**	**2**	**-**	**-**	**-**	**2**	**3**	**1**	**2**
CO-4	**1**	**2**	**3**	**3**	**1**	**-**	**-**	**-**	**3**	**2**	**1**	**3**
CO-5	**1**	**2**	**3**	**2**	**1**	**-**	**-**	**-**	**2**	**1**	**1**	**1**
Avg	**1.6**	**2.2**	**2.2**	**2.6**	**1.4**	**-**	**-**	**-**	**2.2**	**2.2**	**1.4**	**1.8**

		L	T	P	C
JIT1024	**WEB SECURITY AND PRIVACY**	**3**	**0**	**0**	**3**

COURSE OBJECTIVE
- To familiarize the fundamentals of web application security
- To help students understand the wide aspects of secure development and deployment of web applications
- To explain how to build secure APIs
- To make understand the basics of vulnerability assessment and penetration testing
- To explain about Hacking techniques and Tools

UNIT I   FUNDAMENTALS OF WEB APPLICATION SECURITY   9

The history of Software Security-Recognizing Web Application Security Threats,Web Application Security, Authentication and Authorization, Secure Socket layer, Transport layer Security, SessionManagement-Input Validation.

UNIT II SECURE DEVELOPMENT AND DEPLOYMENT   9
Web Applications Security - Security Testing, Security Incident Response Planning,the Microsoft Security Development Lifecycle (SDL), OWASP Comprehensive Lightweight Application Security Process (CLASP), The Software Assurance Maturity Model (SAMM)

UNIT III   SECURE API DEVELOPMENT   9
API Security- Session Cookies, Token Based Authentication, Securing Natter APIs: Addressing threats with Security Controls, Rate Limiting for Availability, Encryption, Audit logging, Securing service-to-service APIs: API Keys, OAuth2, Securing Microservice APIs: Service Mesh, Locking Down Network Connections, Securing Incoming Requests.

UNIT IV VULNERABILITY ASSESSMENT AND PENETRATION TESTING   9

Vulnerability Assessment Lifecycle, Vulnerability Assessment Tools: Cloud-based vulnerability scanners, Host-based vulnerability scanners, Network-based vulnerability scanners, Database- based vulnerability scanners, Types of Penetration Tests: External Testing, Web Application Testing, Internal Penetration Testing, SSID or Wireless Testing, Mobile Application Testing.

UNIT V HACKING TECHNIQUES AND TOOLS   9

Social Engineering, Injection, Cross-Site Scripting(XSS), Broken Authentication and Session Management, Cross-Site Request Forgery, Security Misconfiguration, Insecure Cryptographic Storage, Failure to Restrict URL Access, Tools: Comodo, OpenVAS, Nexpose, Nikto, Burp Suite, etc.

TOTAL : 45 PERIODS

Course Outcome:

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

- Discuss the basic concepts of web application security and the need for it
- Explain the process for secure development and deployment of web applications
- Make use of the skill to design and develop Secure Web Applications that use Secure APIs
- Analyze the problem and carry out vulnerability assessment and penetration testing
- Acquire the skill to think like a hacker and to use hackers tool sets for ethical hacking.

TEXT BOOKS:

1. Andrew Hoffman, "Web Application Security: Exploitation and Counter measures for Modern Web Applications", First Edition, O'Reilly Media, Inc. 2020,
2. Bryan Sullivan, Vincent Liu, "Web Application Security: A Beginners Guide",   The McGraw-Hill Companies ,2012,.

REFERENCES:

1. Ravi Das and Greg Johnson, " Testing and Securing Web Applications", Taylor & Francis Group, LLC, 2021,
2. Prabath Siriwardena, "Advanced API Security", Apress Media LLC, USA, 2020.
3. Malcom McDonald, "Web Security for Developers", No Starch Press, Inc.2020,
4. Neil Madden, "API Security in Action", Manning Publications Co., NY, USA,2020.

WEBSITE REFERENCES:

1. https://www.rapid7.com/fundamentals/web-application-security/
2. https://owasp.org/www-community/api_security_tools
3. https://owasp.org/
4. https://www.veracode.com/security/vulnerability-assessment-and-penetration-testing
5. https://www.guru99.com/learn-everything-about-ethical-hacking-tools-and-skills.html

Mapping of PO with CO

	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	3	3	3	3	2	-	-	-	2	2	-	3
CO-2	3	3	3	3	2	-	-	-	2	2	-	3
CO-3	3	2	3	3	2	-	-	-	2	2	-	3
CO-4	3	3	3	3	2	-	-	-	2	2	-	3
CO-5	3	1	3	3	3	1	-	2	2	2	-	3
Avg	3	2.4	3	3	2.2	-	-	2	2	2	-	3

JIT1025	MERN STACK DEVELOPMENT	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE
- To introduce the basics of JavaScript and importance of MERN stack.
- To identify the role of React in designing front-end components.
- To familiarize the design issues in the development of backend components using Node.js and Express.
- To illustrate the significance of using MongoDB as a database system.
- To make understand the advanced features of full stack development.

UNIT I   JAVASCRIPT AND BASICS OF MERN STACK   9

JavaScript Fundamentals -Modules -DOM tree -Node properties -browser events -Events - Forms, controls -Document and resource loading -Mutation observer -Event loop -MERN Components.

UNIT II   REACT   9

React ES6 -React Render HTML -React JSX -Components -React Classes -Composing Components -Passing Data -Dynamic Composition -React state -setting State -Async State Initialization - Event Handling -Stateless Components -Designing components-React Forms - React CSS -React SaaS.

UNIT III   NODE.JS AND EXPRESS   **9**

Node.js basics -Node Package Manager -Node.js web server -Node.js File system -Node Inspector -Node.js Event Emitter -Frameworks for Node.js -Express.js Web App -Node.js Data Access - Express REST APIs -REST -Resource Based -HTTP Methods as Actions -JSON-Express - Routing -Handler Function -Middleware -List and Create API -Automatic Server Restart -Error Handling -Template Engine.

UNIT IV   MONGODB   **9**

MongoDB -MongoDB Basics -Documents -Collections -Query Language -Installation-The mongo Shell -MongoDB Node.js Driver -Reading from MongoDB -Writing to MongoDB - CRUD operations -projections -Indexing -Aggregaton -Replication -Sharding -Creating backup – Deployment.

UNIT V   ADVANCED FEATURES   **9**

Modularization and Webpack -Routing with React Router -Forms -More Filters in the List API - UI Components -React-Bootstrap -Table and Panel -Forms -Alerts -Modals -Server Rendering - Basic Server Rendering -Handling State -MongoDB Aggregate -Pagination -Higher Order Components -Search Bar -Google Sign-In -Session Handling.

TOTAL : 45 PERIODS

COURSE OUTCOME:

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

- Discuss the basic concepts of javascript and MERN
- Build programs and applications using REACT
- Create applications using Node.Js and Express
- Apply MongoDB for database access.
- Explain what future enhancements are available for MERN stack.

TEXT BOOKS

1. Vasan Subramanian , "Pro MERN Stack, Full Stack Web App Development with Mongo, Express, React, and Node" , APress Publisher, 2019.
2. Eric Bush, "Node.Js, Mongodb, React, React Native Full-Stack Fundamentals and Beyond", Blue Sky Productions Incorporated, 2018.

REFERENCES

1. Manu Sharma , "Full Stack Development with MongoDB", BPB publication, 2022.
2. Greg Lim , "Beginning MERN Stack: Build and Deploy a Full Stack MongoDB, Express, React, Node.js App" , Independent publication, 2021.

3. Chris Northwood , "The Full Stack Developer Your Essential Guide to the Everyday Skills Expected of a Modern Full Stack Web Developer", APress Publisher 2018

WEBSITE REFERENCES

1. https://www.tutorialsteacher.com/javascript
2. https://reactjs.org/
3. https://nodejs.org
4. www.Expressjs.com
5. www.mongodb.com

Mapping of PO with CO

	Program Outcomes											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO-1	3	1	3	3	3	-	-	-	2	2	-	3
CO-2	3	2	3	3	3	-	-	-	2	2	-	3
CO-3	3	3	3	3	3	-	-	-	2	2	-	3
CO-4	3	2	3	3	3	-	-	-	2	2	-	3
CO-5	3	2	3	3	3	-	-	-	2	2	-	3
Avg	3	2	3	3	3	-	-	-	2	2	-	3

JIT1026	SOFTWARE TESTING AND AUTOMATION	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES
- To understand the basics of software testing
- To learn how to do the testing and planning effectively
- To build test cases and execute them
- To focus on wide aspects of testing and understanding multiple facets of testing
- To get an insight about test automation and the tools used for test automation

UNIT I   FOUNDATIONS OF SOFTWARE TESTING   6

Why do we test Software?, Black-Box Testing and White-Box Testing, Software Testing Life Cycle, V-model of Software Testing, Program Correctness and Verification, Reliability versus Safety, Failures, Errors and Faults (Defects), Software Testing Principles, Program Inspections, Stages of Testing: Unit Testing, Integration Testing, System Testing

UNIT II   TEST PLANNING   6

The Goal of Test Planning, High Level Expectations,Intergroup Responsibilities, Test Phases, Test Strategy, Resource Requirements, Tester Assignments, Test Schedule, Test Cases, Bug Reporting, Metrics and Statistics.

UNIT III   TEST DESIGN AND EXECUTION   6

Test Objective Identification, Test Design Factors, Requirement identification, Testable Requirements, Modeling a Test Design Process, Modeling Test Results, Boundary Value Testing, Equivalence Class Testing, Path Testing, Data Flow Testing, Test Design Preparedness Metrics, Test Case Design Effectiveness, Model-Driven Test Design, Test Procedures, Test Case Organization and Tracking, Bug Reporting, Bug Life Cycle.

UNIT IV   ADVANCED TESTING CONCEPTS   6

Performance Testing: Load Testing, Stress Testing, Volume Testing, Fail-Over Testing, Recovery Testing, Configuration Testing, Compatibility Testing, Usability Testing, Testing the Documentation, Security testing, Testing in the Agile Environment, Testing Web and Mobile Applications.

UNIT V   TEST AUTOMATION AND TOOLS   6

Automated Software Testing, Automate Testing of Web Applications, Selenium: Introducing Web Driver and Web Elements, Locating Web Elements, Actions on Web Elements, Different Web Drivers, Understanding Web Driver Events, Testing: Understanding Testing.xml, Adding Classes, Packages, Methods to Test, Test Reports.

TOTAL : 45 PERIODS

PRACTICAL EXERCISES:

1. Develop the test plan for testing an e-commerce web/mobile application .
2. Design the test cases for testing the e-commerce application
3. Test the e-commerce application and report the defects in it.
4. Develop the test plan and design the test cases for an inventory control system.
5. Execute the test cases against a client server or desktop application and identify the defects.
6. Test the performance of the e-commerce application.
7. Automate the testing of e-commerce applications using Selenium.
8. Integrate TestNG with the above test automation.
9. Mini Project:

10. Build a data-driven framework using Selenium and TestNG

11. Build Page object Model using Selenium and TestNG

12. Build BDD framework with Selenium, TestNG and Cucumber

TOTAL:60 PERIODS

COURSE OUTCOMES

- Understand the basic concepts of software testing and the need for software testing
- Design Test planning and different activities involved in test planning
- Design effective test cases that can uncover critical defects in the application
- Carry out advanced types of testing
- Automate the software testing using Selenium and TestNG

TEXTBOOKS

1. Yogesh Singh, "Software Testing", Cambridge University Press, 2012
2. Unmesh Gundecha, Satya Avasarala, "Selenium WebDriver 3 Practical Guide" - Second Edition 2018

REFERENCES

1. Glenford J. Myers, Corey Sandler, Tom Badgett, The Art of Software Testing, 3rd Edition, 2012, John Wiley & Sons, Inc.
2. Ron Patton, Software testing, 2nd Edition, 2006, Sams Publishing
3. Paul C. Jorgensen, Software Testing: A Craftsman's Approach, Fourth Edition, 2014, Taylor & Francis Group.
4. Carl Cocchiaro, Selenium Framework Design in Data-Driven Testing, 2018, Packt Publishing.
5. Elfriede Dustin, Thom Garrett, Bernie Gaurf, Implementing Automated Software Testing, 2009, Pearson Education, Inc.
6. Satya Avasarala, Selenium WebDriver Practical Guide, 2014, Packt Publishing.
7. Varun Menon, TestNg Beginner's Guide, 2013, Packt Publishing.

WEBSITE REFERENCES

- **https://www.geeksforgeeks.org/software-testing-test-plan/**
- **https://www.tutorialspoint.com/software_testing_dictionary/test_execution.htm**
- **https://www.javatpoint.com/automation-testing-tool**
- **https://www.guru99.com/automated-testing-tools.html**

MAPPING OF PO WITH CO

	Program Outcomes											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO-1	3	3	2	1	2	-	-	-	1	1	3	2
CO-2	2	3	1	1	1	-	-	-	2	2	1	2
CO-3	2	2	1	3	1	-	-	-	1	3	1	2
CO-4	2	1	3	2	1	-	-	-	1	1	1	2
CO-5	2	2	1	3	1	-	-	-	1	3	2	1
Avg	2.2	2.2	1.6	2	1.2	-	-	-	1.2	2	1.6	1.8

JIT1027	NO SQL DATABASE	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE

- To describe the basics of NoSQL
- To make understand the features of RDBMS and NoSQL
- To familiarize the concept of Document oriented NoSQL Database.
- To help the students understand how store and access data column oriented databases
- To explain the usage of key value pair NoSQL database.

UNIT I   BASICS OF NOSQL   9

Overview and History of NoSQL Databases. Definition of the Four Types of NoSQL Database, The Value of Relational Databases, Getting at Persistent Data, Concurrency, Integration, Impedance Mismatch, Application and Integration Databases, Attack of the Clusters, The Emergence of NoSQL, Key Points.

UNIT II   RDBMS AND NOSQL   9

Comparison of relational databases to new NoSQL stores, MongoDB, Cassandra, HBASE, Neo4j use and deployment, Application, RDBMS approach, Challenges NoSQL approach, Key-Value and Document Data Models, Column-Family Stores, Aggregate-Oriented Databases. Replication and sharding,

UNIT III   DOCUMENT ORIENTED NOSQL DB   9

NoSQL Key/Value databases using MongoDB, Document Databases, Document oriented Database Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Web Analytics or Real-Time Analytics, E-Commerce Applications, Complex Transactions Spanning Different Operations, Queries against Varying Aggregate Structure.

UNIT IV COLUMN ORIENTED NOSQL DB   9

Column- oriented NoSQL databases using Apache HBASE, Column-oriented NoSQL databases using Apache Cassandra, Architecture of HBASE, Column-Family Data Store Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Counters, Expiring Usage.

UNIT V KEY VALUE PAIR NOSQL DB   9

NoSQL Key/Value databases using Riak, Key-Value Databases,Key-Value Store, Key-Value Store Features, Consistency, Transactions, Query Features, Structure of Data, Scaling, Suitable Use Cases, Storing Session Information, User Profiles, Preferences, Query by Data, Operations by Sets. Graph NoSQL databases usingNeo4, NoSQL database development tools and programming languages, Graph Database. Features, Suitable Use Cases.

TOTAL : 45 PERIODS

COURSE OUTCOME:

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

- Discuss basic concepts of NoSQL databases.
- Explain the similarities and contrasts of RDBMS with different NoSQL databases.

- Explain the detailed architecture and performance tune of Document-oriented NoSQL databases.
- Analyze problems and use column oriented databases when necessary.
- Build efficient Key-Value Pair NoSQL databases.

TEXT BOOKS
1. Martin Fowler , Pramod Sadalage, "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Wiley Publications",1st Edition ,2014.
2. Dan Sullivan Sullivan , "NoSQL for Mere Mortals", Wesley Publication ,1st Edition, 2015

REFERENCES
1. Adam Fowler, "NoSQL For Dummies" , For dummies publication , 2015.
2. Shashank Tiwari , "Professional NoSQL", Wiley publication 2011.
3. Gaurav Vaish, "Getting Started with NoSQL" , Packet publishing Limited, 2013.
4. Olivier Pivert , "NoSQL Data Models: Trends and Challenges" , Wiley publication, 2018
5. Dan McCreary, Ann Kelly, "Making Sense of NoSQL: A guide for managers and the rest of us", Manning Publications, 2013.

WEBSITE REFERENCES:
1. https://www.ibm.com/cloud/learn/nosql-databases
2. https://www.coursera.org/lecture/nosql-databases/introduction-to-nosql-VdRNp
3. https://www.geeksforgeeks.org/introduction-to-nosql/
4. https://www.javatpoint.com/nosql-database
5. https://www.couchbase.com/resources/why-nosql/

Mapping of PO with CO

	Program Outcomes											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO-1	3	1	1	1	2	-	-	-	2	2	-	3
CO-2	3	1	3	1	2	-	-	-	2	2	-	3
CO-3	3	1	3	1	2	-	-	-	2	2	-	3
CO-4	3	1	3	1	2	-	-	-	2	2	-	3
CO-5	3	1	3	1	2	-	-	-	2	2	-	3
Avg	3	1	2.6	1	2	-	-	-	2	2	-	3

COGNITIVE ENGINEERING

		L	T	P	C
JIT1028	**AI TOOLS AND TECHNIQUES**	3	0	0	3

COURSE OBJECTIVES:
- To demonstrate various AI applications, languages and Intelligent Agents.
- To solve problems using search strategies and understand the basic process of Machine Learning.
- To apply classification and regression algorithms on real world data.
- To develop an expert system.
- To comprehend the structure of an artificial neural network

Prerequisite: Mathematics, Python Programming

UNIT-I : ARTIFICIAL INTELLIGENCE   9
Introduction, Definition of AI, Goals of AI, Turing Test, Applications of AI, AI Programming Languages; Introduction, Intelligent Systems, the Concept of rationality, types of Agents, Environments and its properties, PEAS.

UNIT-II: UNIFORMED SEARCH STRATEGIES   9
Breadth-first search, Uniform cost search, Depth-first search, Iterative deepening Depth-first search, Bidirectional search -Search Strategies: Greedy best-first search, A* search, Heuristic Functions-Beyond Classical Search: Hill-climbing search, Simulated annealing search

UNIT-III : REGRESSION AND CLASSIFICATION   9
Simple Regression, Multiple Regression, Model Assessment-Training Error, Generalized Error, Testing Error, Bias-Variance Tradeof -Linear classification, Logistic Regression, Decision Trees

UNIT-IV : CLUSTERING AND EXPERT SYSTEMS   9
K-Means Clustering- Introduction, Need and Justification of ES, Knowledge Representation, Knowledge Acquisition and Variation, Utilisation and Functionality, Basics of Prolog.

UNIT-V : ARTIFICIAL & CONVOLUTION NEURAL NETWORK   9

Biological Neuron, Types of ANN, Optimization Techniques, Vanishing Gradient Problem, Exploding Gradient Problem, Weight Initialization. Introduction, Components of CNN –Architecture Convolution Layer(with example), Pooling/Downsampling Layer, Flattening Layer, Fully Connected Layer; Rectified Linear Unit Layer, Exponential Linear Unit,Unique Properties of CNN, Architectures of CNNs, Applications of CNN

TOTAL: 45 HOURS

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

CO1 : Understand to classify various AI Applications and the List of AI Languages

CO2 : Learn to apply informed search techniques to problems

CO3 : Understand to solve real world data using classification techniques

CO4 : Understand the concept of clustering over classification

CO5 : Understand the principles of data simulation and modeling

TEXT BOOKS:

1. Dr.Nilakshi Jain, "Artificial Intelligence:Making a System Intelligent", WileyPublications, 1st Edition,2019
2. Vijayvargia, Abhishek, "Machine Learning with Python: An Approach to Applied Machine Learning", BPB Publications; 1st edition,2018.

REFERENCES:

1. Dr.S.Lovelyn Rose, Dr. L.Ashok Kumar, Dr.D.Karthika Renuka, "Deep Learning using Python",Wiley India Pvt. Ltd 2019..

2. Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", Pearson Publications, 4th Edition, 2020.

3. Saroj Kaushik, "Artificial Intelligence", Cengage Learning India, 2011.

4. Stuart Russell and Peter Norvig , "Artificial Intelligence A Modern Approach", Third Edition- Pearson Education

5. Ela Kumar , "Artificial Intelligence" –-IK International

WEBSITE REFERENCES :
1. **https://keras.io/**
2. **https://ai.google/**
3. **https://www.coursera.org/learn/neural-networks-deep-learning#syllabus**
4. **https://swayam.gov.in/nd1_noc19_me71/preview**
5. **https://www.javatpoint.com/ai-tools**

CO-PO AND CO-PSO MAPPING:

CO1 : Understand to classify various AI Applications and the List of AI Languages
CO2 : Learn to apply informed search techniques to problems
CO3 : Understand to solve real world data using classification techniques
CO4 : Understand the concept of clustering over classification
CO5 : Understand the principles of data simulation and modeling

CO/ PO,PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3			3						3	
CO2	3	3	3		3					3	3	
CO3	3	3	3		3				3	3	2	
CO4	3	3			3						2	
CO5	3	3	3		3				3		3	
AVG	3	3	3		3				3	3	2.6	

		L	T	P	C
JIT1029	**Introduction to Machine Learning**	**3**	**0**	**0**	**3**

COURSE OBJECTIVES

- To understand the basic concepts of machine learning.
- To understand and build supervised learning models
- To understand and build unsupervised learning models
- To understand the concept of Neural Networks
- To evaluate the algorithms based on corresponding metrics identified

Prerequisite: Mathematics, Statistics and Probability, Python Programming

UNIT-I : INTRODUCTION TO MACHINE LEARNING   9
Review of Linear Algebra for machine learning; Introduction and motivation for machine learning; Examples of machine learning applications, Vapnik-Chervonenkis (VC) dimension, Probably Approximately Correct (PAC) learning.

UNIT-II : SUPERVISED LEARNING   9
Linear Regression Models: Least squares, single & multiple variables, Bayesian linear regression, gradient descent, Linear Classification Models: Discriminant function – Perceptron algorithm, Probabilistic discriminative model - Logistic regression, Probabilistic generative model – Naive Bayes, Maximum margin classifier – Support vector machine, Decision Tree.

UNIT-III : UNSUPERVISED LEARNING   9
Combining multiple learners: Model combination schemes, Voting, Ensemble Learning - bagging, boosting, stacking, Unsupervised learning: K-means, Instance Based Learning: KNN, Gaussian mixture models and Expectation maximization.

UNIT-IV:NEURAL NETWORKS   9
Multilayer perceptron, activation functions, network training – gradient descent optimization – stochastic gradient descent, error back propagation, from shallow networks to deep networks – Unit saturation – ReLU, hyper parameter tuning, batch normalization, regularization, dropout.

UNIT-V:DESIGN AND ANALYSIS OF MACHINE LEARNING   9

Guidelines for machine learning experiments, Cross Validation (CV) and resampling – K-fold CV, bootstrapping, measuring classifier performance, assessing a single classification algorithm and comparing two classification algorithms – t test, McNemar's test, K-fold CV paired t test

TOTAL: 45 PERIODS

COURSE OUTCOMES
Upon completion of the course, the students will be able to:
- Learn the basic concepts of machine learning
- Construct supervised learning models.
- Construct unsupervised learning algorithms.
- Learn the concept of neural networks
- Understand to evaluate and compare different models

TEXT BOOKS:
1. Ethem Alpaydin, "Introduction to Machine Learning", MIT Press, Fourth Edition, 2020
2. Stephen Marsland, "Machine Learning: An Algorithmic Perspective, "Second Edition", CRC Press, 2014.

REFERENCES:
1. Christopher M. Bishop, "Pattern Recognition and Machine Learning", Springer, 2006.
2. Tom Mitchell, "Machine Learning", McGraw Hill, 3rd Edition, 1997.
3. Mehryar Mohri, Afshin Rostamizadeh, Ameet Talwalkar, "Foundations of Machine Learning", Second Edition, MIT Press, 2018.
4. Ian Goodfellow, Yoshua Bengio, Aaron Courville, "Deep Learning", MIT Press, 2016
5. Sebastain Raschka, Vahid Mirjalili , "Python Machine Learning", Packt publishing, 3rd Edition, 2019.

WEBSITE REFERENCES :
1. **https://keras.io/**
2. **https://ai.google/**
3. **https://www.coursera.org/learn/neural-networks-deep-learning#syllabus**
4. **https://swayam.gov.in/nd1_noc19_me71/preview**
5. **https://www.javatpoint.com/ai-tools**

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

		L	T	P	C
JIT1030	**FUNDAMENTALS OF DEEP LEARNING**	**3**	**0**	**0**	**3**

COURSE OBJECTIVES:
- **To understand the basic concepts of Deep Learning**
- **To understand the methods and terminologies involved in deep neural network.**
- **To impart knowledge on CNN.**
- **To introduce RNN and Deep Generative model**
- **To solve real world computer vision applications using Deep learning.**

Prerequisite: Mathematics, Statistics and Probability, Python Programming

UNIT-I BASICS OF DEEP LEARNING   **9**
Deep Feed-Forward Neural Networks – Gradient Descent – Back-Propagation - Vanishing Gradient Problem – Mitigation – Rectified Linear Unit (ReLU) – Heuristics for Avoiding Bad Local Minima – Heuristics for Faster Training – Nestors Accelerated Gradient Descent – Regularization for Deep Learning – Dropout – Adversarial Training – Optimization for Training Deep Models

UNIT-II VISUALIZATION AND UNDERSTANDING CNN   **9**
Convolutional Neural Networks (CNNs): Introduction to CNNs; Evolution of CNN Architectures:AlexNet, ZFNet, VGG.Visualization of Kernels; Backprop-to-image/ Deconvolution Methods; Deep Dream, Hallucination,Neural Style Transfer; CAM, Grad-CAM**.**

UNIT-III CNN FOR IMAGE AND VIDEO PROCESSING   **9**

CNNs for Recognition, Verification, Detection, Segmentation: CNNs for Recognition and Verification (Siamese Networks, Triplet Loss, Contrastive Loss, Ranking Loss); CNNs for Detection: Background of Object Detection, R-CNN, Fast R-CNN. CNNs for Segmentation: FCN, SegNet

UNIT-IV RNN FOR IMAGE AND VIDEO PROCESSING   9
Recurrent Neural Networks - Feed-Forward Neural Networks vs Recurrent Neural Networks -Review of RNNs; CNN + RNN Models for Video Understanding: Spatio-temporal Models,Action /Activity Recognition

UNIT-V DEEP GENERATIVE MODELS   9
Deep Generative Models: Review of (Popular) Deep Generative Models: GANs, VAEs Variants and Applications of Generative Models in Vision: Applications: Image Editing, Inpainting,Superresolution, 3D Object Generation, Security

                                           TOTAL: 45 HOURS

COURSE OUTCOMES:
At end of the course students will be able to:
   CO1 : Implement basic Image processing operations
   CO2 :Understand the basic concept of deep learning
   CO3 :Design and implement CNN and RNN and Deep generative model
   CO4 :Understand the role of deep learning in computer vision applications
   CO5 : Design and implement Deep generative model

TEXT BOOKS:

   1. Ian 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. Adrian Rosebrock ,"Deep Learning for Computer Vision" -pyimagesearch

   2. Ian Goodfellow, Yoshua Bengio, and Aaron Courville,"Deep Learning"-MIT Press

    3. Pieter Abbeel and John Schulman,"Deep Reinforcement Learning"-Grokking

   4. Christopher M. Bishop ,"Pattern Recognition and Machine Learning",paperback-23 August 2016.

5. Andrew W. Trask,"Grokking Deep Learning"

WEBSITE REFERENCES :
1. **https://www.mathworks.com/discovery/deep-learning.html**
2. **https://www.geeksforgeeks.org/introduction-deep-learning/**
3. **h**ttps://www.techtarget.com/searchenterpriseai/definition/deep-learning-deep-neural-network
4. **https://www.simplilearn.com/tutorials/deep-learning-tutorial/what-is-deep-learning**
5. **https://www.coursera.org/specializations/deep-learning**

CO-PO AND CO-PSO MAPPING:

CO/ PO,PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3					3						3		
CO2	3	3						3	3			3		
CO3			3					3	3		3	3		
CO4	3	3						3	3					
CO5	3	2	3	3								3		
AVG	3	2.6	3	3		3		3	3		3	3		

JIT1031	**FOG COMPUTING**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES:
- To understand the basic concepts of Fog Computing and Edge computing
- To understand the Architecture and working procedure of systems.
- To gain knowledge about the protocols.
- To impart knowledge in management of Data and Security.
- To solve real world computer applications using Fog Computing.

Prerequisite: Cloud Computing, Networks and IoT

UNIT-I : BASICS OF FOG COMPUTING 9
Fog Computing-Definition-Characteristics-Application Scenarios - Issues –Fog. Computing and Internet of Things-Pros and Cons-Myths of Fog Computing -Need and Reasons for Fog Computing Fog Computing and Edge Computing-IoT, FOG, Cloud Benefits.

UNIT-II: SYSTEM ARCHITECTURE 9
Working Procedure -Performance Evaluation Components- Software Systems – Architecture-Modeling and Simulation –Challenges

UNIT-III : FOG PROTOCOLS 9

Fog Protocol-Fog Kit- Proximity Detection Protocols- DDS/RTPS computing Protocols

UNIT-IV : MANAGEMENT OF DATA AND SECURITY ANALYSIS   **9**
Smart Management of Big Data-Smart Data-Structure of Smart Data- Smart Data Life. Cycle-System Architecture-Multi-dimensional Payment Plan- -Security and Privacy. Issues-Multimedia Fog Computing-Architecture Deduplication-Hybrid Secure. Deduplication- Security Challenges-Security Requirements.

UNIT-V :CASE STUDY   **9**
CASE STUDY: Wind Farm - Smart Traffic Light System, Wearable Sensing. Devices,Wearable Event Device, Wearable System, Demonstrations, Post. Application Example. EventApplications Example

TOTAL: 45 HOURS

COURSE OUTCOMES:
At end of the course students will be able to:
   CO1 : Descriptive Knowledge about the basic concepts of Fog Computing and Edge computing
   CO2 : Understand the Architecture and working principles of the system.
   CO3 : Understand and analysis the different protocol mechanism
   CO4 : Understand how to do Data Security analysis
   CO5 : Learn the various industry based application of fog computing.

TEXT BOOKS:

1. Assad Abbas, Samee U. Khan "Fog Computing: Theory and Practice " wiley India May2020
2. Stojan Kitanov (Mother Teresa University, Macedonia)"Introduction to Fog Computing" IGI Global Publication

REFERENCES:

1 . Mukherjee ,"Fog Computing: Concepts, Frameworks and Technologies"

2. Buyya,Rajkumar,Srirama & Satish Narayana "Edge and Fog Computing: Principles and Paradigms"

3. Jantsch, Axel , Liljeberg , Pasi , Preden , Jürgo-Sören , Rahmani & Amir M Ray ,"Fog Computing in the Internet of Things: Intelligence at the Edge" -Springer

4. Zaigham Mahmood ,"Fog Computing-Concepts,Frameworks and Technologies"-Springer

WEBSITE REFERENCES :

1. **https://www.techtarget.com/iotagenda/definition/fog-computing-fogging**
2. **https://www.geeksforgeeks.org/fog-computing/**
3. **https://www.heavy.ai/technical-glossary/fog-computing**
4. https://link.springer.com/chapter/10.1007/978-3-030-34957-
8.**https://www.tutorialspoint.com/what-is-fog-computing**

CO-PO AND CO-PSO MAPPING:

CO/PO,PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3													
CO2	3													
CO3	3	3										3		
CO4	3	3		3									3	
CO5	3							3	3				3	
AVG	3	3		3				3	3		3	3		

		L	T	P	C
JIT1032	**EXPERT SYSTEM**	**3**	**0**	**0**	**3**

COURSE OBJECTIVES

- Understand the principles and components of expert systems.
- Develop and implement rule-based reasoning systems using forward and backward chaining.
- Apply certainty factors and uncertainty handling techniques in rule-based inference engines.
- Apply knowledge acquisition techniques to capture expert knowledge effectively.
- Analyze case studies and real-world applications of expert systems in engineering domains.

Prerequisite: Artificial Intelligence and Python Programming

UNIT-I Introduction to Expert Systems   9

Components of an expert system: knowledge base, inference engine, user interface, and explanation module. Expert system architectures: rule-based systems, case-based systems, and hybrid systems, Benefits and limitations of expert systems in engineering domains, Examples of successful expert system applications in engineering fields, Comparison between expert systems and conventional programming approaches, Introduction to knowledge engineering

and knowledge acquisition for expert systems, Challenges in developing and deploying expert systems, Ethical and legal considerations in the use of expert system.

UNIT-II Knowledge Representation   9

Knowledge types: declarative, procedural, and heuristic knowledge, Rule-based knowledge representation: IF-THEN rules and production rules, Rule-based reasoning: forward chaining and backward chaining, Rule-based inference engines: Rete algorithm and conflict resolution strategies
Case-based reasoning: case representation, retrieval, and adaptation, Semantic networks and ontologies for knowledge representation, Knowledge engineering tools and methodologies for capturing and organizing expert knowledge, Knowledge validation and verification techniques, Knowledge representation using frames and scripts and Integration of domain-specific knowledge with expert systems

UNIT-III Inference Engines   9

Inference mechanisms in expert systems, Forward chaining algorithms: data-driven and goal-driven strategies, Backward chaining algorithms: goal-directed and sub goal-directed strategies, Conflict resolution strategies: specificity, salience, and certainty factors, Rule-based reasoning systems: matching and firing rules, chaining and agenda control, Rule-based inference engines: forward chaining and backward chaining engines. Certainty factors and handling uncertainty in expert systems, Inference with numerical and probabilistic information, Explanation and justification mechanisms in expert systems, Temporal and dynamic reasoning in expert systems

UNIT-IV   Knowledge Acquisition and Engineering   9

Knowledge acquisition techniques: interviewing, observation, and documentation, Knowledge elicitation methods: structured interviews, protocol analysis, and knowledge workshops, Knowledge representation using frames and semantic networks, Knowledge engineering methodologies: knowledge acquisition, representation, and validation, Knowledge acquisition tools and expert system shells, Knowledge refinement and iterative development process, Knowledge reuse and maintenance in expert systems, Knowledge acquisition from domain experts and existing data sources, Natural language processing and machine learning techniques for knowledge acquisition, Ontologies and knowledge engineering in the Semantic Web context.

UNIT-V   Advanced Topics and Applications   9

Uncertainty handling in expert systems: fuzzy logic, probability theory, and certainty factors, Hybrid expert systems: integrating rule-based and case-based reasoning, Explanation and justification mechanisms in expert systems, Knowledge-based systems for fault diagnosis and troubleshooting, Expert systems for decision support and optimization, Expert systems in robotics and automation, Challenges and future directions in expert systems research and development.

TOTAL: 45 PERIODS

COURSE OUTCOMES

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

- Understand the fundamental concepts and principles of expert systems
- Apply knowledge engineering techniques to capture and represent expert knowledge.
- Utilize appropriate inference engines for effective decision-making in engineering domains.
- Understand knowledge acquisition techniques to capture expert knowledge effectively.
- Analyze and evaluate real-world engineering problems for potential applications of expert systems.

TEXT BOOKS:

1. Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach" Authors, 4th Edition Edition, Pearson Publisher 2020.

2. Joseph C. Giarratano and Gary D. Riley Edition ,"Expert Systems: Principles and Programming" 4th Edition ,Cengage Learning,2018.

REFERENCES:

1. Cornelius T. Leondes ,"Expert Systems and Artificial Intelligence: An Information Manager's Guide" 1st Edition, 2019 ,Academic Press.
2. Bruce G. Buchanan and Edward H. Shortliffe ,"Rule-Based Expert Systems: The MYCIN Experiments of the Stanford Heuristic Programming Project" 1st Edition , Addison-Wesley ,1984.
3. John Durkin ,"Expert Systems: Design and Development" , 1st Edition ,Prentice Hal,1994
4. Cornelius T. Leondes, "Fuzzy Logic and Expert Systems Applications" –Pearson Publications 2020

WEBSITE REFERENCES :

1. https://probml.github.io/pml-book/
2. http://aima.cs.berkeley.edu/
3. https://www.sciencedirect.com/journal/expert-systems-with-applications
4. **https://www.journals.elsevier.com/expert-systems-with-applications**
5. https://dl.acm.org/doi/abs/10.1016/j.eswa.2022.119049

CO-PO AND CO-PSO MAPPING:

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

JIT1033	RECOMMENDER SYSTEMS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To understand the foundations of the recommender system.
- To learn the content-based recommendation systems
- To learn about collaborative filtering
- To make students to learn about attack-resistant recommender systems.
- To learn Evaluating Recommender Systems

Prerequisite: Probability and Statistics, Machine Learning , Python Programming

UNIT-I INTRODUCTION   9

Introduction and basic taxonomy of recommender systems - Traditional and non-personalized Recommender Systems - Overview of data mining methods for recommender systems- similarity measures- Dimensionality reduction – Singular Value Decomposition (SVD), Applications of recommendation systems and Issues with recommender system

UNIT-II CONTENT-BASED RECOMMENDATION SYSTEMS   9

High-level architecture of content-based systems, advantages and drawbacks of content based filtering - Item profiles, Discovering features of documents, Obtaining item features from tags, Representing item profiles, Methods for learning user profiles, Similarity-based retrieval, and Classification algorithms.

UNIT-III COLLABORATIVE FILTERING   9

A systematic approach, Nearest-neighbor collaborative filtering (CF), user-based and item-based CF, components of neighborhood methods (rating normalization, similarity weight computation, neighborhood selection and Attacks on collaborative recommender systems

UNIT-IV ATTACK-RESISTANT RECOMMENDER SYSTEMS   9

Introduction – Types of Attacks – Detecting attacks on recommender systems – Individual attack – Group attack – Strategies for robust recommender design - Robust recommendation algorithms.

UNIT-V   EVALUATING RECOMMENDER SYSTEMS   9

Evaluating Paradigms – User Studies – Online and Offline evaluation – Goals of evaluation design – Design Issues – Accuracy metrics – Limitations of Evaluation measures - Evaluation on historical datasets, Error metrics, Decision-Support metrics, User-Centred metrics.

TOTAL: 45 PERIODS

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

CO1: To understand basic techniques and problems in the field of recommender systems
CO2: To understand the concepts of content based recommender system
CO3:To understand the concepts of collaborative filtering
CO4: To understand the concepts of attack-resistant recommender systems
CO5: To understand the concepts of evaluating recommender systems

TEXT BOOKS:
1 Jannach D., Zanker M. and FelFering A., Recommender Systems: An Introduction, Cambridge University Press(2011), 1st ed.
2. Fatih Gedikli , "Recommender Systems and the Social Web: Leveraging Tagging Data for Recommender Systems"- Springer

REFERENCES:
1. Charu C. Aggarwal, Recommender Systems: The Textbook, Springer, 2016.
2. Dietmar Jannach , Markus Zanker , Alexander Felfernig and Gerhard Friedrich , Recommender Systems: An Introduction, Cambridge University Press (2011), 1st ed.
3. Francesco Ricci , Lior Rokach , Bracha Shapira , Recommender Sytems Handbook, 1st ed, Springer (2011),
4. Jure Leskovec, Anand Rajaraman, Jeffrey David Ullman, Mining of massive datasets, 3rd edition, Cambridge University Press, 2020.r.

WEBSITE REFERENCES :
1. https://freevideolectures.com/course/4694/nptel-e-business/54
2. https://www.cse.iitk.ac.in/users/nsrivast/HCC/Recommender_systems_handbook.pdf
3. https://recommender-systems.com/study-learn/online-courses/
4. https://www.pdfdrive.com/recommender-systems
5. https://www.nvidia.com/en-us/glossary/data-science/recommendationsystem.

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	3	3	-	-	-	-	-	-	-	-	3	3	3

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

		L	T	P	C
JIT1034	**GAME PROGRAMMING**	**3**	**0**	**0**	**3**

COURSE OBJECTIVES

- Understand the concepts of Game design and development.
- Learn the processes, mechanics and issues in Game Design.
- Be exposed to the Core architectures of Game Programming
- Know about Game programming platforms, frame works and engines to develop games.
- To learn Evaluating Recommender Systems

Prerequisite: Data Structures and Algorithms, Python Programming

UNIT-I 3D GRAPHICS FOR GAME PROGRAMMING   9

3D Transformations, Quaternions, 3D Modeling and Rendering, Ray Tracing, Shader Models, Lighting, Color, Texturing, Camera and Projections, Culling and Clipping, Character Animation,Physics-based Simulation, Scene Graphs.

UNIT-II GAME ENGINE DESIGN   9

Game engine architecture, Engine support systems, Resources and File systems, Game loop and real-time simulation, Human Interface devices, Collision and rigid body dynamics, Game profiling

UNIT-III GAME PROGRAMMING   9

Application layer, Game logic, Game views, managing memory, controlling the main loop, loading and caching game data, User Interface management, Game event management.

UNIT-IV   GAMING PLATFORMS AND FRAMEWORKS   9

2D and 3D Game development using Flash, DirectX, Java, Python, Game engines - Unity. DX Studio, Unity.

UNIT-V   GAME DEVELOPMENT   9

Developing 2D and 3D interactive games using DirectX or Python – Isometric and Tile Based Games, Puzzle games, Single Player games, Multi-Player games.

TOTAL: 45 PERIODS

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

CO1: Discuss the concepts of Game design and development.
CO2:Design the processes, and use mechanics for game development.
CO3: Explain the Core architectures of Game Programming.
CO4: Use Game programming platforms, frame works and engines.
CO5: Create interactive Games.

TEXT BOOKS:
1. Mike Mc Shaffrfy and David Graham, "Game Coding Complete", Fourth Edition, Cengage Learning, PTR, 2012.
2. Jason Gregory, "Game Engine Architecture", CRC Press / A K Peters, 2009.

REFERENCES:
1. David H. Eberly, "3D Game Engine Design, Second Edition: A Practical Approach to Real-Time Computer Graphics" 2 nd Editions, Morgan Kaufmann, 2006.
2. Ernest Adams and Andrew Rollings, "Fundamentals of Game Design", 2 nd Edition Prentice Hall / New Riders, 2009.
3. Eric Lengyel, "Mathematics for 3D Game Programming and Computer Graphics", 3 rd Edition, Course Technology PTR, 2011.
4. Jesse Schell, The Art of Game Design: A book of lenses, 1 st Edition, CRC Press, 2008.

WEBSITE REFERENCES :
1. https://www.coursera.org/specializations/game-design-and-development
2. https://www.freecodecamp.org/news/the-ultimate-beginners-guide-to-game-development-in-unity-f9bfe972c2b5/
3. https://www.udemy.com/course/unitycourse2/
4. https://www.developer.com/languages/game-programming-fundamentals/
5. https://www.gamedesigning.org/career/programming-languages/

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	-	3	-	-	-	-	-	-	-	-	3	3	3
CO-2	3	-	3	-	2	-	-	-	-	-	-	3	3	3
CO-3	3	1	3	-	2	-	-	-	1	-	-	3	3	3
CO-4	3	1	3	-	3	-	-	-	1	-	-	3	3	3
CO-5	3	1	3	-	3	-	-	-	1	-	-	3	3	3

JIT1035	AGENT BASED INTELLIGENT SYSTEMS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:
- To Study the fundamentals concepts of agent based systems
- To learn the mechanism through knowledge representation
- Understand the Planning Problem-State Space Search
- To understand Agents and security
- To gain Knowledge in Agent Applications

Prerequisite: Artificial Intelligence , Python Programming

UNIT-I : BASICS FUNDAMENTALS OF AGENTS 9
Definitions - Foundations - History - Intelligent Agents-Problem Solving-Searching -Heuristics -Constraint Satisfaction Problems - Game playing.

UNIT-II: KNOWLEDGE REPRESENTATION AND REASONING 9
Logical Agents-First order logic-First Order Inference-Unification-Chaining-Resolution Strategies-Knowledge Representation-Objects-Actions-Events

UNIT-III : PLANNING AGENTS 9
Planning Problem-State Space Search-Partial Order Planning-Graphs-Nondeterministic Domains-Conditional Planning-Continuous Planning-MultiAgent Planning.

UNIT-IV : AGENTS AND UNCERTAINTY 9
Acting under uncertainty – Probability Notation-Bayes Rule and use –Bayesian Networks-Other Approaches-Time and Uncertainty-Temporal Models- Utility Theory - Decision Network – Complex Decisions

UNIT-V : HIGHER LEVEL AGENTS 9

Knowledge in Learning-Relevance Information-Statistical Learning Methods-Reinforcement Learning-Communication-Formal Grammar-Augmented Grammars-Future of AI

TOTAL: 45 HOURS

COURSE OUTCOMES:
At end of the course students will be able to:
  CO1 : Understand the development of software agents
  CO2 : Understand the mechanism through knowledge representation.
  CO3 : Gain Knowledge in Multi agent and Intelligent agents.
  CO4 : Understand Agents and security
  CO5 : Gain knowledge on applications of agents

TEXT BOOKS:

1. Stuart Russell and Peter Norvig, "Artificial Intelligence - A Modern Approach",2ⁿᵈ Edition, Prentice Hall, 2002
2. Michael Wooldridge, "An Introduction to Multi Agent System", John Wiley, 2002

REFERENCES:
  1 . Patrick Henry Winston, Artificial Intelligence, 3rd Edition, AW, 1999.
  2. Nils.J.Nilsson, Principles of Artificial Intelligence, Narosa Publishing House, 1992.
  3. Gerhard Weiss, Multi Agent Systems – A Modern Approach to Distributed Artificial Intelligence, MIT Press , 2016
  4. Mohammad Essaaidi, Maria Ganzha, and Marcin Paprzycki, Software Agents, Agent Systems and Their Applications, IOS Press , 2012 .
  5. Patrick Henry Winston, Artificial Intelligence,3ʳᵈ Edition,AW1999.
WEBSITE REFERENCES :
  1. **https://what-when-how.com/artificial-intelligence/agent-based-intelligent-system-modeling-artificial-intelligence/**
  2. **https://www.javatpoint.com/agents-in-ai**
  3. **https://www.geeksforgeeks.org/agents-artificial-intelligence/**
  4. **https://www.simplilearn.com/what-is-intelligent-agent-in-ai-types-function-article**
  5. **https://www.techtarget.com/searchenterpriseai/definition/agent-intelligent-agent**

CO-PO AND CO-PSO MAPPING:

CO/ PO,PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2				3	3	3	2		2	3		
CO2	3	3		3	2	3			3		2	3		
CO3	3	3				3						3		

CO4	3	3			2	3		2	3		3	3		
CO5	3		3			3		3			3	3		
AVG	3	2.6	3	3	2	3	3	2.6	2.6		2.5	3		

JIT1002	AGILE METHODOLOGY	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:
- To understand the basic concepts of Agile Software Process.
- To comprehend various Agile Methodologies.
- To develop Agile Software Process.
- To apply principles of Agile Testing.
- To understand metrics used in Agile.

Prerequisite: Software Engineering, Object Oriented Analysis and Design

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 HOURS

COURSE OUTCOMES:
At end of the course students will be able to:
    CO1 : Differentiate agile methodologies and Non –agile methodologies
·   **CO2 :** Describe the various practices followed in Agile Software Process

    CO3 : Select suitable agile approach for the projects.

    CO4 : Understand Agile Environment.

    CO5 : 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.

3. Hazza and Dubinsky, "Agile Software Engineering, Series: Undergraduate Topics in Computer Science, Springer, 2009.

4. Kevin C. Desouza, "Agile Information Systems: Conceptualization, Construction, and Management, Butterworth-Heinemann, 2007.

WEBSITE REFERENCES :
1. https://www.coursera.org/learn/agile-project-management
2. https://www.udemy.com/course/introduction-to-agile/
3. https://www.infoworld.com/article/3237508/what-is-agile-methodology-modern-software-development-explained.html
4. https://www.javatpoint.com/agile
5. https://www.nimblework.com/agile/agile-methodology/

CO-PO AND CO-PSO MAPPING:

CO/ PO,PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	2	-	-	-	1	1	3	2	3	2
CO2	2	3	1	1	1	-	-	-	2	2	1	2	1	2
CO3	2	2	1	3	1	-	-	-	1	3	1	2	2	3
CO4	2	1	3	2	1	-	-	-	1	1	1	2	3	1
CO5	2	2	1	3	1	-	-	-	1	3	2	1	2	1
AVG	2.2	2.2	1.6	2	1.2	-	-	-	1.2	2	1.6	1.8	2.2	1.8

		L	T	P	C
JIT1023	**DEVOPS**	**3**	**0**	**0**	**3**

COURSE OBJECTIVES:

- To introduce DevOps terminology, definition & concepts.
- To understand the different Version control tools.
- To understand the concepts of Continuous Integration and Testing.
- To understand Configuration management using Ansible.
- To illustrate the benefits and drive the adoption of cloud-based Dev ops tools to solve real world problems

Prerequisite: C Programming, Java Programming

UNIT-I   :   INTRODUCTION TO DEVOPS   9

Devops Essentials - Introduction To AWS, GCP, Azure - Version control systems: Git and Github.

UNIT-II   : COMPILE AND BUILD USING MAVEN & GRADLE   9

Introduction, Installation of Maven, POM files, Maven Build lifecycle, Build phases (compile build, test, package) Maven Profiles, Maven repositories (local, central, global), Maven plugins, Maven create and build Artificats, Dependency management, Installation of Gradle, Understand build using Gradle

UNIT-III   :   CONTINUOUS INTEGRATION USING JENKINS   9

Install & Configure Jenkins, Jenkins Architecture Overview, Creating a Jenkins Job, Configuring a Jenkins job, Introduction to Plugins, Adding Plugins to Jenkins, Commonly used plugins (Git Plugin, Parameter Plugin, HTML Publisher, Copy Artifact and Extended choice parameters). Configuring Jenkins to work with java, Git and Maven, Creating a Jenkins Build and Jenkins workspace.

UNIT-IV   :   CONFIGURATION MANAGEMENT USING ANSIBLE   9

Ansible Introduction, Installation, Ansible master/slave configuration, YAML basics, Ansible modules, Ansible Inventory files, Ansible playbooks, Ansible Roles, adhoc commands in ansible

UNIT-V   :   BUILDING DEVOPS PIPELINES USING AZURE   9

Create Github Account, Create Repository, Create Azure Organization, Create a new pipeline, Build a sample code, Modify azure-pipelines.yaml file

TOTAL: 45 HOURS

COURSE OUTCOMES:
At end of the course students will be able to:
    CO1 : Understand different actions performed through Version control tools like Git.
    CO2 : Perform Continuous Integration and Continuous Testing and Continuous
Deployment using Jenkins by building and automating test cases using Maven & Gradle.
    CO3 : Ability to Perform Automated Continuous Deployment
    CO4 : Ability to do configuration management using Ansible
    CO5 : Understand to leverage Cloud-based DevOps tools using Azure DevOps

TEXT BOOKS:
    1. Roberto Vormittag, "A Practical Guide to Git and GitHub for Windows Users: From Beginner to Expert in Easy Step-By-Step Exercises", Second Edition, Kindle Edition, 2016.
    2. Jason Cannon, "Linux for Beginners: An Introduction to the Linux Operating System and Command Line", Kindle Edition, 2014

REFERENCES:

1. Hands-On Azure Devops: Cicd Implementation For Mobile, Hybrid, And Web Applications Using Azure Devops And Microsoft Azure: CICD Implementation for ... DevOps and Microsoft Azure (English Edition) Paperback – 1 January 2020 by Mitesh Soni
2. Jeff Geerling, "Ansible for DevOps: Server and configuration management for humans", First Edition, 2015.
3. David Johnson, "Ansible for DevOps: Everything You Need to Know to Use Ansible for DevOps", Second Edition, 2016.
4. Mariot Tsitoara, "Ansible 6. Beginning Git and GitHub: A Comprehensive Guide to Version Control, Project Management, and Teamwork for the New Developer", Second Edition, 2019.

WEBSITE REFERENCES :

1. https://www.jenkins.io/user-handbook.pdf
2. https://maven.apache.org/guides/getting-started/
3. https://www.atlassian.com/devops
4. https://en.wikipedia.org/wiki/DevOps
5. https://www.techtarget.com/searchitoperations/definition/DevOps

CO-PO AND CO-PSO MAPPING:

CO/ PO,PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	1	3	1	-	-	-	3	3	2	1		
CO2	2	3	1	3	2	-	-	-	1	2	2	2		
CO3	1	3	3	2	2	-	-	-	2	3	1	2		
CO4	1	2	3	3	1	-	-	-	3	2	1	3		
CO5	1	2	3	2	1	-	-	-	2	1	1	1		
AVG	1.6	2.2	2.2	2.6	1.4	-	-	-	2.2	2.2	1.4	1.8		

JAD1020	SOFTWARE TESTING USING SELENIUM	L	T	P	C

		3	0	0	3

COURSE OBJECTIVES:
- To study the basics of software testing.
- To study selenium web driver.
- To study the test frameworks and test design.
- To study test reporting and logging.
- To study dynamic web elements and automation for web services.

Prerequisite: Software Engineering, Software Testing.

UNIT-I   :   INTRODUCTION TO SOFTWARE TESTING & SELENIUM   9

Fundamentals of software testing - Testing lifecycle and methodologies - Role of automation in software testing Introduction to Selenium: Overview of Selenium and its features - Selenium WebDriver architecture - Setting up the Selenium environment

UNIT-II   : SELENIUM WEBDRIVER   9

Selenium WebDriver Basics: Locating web elements using different techniques (e.g., ID, XPath, CSS selectors) - Interacting with web elements (e.g., clicking, typing, selecting) - Handling different types of web elements (e.g., text fields, checkboxes, dropdowns)

UNIT-III   :   TEST FRAMEWORKS AND TEST DESIGN   9

Introduction to test frameworks (e.g., TestNG, JUnit) - Creating test cases and test suites - Organizing tests and test data - Test design techniques (e.g., boundary value analysis, equivalence partitioning)Test Automation

UNIT-IV   : TEST REPORTING AND LOGGING   9

Generating test reports and logs - Analyzing test results and debugging failures - Integration with Continuous Integration (CI) tools (e.g., Jenkins)Selenium Grid and Cross-Browser Testing: Introduction to Selenium Grid - Parallel test execution for improved efficiency

UNIT-V   : ADVANCED TOPICS IN SELENIUM   9

Introduction to Test Automation for Web Services: Overview of testing web services - Introduction to tools/frameworks for web service testing (e.g., REST Assured) - Testing API endpoints and response validation.

TOTAL: 45 HOURS

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

CO1 : Understand the basics of software testing
CO2 : Learn the selenium web driver
CO3 : Understand Test frameworks and framework design.
CO4 : Learn test reporting and logging techniques.
CO5 : Learn dynamic web elements and automation for web services.

TEXT BOOKS:
1. Paul C , "Software. Testing. A Craftsman's Approach", CRC press, Fourth Edition, 2013.
2. Satya Avasarala, 'Selenium WebDriver Practical Guide", 2014.

REFERENCES:
1. Unmesh Gundecha, **"**Selenium Testing Tools Cookbook", 2nd Edition, 2015.
2. Zhimin Zhan, "Selenium WebDriver Recipes in C#", Apress publisher,2015.
3. Dima Kovalenko, "Selenium Design Patterns and Best Practices", Packt Publishing, 2018.
4. S BASU, "Selenium with Python Simplified For Beginners", Independently published 2020.

WEBSITE REFERENCES :
1. https://www.tutorialspoint.com/software_testing/index.htm
2. https://www.javatpoint.com/software-testing-tutorial
3. https://www.javatpoint.com/selenium-webdriver
4. https://www.tutorialspoint.com/selenium/selenium_webdriver.htm
5.https://support.smartbear.com/testcomplete/videos/testcomplete-basics-logging-and-reporting/

CO-PO AND CO-PSO MAPPING:

CO/ PO,PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	2	-	-	-	-	-	-	-	-	-		
CO2	3	2	1	-	-	-	-	-	-	-	-	-		
CO3	2	2	2	-	-	-	-	-	-	-	-	-		
CO4	2	3	3	-	-	-	-	-	-	-	-	-		
CO5	2	3	2	-	-	-	-	-	-	-	-	-		
AVG	2.2	2.6	2	-	-	-	-	-	-	-	-	-		

JAD1021	PANDAS FOR DATA ANALYSIS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:
- To understand the fundamentals of data analysis and its importance in various fields
- To utilize the pandas plotting subpackage for data visualization.

- To understand the process of building a Python package for data analysis.
- To learn techniques for preprocessing data before applying machine learning algorithms.
- To understand the process of hyperparameter tuning using grid search.

Prerequisite: Statistics and Probability, Database management systems.

UNIT-I : FUNDAMENTALS OF DATA ANALYSIS **9**
Fundamentals of data analysis-Statistical foundations-Setting up a virtual environment-Pandas data structures-Bringing data into a Pandas DataFrames-Inspecting a DataFrame object-Grabbing subsets of the data-Adding and removing data

UNIT-II :USING PANDAS FOR DATA ANALYSIS **9**
Data Wrangling with Pandas:Data Wrangling-Collecting temperature data-Cleaning up the data-Restructuring the data-Handling duplicate, missing,or invalid data-Database-style operations on DataFrames- DataFrame operations-Aggregations with pandas and numpy-Time Series-plotting with pandas-the pandas.plotting subpackage

UNIT-III   APPLICATIONS AND PLOTTING **9**
Seaborn utility-Formatting-Customizing Visulaizations-Building a python package-Data extraction with pandas-Exploratory data analysis-Modeling performance-Simulating login attempts-Rule based anomaly detection.

UNIT-IV MACHINE LEARNING WITH SCIKIT **9**
Exploratory data analysis-prepocessing data-clustering –Regression-Classification

UNIT-V METHODS TO OPTIMIZE DATA **9**
Hyperparameter tuning with grid search-Ensemble methods-Inspecting classification prediction confidence-Addressing class imbalance-Regularization-Unsupervised methods-Supervised methods-Online Learning

TOTAL: 45 HOURS

COURSE OUTCOMES:
At end of the course students will be able to:
    CO1 : Understand the fundamentals of data analysis.
    CO2 : Able to perform various operations and aggregations using Pandas and NumPy.
    CO3 : Able to perform exploratory data analysis on different datasets.
    CO4 : Have a good understanding of classification techniques and algorithms.
    CO5 : Have a good understanding of ensemble methods and their application.

TEXT BOOKS:
1. Stefanie Molin, "Hands-On Data Analysis with Pandas", Packt Publishing Ltd, 2019.
2. Ashish Kumar, "A Complete Guide to Pandas, from Installation to Advanced Data Analysis Techniques", 2nd Edition, 2019.

REFERENCES:

1. Alvaro Fuentes, "Become a Python Data Analyst", Packt Publishing, 2018
2. Jacqueline Kazil, Katharine Jarmul, "Data Wrangling with Python", O'Reilly Media, 2016.
3. Hannah Stepanek, "Thinking in Pandas" , Apress, 2020.

WEBSITE REFERENCES :

1. https://www.google.co.in/books/edition/Thinking_in_Pandas/pZnpDwAAQBAJ?hl=en&gbpv=0
2. https://www.google.co.in/books/edition/Hands_On_Data_Analysis_with_Pandas/buGlDwAAQBAJ?hl=en&gbpv=1&printsec=frontcover
3. https://www.packtpub.com/product/hands-on-data-analysis-with-pandas-second-edition/9781800563452
4. https://www.goodreads.com/book/show/45861407-hands-on-data-analysis-with-pandas
5. https://searchworks.stanford.edu/view/13489419

CO-PO AND CO-PSO MAPPING:

CO/ PO,PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	2	-	-	-	1	1	3	2	3	2
CO2	2	3	1	1	1	-	-	-	2	2	1	2	1	2
CO3	2	2	1	3	1	-	-	-	1	3	1	2	2	3
CO4	2	1	3	2	1	-	-	-	1	1	1	2	3	1
CO5	2	2	1	3	1	-	-	-	1	3	2	1	2	1
AVG	2.2	2.2	1.6	2	1.2	-	-	-	1.2	2	1.6	1.8	2.2	1.8

JAD1022	DATA VISUALIZATION USING TABLEAU	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To perceive in-depth knowledge on how to represent data with visual analytics as suits the target audience, task and data.
- To equip the students with knowledge of visual encoding design choices for arranging and representing data in an interactive and spatial form.
- To gain an insight into Data Visualization techniques and tools.
- To explore business insights and achieve business goals in the right direction

- To provide insight and training on designing visualization dashboard that would support decision making on large scale data

Prerequisite: Database Management Systems, Data Mining and Warehousing.

UNIT-I : INTRODUCTION 9

Purpose of visualization, Data Abstraction: Data Types, Dataset types, Attribute types, Semantics, Preparing your Data, Survey Data, Compute descriptive Statistics, Explore the data visually, Design Standards: Chart Format, Color, Text and Labels Readability, Scales, data Integrity, chart Junk, data density, data richness, Attribution and Design Standard Checklist. Task Abstraction: Actions, Targets, Analyzing & Deriving – Example, Four levels for Validation, Marks and Channels, Analysis – Four levels of Validation.

UNIT-II:Data Manipulation with Pandas 9

Introduction, Data Indexing and selection, operating on data, handling missing data, Hierarchical Indexing, combining dataset, Aggregation and Grouping, Pivot tables, String operation Visualization with Matplotlib: Line plots, Scatter Plots, Visualizing Errors, Density and Contour plots, Histogram, Customizing Plot legends, Color bars, Test and Annotation, Three dimensional Plotting, Geographic data with base map, visualization with sea born

UNIT-III : VISUALIZATION TECHNIQUES 9

Arrange tables, Arrange Network and Trees, Map Color and other Channels, Manipulate Views, Facet, Reduce Items and Attributes: Filter, Aggregate, Time-Series Data visualization, Text data Visualization, Multivariate data visualization.

UNIT-IV :DATA VISUALIZATION USING TABLEAU 9

Exploratory Data Analysis using Tableau Visualizations, Creating basic visualizations- Bar Chart, Geographic map, Crosstab Report, Scatter plot, Line Chart, Connecting to Data, Live Connection, Extract Data, Combine data sources, Join tables, Blend data sources, cross-database join, filtering and sorting data, creating groups and hierarchies - Publishing to Tableau Server - Mapping

UNIT-V : Case Study 9

Geographic Maps, Filled Maps, Mapping options Heat Map, Choropleth map and highlight table, Histograms, Dashboard Development -design Principles and Interactivity

TOTAL: 45 HOURS

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

CO1 : Understand the need for data abstraction and task abstraction and would be able to relate with the various data, datasets associated with different applications.
CO2 : Apply the various visual analytics techniques available for arranging the different types of data.
CO3 : Identify and apply appropriate data visualization techniques, given particular requirements imposed by the data.
CO4 : Employ best practices in data visualization to develop charts, maps, tables and other visual representations of data and would be able to identify the need for reducing and aggregating item-sets.
CO5 : Apply the different exploratory data analysis techniques on the datasets using Tableau.

TEXT BOOKS:
1. Sosulski K (2018), "Data Visualization made simple: Insights into Becoming Visual, New York: Routledge.
2. Jake VanderPlas "Python Data Science Handbook", November 2017.

REFERENCES:
1. TamaraMunzner, "Visualization Analysis and Design", December 2014.
2. Few, Stephen, "Show me the numbers: Designing Tables and Graphs to Enlighten" 2nd Edition. Analytics Press Publishers June 2012.
3. Mathew Ward, Georges Grinstein and Daniel Keim, "Interactive Data Visualization Foundations, Techniques, Applications" , 2010.
4. Stephen Few, "Information Dashboard Design: Displaying Data for At-a-glance Monitoring", Analytics Press, 2nd Edition, 2013.

WEBSITE REFERENCES :
1. https://datavizproject.com/
2. https://app.rawgraphs.io/
3. https://www.datawrapper.de/
4. https://www.tableau.com/
5. https://www.tableau.com/learn/articles/data-visualization

CO-PO AND CO-PSO MAPPING:

CO/PO,PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3				3				3					
CO2	3	2	3		3						3			
CO3	3		3		3	2					3	3		
CO4	3		3									3		
CO5	3	3	3		3						3			
AVG	3	2.6	3		3	2			3		3	3		

JAD1023	JENKINS AUTOMATION FOR SERVER	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To Understand the automation tools and their application

- To Learn about Jenkins interface and its role in

- To Understand Version Control Integration for Jenkins

- To Learn about Continuous Delivery and Deployment with Jenkins

- To Learn about advanced server automation concepts.

Prerequisite: Operating Systems, Computer Network

UNIT-I   :   INTRODUCTION TO SERVER AUTOMATION TOOLS   9

Introduction-Overview of server automation- benefits-Introduction to popular server automation tools-Understanding infrastructure as code (IaC) principles,Ansible Automation-Introduction-architecture- components and terminology-Chef Automation-Introduction to Chef: architecture, components, and terminology- Puppet Automation-Introduction to Puppet: architecture, components, and terminology-SaltStack Automation-Introduction to SaltStack: architecture, components, and terminology- Comparison and Selection of Automation Tools

UNIT-II   :   INTRODUCTION   9

Introduction to Jenkins-Overview of Jenkins and its role in software development and automation-Installation and setup of Jenkins on a local machine or server-Familiarization with the Jenkins user interface and basic configuration options-Introduction to Jenkins jobs and their types (e.g., Freestyle, Pipeline)-Creating and configuring jobs using the Jenkins web interface -Parameterized builds and job triggering options

UNIT-III   :   VERSION CONTROL INTEGRATION   9

Version Control Integration- Integrating Jenkins with popular version control systems-Setting up build triggers on version control events-Configuring webhooks for automatic job triggering-Continuous Integration with Jenkins- principles of continuous integration (CI)-Configuring Jenkins for automated build and unit testing-Running tests and generating test reports with Jenkins

UNIT-IV   :   CONTINUOUS DELIVERY AND DEPLOYMENT WITH JENKINS 9

Introduction to continuous delivery and deployment -Creating deployment pipelines in Jenkins-Integrating Jenkins with deployment tools -Jenkins Pipeline Fundamentals-Understanding Jenkins pipelines and their advantages -Implementing Jenkins pipelines using the declarative syntax-Writing Jenkins files for defining and managing pipelines

UNIT-V : ADVANCED TOPICS IN SERVER AUTOMATION 9

Configuration management with multiple environments -Integration of server automation tools with version control systems- Implementing advanced features like idempotence, conditional execution, and error handling-Advanced Jenkins Pipeline Concepts -Using Jenkins pipeline stages and steps- Scripted pipeline syntax and advanced scripting techniques -Error handling, parallel execution, and agent configuration in Jenkins pipelines- Jenkins Plugin Ecosystem.

TOTAL: 45 HOURS

COURSE OUTCOMES:
At end of the course students will be able to:
CO1:Apply the automation techniques
CO2:Apply server automation tools for server validation
CO3:Apply version control integration of various projects
CO4:Learn about Continuous delivery
CO5:Learn about advanced server automation tools

TEXT BOOKS:

1. "Intelligent Automation: Welcome to the world of Hyper automation", Pascal Bornet , World Scientific Publishing Co Pvt Ltd.,2020.

2. Arnon Axelrod," Complete Guide to Test Automation",Apress publications,2020

REFERENCES:

1. Walter de Gruyter ,"Robotic Process Automation Management, Technology, Applications", de Gruyter Publication,2021.

2. Bernd Ruecker ,"Practical Process Automation",OReilly media Publication,2021.

3. Mitesh Soni, "Hands-on Pipeline as YAML with Jenkins", BPB Publications, 2021.

4. Brent Laster, "Jenkins 2: Up and Running", O'Reilly Media, 2018.

WEBSITE REFERENCES :
1. https://www.jenkins.io/
2. https://www.tutorialspoint.com/jenkins/jenkins_automated_testing.htm
3. https://www.testim.io/blog/jenkins-test-automation/
4. https://www.youtube.com/watch?v=PAKWqRE0aTk
5. https://www.youtube.com/watch?v=f4idgaq2VqA

CO-PO AND CO-PSO MAPPING:

CO/	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2

PO,PSO														
CO1	2	-	2	-	-	-	-	-	2	2	2	3	3	3
CO2	3	-	2	-	-	-	-	-	-	-	2	-	3	3
CO3	1	-	2	-	-	-	-	-	-	1	2	-	3	3
CO4	3	-	2	-	-	-	-	-	-	1	2	-	3	3
CO5	2	-	2	-	-	-	-	-	-	1	2	-	3	3
AVG	3	-	2	-	-	-	-	-	-	-	2	-	3	3

		L	T	P	C
JAD1024	**CLOUD COMPUTING TOOLS**	3	0	0	3

COURSE OBJECTIVES:
- To understand the principles of cloud architecture, models and infrastructure.
- To understand the concepts of virtualization and virtual machines.
- To gain knowledge about virtualization Infrastructure.
- To explore and experiment with various Cloud deployment environments.
- To learn about the security issues in the cloud environment

Prerequisite: Computer Networks, Cloud computing

UNIT-I   :   Cloud Computing Overview   9

Origins of Cloud computing – Cloud components - Essential characteristics – On-demand self-service, Broad network access, Location independent resource pooling, Rapid elasticity , Measured service, Comparing cloud providers with traditional IT service providers, Roots of cloud computing.

UNIT-II   :   Cloud Insights   9
Architectural influences – High-performance computing, Utility and Enterprise grid computing, Cloud scenarios – Benefits: scalability, simplicity, vendors, security, Limitations – Sensitive

information - Application development- security level of third party - security benefits, Regularity issues: Government policies.

UNIT-III : Cloud Architecture- Layers and Models 9

Layers in cloud architecture, Software as a Service (SaaS), features of SaaS and benefits, Platform as a Service (PaaS), features of PaaS and benefits, Infrastructure as a Service (IaaS), features of IaaS and benefits, Service providers, challenges and risks in cloud adoption. Cloud deployment model: Public clouds – Private clouds – Community clouds - Hybrid clouds - Advantages of Cloud computing.

UNIT-IV : Cloud Simulators- CloudSim and GreenCloud 9

Introduction to Simulator, understanding CloudSim simulator, CloudSim Architecture(User code, CloudSim, GridSim, SimJava) Understanding Working platform for CloudSim, Introduction to GreenCloud

UNIT-V : Introduction to VMWare Simulator 9

Basics of VMWare, advantages of VMware virtualization, using Vmware workstation, creating virtual machines-understanding virtual machines, create a new virtual machine on local host, cloning virtual machines, virtualize a physical machine, starting and stopping a virtual machine.

TOTAL: 45 HOURS

COURSE OUTCOMES:
At end of the course students will be able to:
   CO1 : Understand the design challenges in the cloud.
   CO2 : Apply the concept of virtualization and its types.
   CO3 : Experiment with virtualization of hardware resources and Docker.
   CO4 : Develop and deploy services on the cloud and set up a cloud environment.
   CO5 : Explain security challenges in the cloud environment.

TEXT BOOKS:
   1. Cloud computing a practical approach - Anthony T.Velte , Toby J. Velte Robert Elsenpeter, TATA McGraw- Hill , New Delhi – 2010

   2. Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online - Michael Miller - Que 2008

   3. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.

   4. James Turnbull, "The Docker Book", O'Reilly Publishers, 2014

REFERENCES:

1. Cloud computing for dummies- Judith Hurwitz , Robin Bloor , Marcia Kaufman ,Fern Halper, Wiley Publishing, Inc, 2010
2. Cloud Computing (Principles and Paradigms), Edited by Rajkumar Buyya, James Broberg, Andrzej Goscinski, John Wiley & Sons, Inc. 2011

3. James E. Smith, Ravi Nair, "Virtual Machines: Versatile Platforms for Systems and Processes", Elsevier/Morgan Kaufmann, 2005.

4. Tim Mather, Subra Kumaraswamy, and Shahed Latif, "Cloud Security and Privacy: an enterprise perspective on risks and compliance", O'Reilly Media, Inc., 2009.

WEBSITE REFERENCES :
1. https://www.cloudzero.com/blog/cloud-computing-tools
2. https://www.ibm.com/cloud/free?utm_content=SRCWW&p1=Search&p4=4370007 5080984306&p5=p&gclid=Cj0KCQjw7aqkBhDPARIsAKGa0oJ5hTJCgy9JVMAb DqxKyh0KbBCmHrqfm80UeIe4YAojIAJiw2ifDKEaAvkZEALw_wcB&gclsrc=aw .ds
3. https://www.knowledgehut.com/blog/cloud-computing/cloud-computing-tools
4. https://mindmajix.com/cloud-computing-tools
5. https://www.analyticssteps.com/blogs/top-cloud-computing-tools-market

CO-PO AND CO-PSO MAPPING:

CO/ PO,PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1	3	1	3	3	-	-	-	-	2	3	3	3	2	2
CO2	2	2	2	1	1	-	-	-	3	2	3	1	3	1
CO3	2	1	2	1	1	-	-	-	-	1	2	1	3	1
CO4	2	2	2	1	-	-	-	-	1	2	1	3	1	3
CO5	3	1	1	2	1	-	-	-	3	2	1	2	2	2
AVG	3	2	2	2	1				3	2	2	2	2	2

	INFRASTRUCTURE BUILD TOOL USING TERRAFORM	L	T	P	C
JAD1025		3	0	0	3

COURSE OBJECTIVES:
- To understand the principles and benefits of Infrastructure as Code.
- To gain proficiency in using Terraform as an infrastructure build tool.

- To learn to install and configure Terraform for various cloud providers.
- To develop the skills to write Terraform configurations to provision infrastructure resources.
- To acquire knowledge of advanced Terraform concepts like managing multiple environments and using plugins.

Prerequisite: Computer Networks, Cloud Computing

UNIT-I : INTRODUCTION TO INFRASTRUCTURE AS CODE AND TERRAFORM   9
Overview of Infrastructure as Code concepts - Introduction to Terraform and its benefits - Terraform ecosystem and components.

UNIT-II : TERRAFORM INSTALLATION AND CONFIGURATION   9
Installing Terraform on different platforms - Setting up the development environment - Configuring Terraform for various cloud providers.

UNIT-III : TERRAFORM BASICS   9
Understanding Terraform configuration files - Declaring and managing infrastructure resources - Working with variables and data types - Resource dependencies and ordering.

UNIT-IV : PROVISIONING INFRASTRUCTURE WITH TERRAFORM   9
Creating and managing AWS infrastructure with Terraform - Provisioning virtual machines, storage, and networking components - Leveraging Terraform modules for reusable infrastructure code - Handling Terraform state and remote backends.

UNIT-V : TERRAFORM ADVANCED CONCEPTS   9
Managing infrastructure across multiple environments: dev, staging, production - Using conditionals and loops in Terraform configurations - Terraform workspace and environment management - Terraform providers and plugins.

                                                        TOTAL: 45 HOURS
COURSE OUTCOMES:
At end of the course students will be able to:
    CO1 : Explain the concept of Infrastructure as Code and its significance.
    CO2 : Install and configure Terraform for infrastructure provisioning.
    CO3 : Write Terraform configurations to define and manage infrastructure resources.
    CO4 : Provision and manage infrastructure using Terraform across different cloud providers.
    CO5 : Apply advanced Terraform techniques such as managing multiple environments and utilizing plugins.

TEXT BOOKS:
1. Yevgeniy Brikman, "Terraform: Up & Running", O'Reilly Media, 2017.
2. Kief Morris, "Infrastructure as Code: Managing Servers in the Cloud", O'Reilly Media, 2016.

REFERENCES:

1. Stephane Jourdan, Thomas Peham, Eberhard Wolff, and Sergey Prysmak, "Infrastructure as Code Cookbook ", Packt Publishing, 2020.
2. Scott Winkler and Martin Atkins "Terraform in Action", Manning publications.
3. Mikael Krief , "Terraform Cookbook: Efficiently define, launch, and manage Infrastructure as Code across various cloud platforms", Packt Publishing, 2020.
4. vgeniy Brikman , "Terraform: Up & Running: Writing Infrastructure as Code", O'Reilly Media, 2nd Edition, 2019.

WEBSITE REFERENCES :

1. https://k21academy.com/terraform-iac/terraform-beginners-guide/
2. https://developer.hashicorp.com/terraform/tutorials/aws-get-started/infrastructure-as-code
3. https://developer.hashicorp.com/terraform/intro
4. https://www.youtube.com/watch?v=3J3wSzKVJ2A
5. https://www.azuredevopslabs.com/labs/vstsextend/terraform/

CO-PO AND CO-PSO MAPPING:

CO/ PO,PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1	3	2	1	3	2	2	1				2	3		
CO2	3	2	2	2	2	1	1				1	2		
CO3	2	2	2	3	3	1					2	2		
CO4	2	2	3	3	2	2	1				2	2		
CO5	2	2	3	3	2	2					2	2		
AVG	2.4	2	2.2	2.8	2.2	1.6	0.6	0	0	0	1.8	2.2		

IoT:Internet Of Things

PREREQUISTE: Python Programming, Computer Networks,Mobile Computing,Internet Of Things

JIT1036	INTERNET OF THINGS: ARCHITECTURE PROTOCOLS AND APPLICATIONS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:
- To Understand the Architectural Overview of IoT
- To Understand the IoT Reference Architecture and Real World Design Constraints
- To Understand the various IoT Protocols.
- To Understand various IoT transport & session layer protocols.
- To Understand various IoT service layer protocols and security

UNIT-I   :   OVERVIEW   9

IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations. M2M and IoT Technology Fundamentals- Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service(XaaS), M2M and IoT Analytics, Knowledge Management

UNIT-II: REFERENCE ARCHITECTURE   9

IoT Architecture-State of the Art – Introduction, State of the art, Reference Model and architecture, IoT reference Model - IoT Reference Architecture- Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views. Real-World Design Constraints- Introduction, Technical Design constraints-hardware is popular again, Data representation and visualization, Interaction and remote control.

UNIT-III : IOT DATA LINK LAYER & NETWORK LAYER PROTOCOLS   9

PHY/MAC Layer(3GPP MTC, IEEE 802.11, IEEE 802.15), Wireless HART, Z-Wave, Bluetooth Low Energy, Zigbee Smart Energy, DASH7 - Network Layer-IPv4, IPv6, 6LoWPAN,6TiSCH,ND, DHCP, ICMP, RPL, CORPL, CARP.

UNIT-IV :   TRANSPORT & SESSION LAYER PROTOCOLS   9

Transport Layer (TCP, MPTCP, UDP, DCCP, SCTP)-(TLS, DTLS) – Session   Layer HTTP,CoAP, XMPP, AMQP, MQTT

UNIT-V :   SERVICE LAYER PROTOCOLS & SECURITY   9

Service Layer -oneM2M, ETSI M2M, OMA, BBF – Security in IoT Protocols – MAC 802.15.4 ,6LoWPAN, RPL, Application Layer

TOTAL: 45 HOURS

COURSE OUTCOMES:
At end of the course students will be able to:
   CO1 : Describe the basic concept and architecture of IOT systems
   CO2 : Understand key skills employed in the IIoT & IoRT space building applications.
   CO3 : Analyze various IoT Comprehend IOT protocols
   CO4 : Analyze various IoT Comprehend IOT protocols
   CO5 : Analyze various IoT service layer protocols and security

TEXT BOOKS:
   1.JanHoller, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos,David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a NewAge of Intelligence", 1st Edition, Academic Press, 2014.

   2.Peter Waher, "Learning Internet of Things", PACKT publishing, BIRMINGHAM – MUMBAI

   3.Bernd Scholz-Reiter, Florian Michahelles, "Architecting the Internet of Things", ISBN978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer

REFERENCES:
   1.   Daniel Minoli, "Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications", ISBN: 978-1-118-47347-4, Willy Publications

   2.   Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-on Approach)",1stEdition, VPT, 2014

WEBSITE REFERENCES:
   1.   http://www.cse.wustl.edu/~jain/cse570-15/ftp/iot_prot/index.html
   2.https://www.hindawi.com/journals/jece/2017/9324035
   3.   https://www.sciencedirect.com/science/article/pii/B9780128205815000134

CO-PO AND CO-PSO MAPPING:

CO/ PO,PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3		1	1							
CO2	3	2	3	3		1	1							
CO3	3	3	2	3		2	2							
CO4	3	3	3	2		2	2							
CO5	3	2	2	2		2	2							
AVG	3	3	3	3		2	2							

		L	T	P	C
JIT1037	**PROGRAMMING FOR IOT BOARDS**	**3**	**0**	**0**	**3**

COURSE OBJECTIVES:
- To introduce Internet of Things (IoT) environment and its technologies for designing smart systems
- To explore open-source computer hardware/software platform, development and debugging environment, programming constructs and necessary libraries
- To learn embedded programming constructs and real time systems
- To understand various options in programming languages
- To test, debug, and deploy and to solve real world problems.

UNIT-I   :   INTRODUCTION TO IOT BOARDS   9

IoT- Introduction and Characteristics, Things, Architecture, Enabling Technologies, Challenges,

Levels - Environment -board, IDE, shields; Programming - syntax, variables, types, operators,

constructs and functions; sketch - skeleton, compile and upload, accessing pins; debugging -

UART communicationprotocol and serial library

UNIT-II   :   INTERFACING WITH IOT BOARDS   9

Circuits - design, wiring, passive components; sensors and actuators, interfacing, read and write;

software libraries to handle complicated hardware; shields, interfacing and libraries

UNIT-III   : Single Board Computers and Python Interfacing   9

Board schematic, setup, configure and use, OS implications; linux - basics, file system and processes, shell CLI, GUI; python - basics, API's RPi.GPIO, PWM library to access pins, Tkinter Networking - Internet Connectivity, Standard Internet Protocols, MQTT, CoAP, Networking Socket Interface; Cloud - Public APIs and SDK's for accessing cloud services, Twitter API using Twython package; Interfacing - sensors and actuators, Pi Camera, Servo, A/D, D/A

UNIT-IV   :Embedded Programming and RTOS   9

MCU - GPIO, WDT, timers/counters, IO, A/D, D/A, PWM, Interrupts, Memory, serial communicationUART, I2C, SPI, Peripheral Interfacing OS - basics, types, tasks, process, threads

(POSIX Threads),thread preemption, Preemptive Task Scheduling Policies, Priority Inversion, Task communication, Task Synchronization issues - racing and deadlock, binary and counting semaphores(Mutexexample),choosingRTOS

UNIT-V :Real World Projects   9

IoT Integrated Primary Health Care, Large Scale Face Detection by AI Powered Street Lights, Cloud IoT Systems for Smart Agriculture, Smart Home Gadgets, Autonomous Car Features – speed and horn intensity control.

TOTAL: 45 HOURS

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

CO1 : Understand basic circuits, sensors and interfacing, data conversion process and shield libraries to interface with the real world

CO2 : Program SBC for practical IoT devices using Python

CO3 : Explore protocols, data conversion process, Api and expansion boards for real world interaction

CO4 : Learn embedded programming constructs and constraints real time systems

CO5 : Illustrate IoT prototyping for real world socio-economic problems

TEXT BOOKS:
1.   Yamanoor, Sai, and Srihari Yamanoor. Python Programming with Raspberry Pi, 1st edition, Packt Publishing Ltd, 2017.
2. Donald Norris, The Internet of Things: Do-It-Yourself Projects with Arduino, Raspberry Pi, and BeagleBone Black, 1st edition,McGraw Hill Education, 2015

REFERENCES:
   1. Marco Schwartz, Home Automation with Arduino, 3rd edition, Open Home Automation 2014.

  2.Schwartz, Marco. Internet of things with arduino cookbook, 1st edition, Packt Publishing Ltd,2016.

3. Kooijman, Matthijs. Building Wireless Sensor Networks Using Arduino, 1st edition, Packt Publishing Ltd, 2015.

WEBSITE REFERENCES :

1. https://elearn.nptel.ac.in/shop/iit-workshops/completed/lab-workshop-on-internet-of-things-iot/
2. https://ict.iitk.ac.in/courses/learn-iot-through-arduino-and-raspberry-pi/
3. https://onlinecourses.swayam2.ac.in/arp20_ap03/preview

CO-PO AND CO-PSO MAPPING:

CO/ PO,PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2				3									
CO2	3													
CO3	3		3	3										
CO4	3													
CO5		3												
AVG	3	3	3	3	3									

JIT1038	INDUSTRIAL IoT 4.0	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:
*   To develop knowledge in Industrial Internet of Things (IIoT) fundamentals.

*   To understand the architecture, IOT and its protocols

*   To Understand the various data analytics techniques

*   To Understand the CPS for Industry 4.0

*   To provide students with a good depth of knowledge of Designing Industrial IOT Systems for various applications

UNIT-I :   Industrial IOT Introduction   9

Introduction to IOT, IOT Vs. IIOT, History of IIOT, Components of IIOT - Sensors and Actuators for Industrial Processes, Role of IIOT in Manufacturing Processes. Challenges & Benefits in implementing IIOT**.**

UNIT-II: IIoT Architecture   9

Industrial IoT: Business Model and Reference Architecture: IIoT-Business Models, Industrial IoT-Layers: IIoT Sensing, IIoT Processing, IIoT Communication, IIoT Networking

UNIT-III : IIOT ANALYTICS   9

Big Data Analytics and Software Defined Networks, Machine Learning and Data Science, Julia Programming, Data Management with Hadoop.

UNIT-IV : Industrial IoT: CYBER PHYSICAL SYSTEM   9

Introduction to Cyber Physical Systems (CPS), Architecture of CPS- Components, Data science and technology for CPS, Emerging applications in CPS in different fields. Case study: Application of CPS in health care domain.

UNIT-V : Industrial IoT- Application Domains   9

Industrial IoT- Application Domains: Healthcare, Power Plants, Inventory Management & Quality Control, Plant Safety and Security (Including AR and VR safety applications), Facility Management.

TOTAL: 45 HOURS

COURSE OUTCOMES:
At end of the course students will be able to:
   CO1 : To understand the basics of industrial IoT (IIoT).
   CO2 : To develop various applications using IIOT architectures
   CO3 : Recognize the uses of cloud computing and data analytics
   CO4 : Analyze privacy and security measures for industry standard solutions
   CO5 : Design and implement IOT applications that manage various technology

TEXT BOOKS:
   1. Veneri, Giacomo, and Antonio Capasso- Hands-on Industrial Internet of Things: Create a Powerful Industrial IoT Infrastructure Using Industry 4.0, 1stEd., Packt Publishing Ltd,2018
   2. Alasdair Gilchrist- Industry 4.0: The Industrial Internet of Things, 1st Ed., Apress, 2017

REFERENCES:
   1. Alasdair Gilchrist, Industry 4.0: The Industrial Internet of Things, 1st Edition, Apress, 2017
   2. Aboul Ella Hassanien, Nilanjan Dey and Sureaka Boara, Medical Big Data and Internet of Medical Things: Advances, Challenges and Applications, 1st edition, CRC Press, 2019.

WEBSITE REFERENCES :
   1.   https://onlinecourses.nptel.ac.in/noc22_cs52/preview
   2. https://www.coursera.org/specializations/developing-industrial-iot#courses
   3. https://www.coursera.org/learn/industrial-internet-of-things.
   4. https://www.coursera.org/learn/internet-of-things-sensing-actuation

CO-PO AND CO-PSO MAPPING:

CO/ PO,PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2													
CO2	3													
CO3	3		3											
CO4	3													
CO5		3												
AVG	3	3	3											

JIT1039	IoT in HealthCare	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:
- To design products related to IoT based Health care applications
- To Understand and design multidisciplinary approach for design, development,
- To simulate, and implement IoT health care systems.
- To Apply the monitored health parameter sensor output data for further computing, analyzation and visualization.
- To Identify and summarize remote health monitoring and Tele-health.

UNIT-I   :   INTRODUCTION TO IOT BASED HEALTH CARE   9

Introduction to IoT applications in smart healthcare& their distinctive advantages - Patient Health Monitoring System (PHMS), Tele-Health, TeleMedicine, Tele-Monitoring, Mobile Health Things (m-health).

UNIT-II: IOT SMART SENSING HEATH CARE AND POWER CHALLENGE   9

Concept of Generic Biomedical sensors, Smart Sensors: Monitor health parameters, Wearable ECG sensors, IoT Data Acquisition System, Energy harvesting, Battery based systems, Power management.

UNIT-III   : INTERNET OF MEDICAL THINGS   9

Data Confidentially, Data Integrity, Data Protection, Security awareness, Emergent threats: Autonomous, IoT heterogeneity and ubiquity, Physical environment.

UNIT-IV   SECURITY AND PRIVACY   9

Security, Privacy and Ethical Issues Smart Health and well-being Applications Risk Analysis Cyber-Physical-Social Systems, Machine Ethics, Physical Safety Software Quality, IT Security, Privacy, Risk of Technology Misuse

UNIT-V :   WEARABLE TECHNOLOGIES – CASE STUDIES   9

Soft Skin simulation for Wearable Haptic Rendering, Design Challenges for real wearable computers, Collaboration with wearable computers. IoT Based Contactless Body Temperature Monitor.

TOTAL: 45 HOURS

COURSE OUTCOMES:

At end of the course students will be able to:

CO1 : Understand and design multidisciplinary approach for design, development, simulation, and implementation of IoT health care systems.

CO2 : Apply the monitored health parameter sensor output data for further computing,analyzation and visualization.

CO3 : Identify and summarize remote health monitoring and Tele-health

CO4 : Elaborate security, privacy and ethical issues in smart sensor health and well-being application

CO5 : Learn about the requirement's to design Frameworks for Wearable Computing

TEXT BOOKS:
1. Dac-Nhuong Le," Emerging Technologies for Health and Medicine: Virtual Reality, Augmented Reality, Artificial Intelligence, Internet of Things,Robotics, Industry 4.0," Wiley, 2019
2. S. Misra, A. Mukherjee, and A. Roy "Introduction to IoT". CambridgeUniversity Press, 2017

REFERENCES:
1.   Qusay F. Hassan " Internet of Things A to Z Technologies and Applications,
2. Intelligent Data Sensing and Processing for Health and Well-being Applications, Miguel Antonio Wister Ovando, Pablo Pancardo Garcia,Francisco Diego Acosta Escalante, Jose Adan Hernandez Nolasco
3. Vankamamidi S. Naresh1,Suryateja S. Pericherla,Pilla Sita Rama Murty,SivaranjaniReddi, "Internet of Things in Healthcare: Architecture, Applications, Challenges, and Solutions",International Journal of Computer Systems Science &Engineering,vol 35 no 6 November 2020

WEBSITE REFERENCES :

1. **https://www.udemy.com/course/iot-based-emergency-health-care-system**
2. **https://skill-lync.com/medical-technology-courses/iot-healthcare**

CO-PO AND CO-PSO MAPPING:

CO/ PO,PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2													
CO2	3													
CO3	3		3											
CO4	3													
CO5		3												
AVG	3	3	3											

JIT1040	Robotics in IOT	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:
- To learn basics of Internet of Things (IoT), and its execution using multiple robotic sensors
- To understand Internet of Robotic Things (IoRT) and its various implementations in industry and automation
- To implement IoT and Robotics application in autonomous driving and health care
- To Learn the design and analysis of Industry 4.0 systems for Energy and smart vehicular applications.
- To understand the Cloud Robotics and Industrial Automation

UNIT-I : Introduction to IoT and Vision systems 9

History and evolution of IoT, AI, ML, Machine Vision, optoelectronic sensors, 3D & 2D machine vision technologies, robot navigation, control schemes, motion controllers, intelligent algorithms and vision systems.

UNIT-II: Robotic Sensors 9

Optical sensors and actuators; Mechanical sensors and actuators; Acoustic sensors and actuators; Performance characteristics of sensors and actuators.

UNIT-III : Internet of Robotic Things 9

Communication architecture for IoRT; Decentralized and automated IoT infrastructure using Blockchain; IoRT Platforms Architecture, IoRT applications

UNIT-IV   :Autonomous Vehicle Systems   9

Introduction to Autonomous Driving; Perception in Autonomous Driving; Robot Operating System (ROS) Overview - Client Systems for Autonomous Driving - Decision planning and control in autonomous vehicle systems - Cloud Platform for Autonomous Driving.

UNIT-V   : Cloud Robotics and Industrial Automation   9

IoMT and Robotics in Healthcare IoMT Driven connected healthcare, Efficient design for IoMT based healthcare design, Robotics in healthcare, Components of Cloud Robotics; Limitations and challenges of Cloud Robotics; Applications:Autonomous mobile robots, Cloud medical robots, Industrial robots.

TOTAL: 45 HOURS

COURSE OUTCOMES:
At end of the course students will be able to:
    CO1 : Understand IoT ecosystem in robotic paradigm

    CO2 : Analyze IoT infrastructure and develop IoRT applications

    CO3 : Apply IoT in robotics over different platforms

    CO4 : Implement Cloud robotics in automations

    CO5 : Implement automated applications using multiple robotic sensors

TEXT BOOKS:
1. Vermesan, Ovidiu, and Joël Bacquet, eds.,Cognitive Hyperconnected Digital Transformation: Internet of Things Intelligence Evolution, 1st edition, River Publishers, 2017.
2. A.K.Gupta, S.K.Arora, and J.Riescher, Industrial Automation and Robotics, 1st edition

,   Mercury Learning and Information LLC,2017

REFERENCES:
1. A.K Dubey, A.Kumar, and S.R Kumar., AI and IoT-based Intelligent Automation in

Robotics, 1st edition. Wiley, 2020

2. . A.E.Hassanien, N.Dey, and S.Borra, Medical Big Data and Internet of Medical Things:

Advances, Challenges and Applications, 1st edition ,Taylor & Francis Group,2019

3. S.Liu, L.Li and J.Tang, Creating Autonomous Vehicle Systems, Synthesis Lectures on

Computer Science, 1st edition ,Morgan & Claypool,2018

4. Nathan Ida, Sensors, Actuators, and Their Interfaces: A multidisciplinary introduction, 2nd

edition The Institution of Engineering and Technology, 2017

WEBSITE REFERENCES :

1. **https://www.udemy.com/course/iot-robotics-hacking-nodemcu/**

CO-PO AND CO-PSO MAPPING:

CO/ PO,PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3		2	2	2						
CO2	3	3	3	3										
CO3	3	3	3	3		1	1	1						
CO4	3	3	3	3		1	1	1						
CO5	3	3	3	3										
AVG	3	3	3	3		2	2	2						

JIT1041	MOBILE APPLICATION DEVELOPMENT FOR IOT	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

*   To understand the mobile application development for Internet of Things (IoT) devices
*   To deploy various components of mobile devices and essential sensors for various application
*   To understand   architectures and models used in Mobile
*   To understand   analytics and security aspects of mobile applications in IoT platforms
*   To apply the technologies for low power wireless devices.

UNIT-I : INTRODUCTION TO IOT ECOSYSTEM   9

IoT ecosystem; Industry 4.0; Application development platforms for IoT; IoT Data sources

UNIT-II: SENSOR FOR MOBILE AND HANDHELD DEVICES   9

Temperature sensors, Proximity sensor, IR sensors, Image sensors, Motion detection sensors, Accelerometer sensors, Gyroscope sensors, Optical sensors

UNIT-III: SENSOR DATA PROCESSING   9

Sensor Data-Gathering and Data-Dissemination Mechanisms; Sensor Database system architecture; Sensor data-fusion mechanisms; Data-fusion Architectures and models

UNIT-IV: PROGRAMMING FRAMEWORKS FOR INTERNET OF THINGS   9

 IoT Programming Approaches: Node-Centric Programming - Database approach - ModelDriven Development - IoT Programming Frameworks: Android Things - ThingSpeak - IoTivity - Node-RED - DeviceHive - Contiki and Cooja – Zetta

UNIT-V: COMMUNICATION TECHNOLOGIES FOR LOW POWER WIRELESS INTERACTIONS   9

Wireless communications in product development – Bluetooth LE - Near Field Communications (NFC) – WiFi; Prototyping Bluetooth LE with Arduino Nano; Power management strategies and practices Case Study

TOTAL: 45 HOURS

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

CO1 : Outlines a fundamental full stack architecture for IoT
CO2 : Describes various development technologies in each IoT layer
CO3 : Develops IoT applications using standardized hardware and software platforms.
CO4 : Creates prototype using low power communication technologies.
CO5 : Explains IoT solution development from Product management perspective

TEXT BOOKS:
 1. Kale, Vivek. Parallel Computing Architectures and APIs: IoT Big Data Stream Processing1st edition, CRC Press, 2019.
2. Lea, Perry. Internet of Things for Architects: Architecting IoT solutions by implementing sensors, communication infrastructure, edge computing, analytics, and security, 1st edition,Packt Publishing Ltd, 2018.

REFERENCES:
   1. 1. Fadi Al-Turjman, Intelligence in IoT-enabled Smart Cities, 1st edition, CRC Press,2019
   2. Giacomo Veneri, and Antonio Capasso, Hands-on Industrial Internet of Things: Create a powerful industrial IoT infrastructure using Industry 4.0, 1 st edition, Packt Publishing,2018
WEBSITE REFERENCES :
   1. **https://www.silabs.com/support/training/app-103-mobile-app-development-for-iot**
   2. **https://www.classcentral.com/course/mobile-development-in-iot-73972**

CO-PO AND CO-PSO MAPPING:

CO/ PO,PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3		2	2	2	3	3	3	3
CO2	3	3	3	3					3	3	3	3
CO3	3	3	3	3		1	1	1	3	3	3	3
CO4	3	3	3	3		1	1	1	3	3	3	3
CO5	3	3	3	3					3	3	3	3
AVG	3	3	3	3		2	2	2	3	3	3	3

JIT1042	COGNITIVE IOT	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To Introduce cloud computing and enabling technologies
- To Explore the need for fog and edge computation
- To Impart the knowledge to log the sensor data and to perform further data analytics
- Impart the knowledge to log the sensor data and to perform further data analytics
- Make the students to apply Internet of Things (IoT) data for business solution in various domain in secured manner

UNIT-I : Cognitive IoT – Introduction   9

Cognitive IoT, Need for Cognitive IoT, Current and Future trends of IoT, Cognitive computing and applications. Data Analytics for IoT Regression, Data Analytics for IoT ANN Classification, Data Analytics for IoT Modern DNN's

UNIT-II: Secure Fog-Cloud of Things   9

Secure Fog-Cloud of Things: Architectures, Opportunities &Challenges IoT Architecture and Core IoT, Collaborative and Integrated Edge Security Architecture, A connected ecosystem, Threat and security in IoT.

UNIT-III : GPU Architecture   9

Introduction to GPU's Parallel programming for GPU, Parallel programming in CUDA, CNN

Inference in GPU, CNN Training in GPU. FPGA for Internet of Things Benefits of FPGA, Interfacing FPGAs with IoT-based edge devices, IoT-FPGA based applications, Microsemi's SmartFusion2 SoC FPGA.

UNIT-IV :   IoT Enabling Technologies and Devices   **9**

Big data, Digital twin, Cloud Computing, Sensors, Communications, Analytical software, Edge

Devices.

UNIT-V :   Security in Cognitive IoT   **9**

Security in Cognitive IoT, Security Issues in IoT, A hardware assisted approach for security,
Architectural level overview for providing security, Security threats.IoT and Edge Security, Physical
and hardware security, Shell security, Cryptography, Software-Defined Perimeter, Blockchains and
cryptocurrencies in IoT, Government regulations and intervention.

TOTAL: 45 HOURS

COURSE OUTCOMES:
At end of the course students will be able to:
   CO1 : Integrate the aspects of human cognitive processes in the system design
   CO2 : Comprehend the underlying cognitive process can have many abstractions of a cognitive
   cycle such as 'Sense', 'Understand', 'Decide' and 'Act'.
   CO3 : Detect any failures of system components and re-configure itself which provides a graceful
   degradation through self-healing.
   CO4 : Accomplish knowledge about the application, system architecture, resources, system state
   and behavior.
   CO5 : Analyze security issues in IoT applications

TEXT BOOKS:
   1. Matin, Mohammad Abdul, ed. Towards Cognitive IoT Networks, 1st edition ,Springer
       International Publishing, 2020.
     2."IoT and Edge Computing for Architects" Perry Lea,"-second edition, Packt, March,2020.
     3."Secure EdgeComputing: Applications, Techniques and Challenges", Mohiuddin Ahmed
        (Editor), Paul Haskell-Dowland (Editor), CRC press, first edition, August 2021.

REFERENCES:
   1. Alessandro Bassi, Martin Bauer, Martin Fiedler, Thorsten Kramp, Rob van Kranenburg,
      Sebastian Lange and Stefan Meissner, Enabling things to talk –Designing IoT solutions with
      the IoT Architecture Reference Model, 1st edition ,Springer Open, 2016
   2. John Mutumba Bilay, Peter Gutsche, Mandy Krimmel and Volker Stiehl, SAP Cloud
      Platform Integration: The Comprehensive Guide, 2nd edition, Rheinwerg publishing.2019.

3. Mahalle, Parikshit Narendra, and Poonam N. Railkar, Identity management for internet of things, 1st edition , River Publishers, 2015.

WEBSITE REFERENCES :
1.   https://learn.microsoft.com/en-us/training/modules/run-cognitive-services-iot-edge/

CO-PO AND CO-PSO MAPPING:

CO/ PO,PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3		2	2	2						
CO2	3	3	3	3										
CO3	3	3	3	3		1	1	1						
CO4	3	3	3	3		1	1	1						
CO5	3	3	3	3										
AVG	3	3	3	3		2	2	2						

JIT1043	**PRIVACY SECURITY FOR IoT**	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To Realize IoT security requirements and management tools
- To know the state-of-the-art methodologies in Cyber Physical system.
- To impart knowledge on Model threats and countermeasures.
- To explore the Privacy Preservation and Trust Models in Internet of Things (IoT)
- To apply the concept of Internet of Things Security in the real world scenarios

UNIT-I : INTRODUCTION: SECURING THE INTERNET OF THINGS   9

Introduction – Security Requirements in IoT architectures – Security in Enabling

Technologies – IoT Security Life Cycle – Cryptographic Fundamentals for IoT Security

Engineering - Security Concerns in IoT Applications – Basic Security Practices.

UNIT-II: SECURITY ARCHITECTURE IN THE INTERNET OF THINGS   9

Introduction – Security Requirements in IoT – Insufficient Authentication/Authorization –

Insecure Access Control – Threads to Access Control, Privacy, and Availability – Attacks

Specific to IoT – Malware Propagation and Control in Internet of Things**.**

UNIT-III : PRIVACY PRESERVATION   **9**

Privacy Preservation Data Dissemination - Privacy Preservation for IoT used in SmartBuilding – Exploiting Mobility Social Features for Location Privacy Enhancement in Internet of Vehicles – Lightweight and Robust Schemes for Privacy Protection in Key personal IOT Applications: Mobile WBSN and Participatory Sensing.

UNIT-IV :TRUST, AUTHENTICATION AND DATA SECURITY   **9**

Trust and Trust Models for IoT – Emerging Architecture Model for IoT Security and Privacy – preventing Unauthorized Access to Sensor Data – Authentication in IoT – Computational Security for the IoT – Secure Path Generation Scheme for real-Time Green IoT – Security Protocols for IoT Access Networks

UNIT-V: SOCIAL AWARENESS AND CASE STUDIES   **9**

User Centric Decentralized Governance Framework for Privacy and Trust in IoT – Policy Based Approach for Informed Consent in IoT - Security and Impact of the IoT on Mobile Networks – Security Concerns in Social IoT – Security for IoT Based Healthcare – Smart cities.

                                                                    TOTAL: 45 HOURS

COURSE OUTCOMES:
At end of the course students will be able to:
   CO1 : Describe the basics of securing Internet of Things.
   CO2 : Explain architecture and threats in IoT.
   CO3 : Analyze various privacy schemes related to IoT
   CO4 : Describe the authentication mechanisms for IoT security and privacy.
   CO5 : Explain security issues for various applications using case studies

TEXT BOOKS:
 1. Shancang Li, Li Da Xu, "Securing the Internet of Things," Syngress (Elsevier)

publication, 2017, ISBN: 978-0-12-804458-2.

 2. Fei Hu, "Security and Privacy in Internet of Things (IoTs): Models, Algorithms, and

Implementations," CRC Press (Taylor & Francis Group), 2016, ISBN:978-1-4987- 23190.

3. Arshdeep Bahga, Vijay Madisetti, "Internet of Things – A Hands-on approach," VPT

Publishers, 2014, ISBN: 978-0996025515.

REFERENCES:
1. Alasdair Gilchris, "Iot Security Issues," Walter de Gruyter GmbH & Co, 2017.
2. Sridipta Misra, Muthucumaru Maheswaran, Salman Hashmi, "Security Challenges and

Approaches in Internet of Things," Springer, 2016. 6. Brian Russell, Drew Van Duren,

"Practical Internet of Things Security," Packet Publishing Ltd, 2016.

WEBSITE REFERENCES :
1. https://onlinecourses.nptel.ac.in/noc22_cs23/preview
2. https://www.coursera.org/lecture/m2m-iot-interface-design-embedded-systems/iot-ecurity/

CO-PO AND CO-PSO MAPPING:

CO/ PO,PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	2	-	3	1	-	-	2	2
CO2	3	3	3	2	2	-	-	1	1	2	3	2
CO3	3	3	2	3	1	-	-	1	-	1	2	2
CO4	3	3	3	2	2	-	-	1	1	2	3	2
CO5	3	3	3	3	2	1	1	2	-	2	2	2
AVG	3	3	3	2.0	2	-	2	1	1	2	2	2

CYBER SECURITY

JCB1402	FOUNDATION OF CYBER SECURITY	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES
- To understand the difference between threat, risk, attack, and vulnerability.
- To learn about security in operating system and networks.
- To analyze the different security available in databases.
- To understand the concept of privacy and security in emerging technologies.
- To learn about management and risks in different technologies.

PREREQUISITE:
- Computer Programming
- Computer Networks

UNIT-I INTRODUCTION TO CYBER SECURITY   9
Introduction -Computer Security - Threats -Harm - Vulnerabilities - Controls - Authentication - Access Control and Cryptography –Web-User Side - Browser Attacks - Web Attacks Targeting Users - Obtaining User or Website Data - Email Attacks

UNIT-II SECURITY IN OPERATING SYSTEM & NETWORKS   9
Security in Operating Systems - Security in the Design of Operating Systems – Root kit - Network security attack- Threats to Network Communications - Wireless Network Security - Denial of Service - Distributed Denial-of-Service.

UNIT-III DEFENCES SECURITY COUNTER MEASURES   9
Cryptography in Network Security - Firewalls - Intrusion Detection and Prevention Systems - Network Management - Databases - Security Requirements of Databases - Reliability and Integrity - Database Disclosure - Data Mining and Big Data.

UNIT-IV PRIVACY IN CYBERSPACE   9
Privacy concepts –privacy principles and policies -authentication and privacy-Data mining – privacy on the Web - email Security - privacy Impacts of Emerging Technologies - where the Field Is Headed.

UNIT-V MANAGEMENT AND INCIDENTS   9
Security Planning - Business Continuity Planning - Handling Incidents - Risk Analysis - Dealing with Disaster - Emerging Technologies - The Internet of Things - Economics - Electronic Voting - Cyber Warfare- Cyberspace and the Law - International Laws - Cyber crime - Cyber Warfare and Home Land Security.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Classify various types of attacks and learn the tools to launch the attacks
- Apply various tools to perform information gathering
- Analyze intrusion techniques to detect intrusion
- Apply intrusion prevention techniques to prevent intrusion
- Explain the basics of cyber security, cyber crime and cyber law

TEXT BOOKS:

1. Charles P. Pfleeger Shari Lawrence Pfleeger Jonathan Margulies, Security in Computing, 5th Edition, Pearson Education, 2015.
2. David Kim & Michael G. Solomon, "FOUNDATIONS" and Custom Edition 1 Jan 1, 2014.

REFERENCES:

1. George K.Kostopoulous, Cyber Space and Cyber Security, CRC Press, 2013.
2. MarttiLehto, PekkaNeittaanmäki, Cyber Security: Analytics, Technology and Automation edited, Springer International Publishing Switzerland 2015
3. Nelson Phillips and EnfingerSteuart, ―Computer Forensics and Investigations‖, Cengage Learning, New Delhi, 2009.

WEB REFERENCES:

- https://onlinecourses.nptel.ac.in/noc23_cs62/preview
- https://onlinecourses.nptel.ac.in/noc23_cs44/preview
- https://www.javatpoint.com/cyber-security-tutorial
- https://www.edureka.co/blog/cybersecurity-fundamentals-introduction-to-cybersecurity/
- https://cnitarot.github.io/courses/fc_Fall_2022/2550_intro_history_pub_cnr.pdf

CO-PO MAPPINGS:

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

JCB1403	CRYPTOGRAPHY AND CRYPTANALYSIS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To study about the fundamentals of Cryptography
- To analyze Key Management techniques and importance of number Theory
- To understand the concept of Message Authentication Codes and Hash Functions
- To design a security solution for a given application
- To understand about cyber crimes and the different security practice.

PREREQUISITE:

- Fundamentals of Mathematics

UNIT-I INTRODUCTION TO CRYPTOGRAPHY   9

Number theory – Algebraic Structures – Modular Arithmetic - Euclid's algorithm – Congruence and matrices – Group, Rings, Fields, Finite Fields-Symmetric Key Ciphers- SDES – Block Ciphers – DES – Strength of DES – Differential and linear cryptanalysis – Block cipher design principles – Block cipher mode of operation – Evaluation criteria for AES – Pseudorandom Number Generators – RC4 – Key distribution.

UNIT-II ASYMMETRIC CRYPTOGRAPHY   9

Primes – Primality Testing – Factorization – Euler's totient function, Fermat's and Euler's Theorem – Chinese Remainder Theorem – Exponentiation and logarithm-Asymmetric Key Ciphers - RSA cryptosystem – Key distribution – Key management – Diffie Hellman key exchange – Elliptic curve arithmetic – Elliptic curve cryptography.

UNIT-III MESSAGE AUTHENTICATION AND HASH FUNCTION   9

Authentication Requirements - Authentication Function- Message Authentication Codes - Hash Functions - Security of Hash Functions and MACs- Secure Hash Algorithm - Whirlpool, HMAC, CMAC -Digital Signatures - Authentication Protocol - Digital Signature Standard- Authentication Applications- Kerberos -X.509 Authentication Service - Public-key infrastructure

UNIT-IV FIREWALLS AND CRYPTANALYSIS   9

Intruder – Intrusion detection system -Password Management-Virus and related threats- Countermeasures- Firewall design principles- Trusted systems -Practical implementation of cryptography and security

UNIT-V CYBER CRIMES AND SECURITY   9

Cyber Crime and Information Security – classifications of Cyber Crimes – Tools and Methods – Password

Cracking, Keyloggers, Spywares, SQL Injection – Network Access Control – Cloud Security – Web Security – Wireless Security

TOTAL: 45 PERIODS

COURSE OUTCOMES:
At the end of the course, the student should be able to:
- Understand the fundamentals of networks security
- Demonstrate the different cryptographic operations of symmetric cryptographic algorithms
- Develop the different cryptographic operations of public key cryptography.
- Explain the various Authentication schemes to simulate different applications.
- Understand various cyber-crimes and cyber security.

TEXT BOOKS:
1. Forouzan Mukhopadhyay "Cryptography and Network Security" McGraw Hill, 2nd Edition
2. William Stallings, "Cryptography and Network Security - Principles and Practice", Seventh Edition, Pearson Education, 2017.
3. Nina Godbole, Sunit Belapure, "Cyber Security: Understanding Cyber-crimes, Computer Forensics and Legal Perspectives", First Edition, Wiley India, 2011.

REFERENCES:
1. Behrouz A. Forouzan, DebdeepMukhopadhyay, "Cryptography and Network Security", 3rd Edition, Tata McGraw Hill, 2015.
2. Charles Pfleeger, Shari Pfleeger, Jonathan Margulies, "Security in Computing", Fifth Edition, Prentice Hall, New Delhi, 2015.

WEB REFERENCES:
- https://www.w3.org/TR/WebCryptoAPI/
- https://ukdiss.com/examples/web-based-crypto-analysis-learning-application.php
- https://developer.mozilla.org/en-US/docs/Web/API/Web_Crypto_API
- https://www.garykessler.net/library/crypto.html
- https://www.cryptomathic.com/news-events/blog/summary-of-cryptographic-algorithms-according-to-nist

CO-PO MAPPINGS:

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

		L	T	P	C
JCB1501	**CYBER FORENSICS**	**3**	**0**	**0**	**3**

COURSE OBJECTIVES
- To understand the process of Digital Cyber Forensics.
- To be aware of the Cyber forensics Environments and standards.
- To study the data and evidence collection activities.
- To understand how to investigate digital evidence.
- To Explore advanced techniques in Cyber Forensics.

PREREQUISITE:
- Cryptography and Cryptanalysis

UNIT-I DIGITAL FORENSICS PROCESS   9
Computer forensic fundamentals - Applying forensic science to computers - Computer forensic services - Benefits of professional forensic methodology -Steps taken by computer forensic specialists, Forensic science, Digital forensics, Digital evidence, Digital forensics process – Identification, Collection, Examination, Analysis, Presentation Phases, Cyber Crime Law.

UNIT-II FORENSICS ENVIRONMENTS & STANDARDS   9
Hardware and software environments – Storage devices - Operating system - File Systems – Metadata - Locating evidence in file systems - Password security – Encryption - Hidden files - Digital evidence.

UNIT-III DATA AND EVIDENCE COLLECTION   9
Identification of Data: timekeeping - Forensic identification - Analysis of technical surveillance devices - Reconstructing past events - Useable file formats - Unusable file formats - Converting files - Investigating network intrusions - Cyber crime - Network forensics - Investigating logs - Network.

UNIT-IV INVESTIGATING DIGITAL EVIDENCE   9
Applying forensic Science to computers – Preparation – Survey – Documentation – Preservation – examination – Reconstruction - Analyzing digital evidence - Locating digital evidence, Categorizing files - Eliminating superfluous files - Event analysis tool - Cloud analysis tool - Lead analysis tool - Volume shadow copy analysis tools.

UNIT-V ADVANCED CYBER FORENSICS   9
Windows forensics evidence collection in linux - Network forensics packet capture using wire shark, t shark and tcp dump - Memory forensics virtual machine- Forensics use - Implementation

-Virtual machines in forensic analysis- Cloud forensics analysis -Cloud storage - Data remnants.

TOTAL: 45 PERIODS

COURSE OUTCOMES:
At the end of the course, the student should be able to:
- Identify the need for cybercrime forensics.
- Examine the hardware, software components and standards responsible for seeking evidence.
- Apply techniques for collecting data and evidences.
- Analyze the methods for investigating digital evidences
- Examine advanced techniques for Cyber Forensics.

TEXT BOOKS:
1. Richard Boddingtons, Practical Digital Forensics, PACKT publishing, First Edition, 2016 ANDRÉ ÅRNES.
2. Marjie T.Britz, Computer Forensics and Cyber Crime: An Introduction, Third Edition, Prentice Hall, 2013

REFERENCES:
1. Richard E.Smith, "Internet Cryptography", Third Edition, Pearson Education, 2008
2. Angus M.Marshall, "Digital forensics: Digital evidence in criminal investigation", John – Wiley and Sons, 2008.
3. John R.Vacca, "Computer Forensic"s, Second Edition, Cengage Learning, 2005.
4. John R. Vacca, Charles River Media "Computer Forensics: Computer Crime Scene Investigation", 2nd Edition, , 2005

WEB REFERENCES:
- https://annamalaiuniversity.ac.in/studport/download/engg/it/resources/Cyber%20Forensics.pdf
- https://www.stannescet.ac.in/cms/staff/qbank/CSE/Notes/CS6004-CYBER%20FORENSICS-1800235714-CS6004%20UNIT%203.pdf
- https://www.geeksforgeeks.org/cyber-forensics/
- https://www.studocu.com/in/document/dr-babasaheb-ambedkar-marathwada-university/cyber-forensic/cyber-forensics-lecture-notes/34989994
- https://www.studocu.com/in/document/kannur-university/network-forensics/cyber-forensics-unit1/17233533

CO-PO MAPPINGS:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	2	-	1	3	-	2	1	3	-	3	1	3
CO-2	1	1	1	-	2	-	2	-	2	-	2	-
CO-3	-	2	1	1	3	-	1	2	3	2	-	2
CO-4	2	1	2	2	2	-	1	2	1	-	3	-
CO-5	2	1	2	2	3	3	1	3	1	-	2	-

JCB1502	INTRUSION DETECTION SYSTEM	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To understand basic concepts of intrusion detection system.
- To learn about Intrusion Prevention Systems, Network IDs protocol and model for intrusion analysis.
- To analyze intrusion detection alerts and logs to distinguish attack types from false alarms
- To understand Intrusion Prevention Systems, Network IDs protocol and model for intrusion analysis.
- To learn agent development for intrusion detection and architectural models of IDs and IPs.

PREREQUISITE:

- Foundations of Cyber Security

UNIT-I INTRODUCTION TO INTRUSION DETECTION   9

History of intrusion detection, Audit, Concept and definition , Internal and external threats to data, Attacks, Need and types of IDS, Information sources,Host based information sources, Network based information sources.

UNIT-II THEORITICAL FOUNDATION OF DETECTION   9

Intrusion prevention systems, Network Ids protocol based Ids, Hybrid Ids, Analysis schemes, Thinking about intrusion, Model for intrusion analysis, Techniques responses ,Requirement of responses, Types of responses, Mapping responses to policy vulnerability analysis, Credential analysis ,Non credential analysis

UNIT-III ARCHITECTURE AND IMPLEMENTATION   9

Introduction to snort, Snort installation scenarios, Installing snort , Running snort on multiple network interfaces, Snort command line options, Step-by-step procedure to compile ,Install snort location of snort files, Snort modes snort alert modes

UNIT-IV SNORT CONCEPTS   9

Working with snort rules, Rule headers, Rule options, Snort configuration file,Plugins, Preprocessors and output modules, Using snort with mysql

UNIT-V CASE STUDY   9

Using ACID and snort snarf with snort, Agent development for intrusion detection, Architecture models of Ids and Ips

TOTAL: 45 PERIODS

COURSE OUTCOMES:
At the end of the course, the student should be able to:
- Understand the basic concepts of intrusion detection system.
- Explain about Intrusion Prevention Systems, Network IDs protocol and model for intrusion analysis.
- Analyze when, where, how, and why to apply Intrusion Detection tools and techniques in order to improve the security posture of an enterprise.
- Understand the fundamentals and history of Intrusion Detection in order to avoid common pitfalls in the creation and evaluation of new Intrusion Detection Systems.
- Explain about agent development for intrusion detection and architectural models of IDs and IPs.

TEXT BOOK:
1. T. Fahringer, R. Prodan, "A Text book on Grid Application Development and Computing Environment". 6th Edition, Khanna Publishers, 2012
2. Rafeeq Rehman : " Intrusion Detection with SNORT, Apache, MySQL, PHP and ACID," 1st Edition, Prentice Hall , 2003

REFERENCES:
1. Christopher Kruegel, Fredrik Valeur, Giovanni Vigna: "Intrusion Detection and Correlation Challenges and Solutions", 1st Edition, Springer, 2005.
2. Carl Endorf, Eugene Schultz and Jim Mellander " Intrusion Detection & Prevention",1st Edition, Tata McGraw-Hill, 2004.
3. Stephen Northcutt, Judy Novak: "Network Intrusion Detection", 3rd Edition, New Riders Publishing, 2002.

WEB REFERENCES:
- https://www.geeksforgeeks.org/intrusion-detection-system-ids/
- https://www.knowledgehut.com/blog/security/intrusion-detection-system
- https://www.helixstorm.com/blog/types-of-intrusion-detection-systems/
- https://usemynotes.com/what-is-intrusion-detection-system/
- https://www.cs.colostate.edu/~massey/Teaching/cs356/RestrictedAccess/Slides/356lecture18.pdf

CO-PO MAPPINGS:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	1	2	-	3	-	1	-	1	-	-	-	1
CO-2	3	2	-	2	3	2	-	-	1	2	-	2
CO-3	3	1	-	1	2	1	-	-	2	1	-	1
CO-4	2	2	3	2	3	-	-	-	-	2	2	-
CO-5	1	2	2	2	2	2	1	1	2	1	2	1

JCB1503	HARDWARE SECURITY	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES
- To know basic components and fundamentals of hardware security.
- To develop an application using various services in security.
- To understand about different attacks and testing.
- To learn the basic and important concepts of hardware design.
- To understand the issues and solutions for hardware security and monitoring.

PREREQUISITE:
- Cryptography and Cryptanalysis

UNIT-I INTRODUCTION   9
Hardware security-Key threats-Security practices-Types-Fault attacks and countermeasures-Hardware design cycle-Measuring hardware security-Secure platforms-Ciphers: historical; block (AES/DES), Stream, (Trivium) Public Key Ciphers (RSA. ECC), Hash Functions (SHA-1)

UNIT-II PRINCIPLES AND APPLICATIONS   9
Physical unclonable functions:-Design-Principles and applications- Hardware random- Number generators: design-Principles and applications-Design and evaluate pufs - Random number generators on an FPGA

UNIT-III ATTACKS AND TESTING   9
Side channels – Overview - Fault attacks and countermeasures Power attacks and countermeasures - Designing Fault attack - Evaluate a counter measure - VLSI testing: attacks and countermeasures, Scan attack on FPGA implementation of DES.

UNIT-IV HARDWARE ARCHITECTURE   9
Hardware trojans-Overview-Attacks and defenses-Malicious 8051 Processor design-IP piracy-Logic encryption-FPGA logic encryption of combinational logic-Reverse engineering: ic layout camouflaging, Gate level reversing, ESL reversing.

UNIT-V CASE STUDY   9
Analysis of notable hardware security breaches - Study of hardware security vulnerabilities in commercial systems-Emerging hardware security technologies – Approaches - Ethical considerations - Hardware security research - Practice- Internet of Things (IoT) Security challenges- Hardware security - Autonomous systems.

TOTAL: 45 PERIODS

COURSE OUTCOMES:
At the end of the course, the student should be able to:
- Demonstrate the main concepts of security, its characteristics, advantages, key technologies.
- Develop and design an application using various tools in hardware environment.
- Understand the basic and important design concepts and issues of attacks and testing.
- Explain about the concept, characteristics and the architecture of hardware.
- Analyze the issue of security and understand the applications of hardware security in various feild.

TEXT BOOK:
1. S. Bhunia and M. Tehranipoor, "Hardware Security: A Hand-on Training Approach, Morgan Kauffman", 2018
2. M. Tehranipoor and C. Wang (Eds.), Introduction to Hardware Security and Trust, Springer, 2011

REFERENCES:
1. Debdeep Mukhopadhyay, "Hardware Security: Design, Threats, and Safeguards", 1st edition, 2015.
2. Mohammad Tehranipoor and Cliff Wang, "Introduction to Hardware Security and Trust, by", kindle edition, 2012.

WEB REFERENCES:
- https://www.amazon.in/Introduction-Hardware-Security-Mohammad-Tehranipoor-ebook/dp/B00F5U36X8
- https://books.google.com/books/about/Introduction_to_Hardware_Security_and_Tr.html?id=bNiw9448FeIC
- https://tehranipoor.ece.ufl.edu/wp-content/uploads/2021/07/01-Intro-to-HW-Security.pdf
- https://catalog.library.vanderbilt.edu/discovery/fulldisplay/alma99104366463960 3276/01VAN_INST:vanui

CO-PO MAPPINGS:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	3	-	2	1	2	-	-	-	-	-	1	1
CO-2	1	2	1	-	1	-	-	-	-	1	1	1
CO-3	1	2	1	1	1	1	-	-	-	1	2	-
CO-4	3	2	3	3	3	2	-	-	-	-	-	2
CO-5	2	3	-	1	3	1	-	-	-	2	1	-

JCB1601	CLOUD SECURITY	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES
- To know basic components and fundamentals of cloud computing.
- To develop an application using various services in cloud.
- To understand how to design the web application development in cloud.
- To understand the issues and solutions for cloud security and cloud monitoring.
- To learn the basic and important concepts of python to implement in an application.

PREREQUISITE:
- Data Communication and Networking
- Foundations of Cyber Security

UNIT-I INTRODUCTION   9

Cloud fundamentals - Cloud service components - Cloud service, Deployment models - Cloud components - Guiding principle - Utilization, Security, Pricing - Application of cloud computing. Case Study: Open stack and AWS.

UNIT-II CLOUD BASED APPLICATIONS DEVELOPMENT   9

Application architectures - Monolithic-Distributed, Micro Service fundamental - Cloud native applications - 12 factors app - Application integration process - APIfication process- API fundamental-Micro service - API management- Spring boot fundamental - Design of micro service - API tools.

UNIT-III WEB DEVELOPMENT TECHNIQUES   9

Devops fundamentals - Devops role – responsibility - Tools - Containerization process and application-Evolution of app deployment- Docker fundamentals – architecture – Commands – Orchestration – Kubernetes - Docker container.

UNIT-IV CLOUD SECURITY AND MONITORING TOOL   9

Cloud security - Shared responsibility architecture - Security by design principles-Identity - Access management - Cloud security layers illustration - Cloud network - Host - Data security concepts - Security operations - Major cloud service provider tools - Security compliance and regulations - Cloud monitoring - Benefits of cloud monitoring.

UNIT-V BUILDING AN APPLICATION USING PYTHON   9

Developing - Deploying an application in the cloud- Building a python project based on design - Development testing - Deployment of an application using a development framework - Deployment Platform - Case study: python use case and python framework.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Demonstrate the main concepts of cloud, its characteristics, advantages, key technologies and its various delivery and deployment models.
- Develop and design an application using various tools in cloud environment.
- Acquire the basic and important design concepts and issues of web application development techniques in cloud.
- Structure simple python program for developing an application in cloud.
- Analyze the issue of cloud such as security, energy efficiency and interoperability, and provide an insight into future prospects of computing in the cloud monitoring.

TEXT BOOK:

1. Thomas Erl, Zaigham Mahmood, and Ricardo Puttini, "Cloud Computing Concepts, Technology & Architecture", Prentice Hall, 2013.
2. Guo Ning Liu, Qiang Guo Tong, Harm Sluiman, Alex Amies, "Developing and Hosting Applications on the Cloud", IBM Press, 2012.

REFERENCES:

1. Michael J. Kavis "Architecting the Cloud: Design Decisions for Cloud Computing Service Models (SaaS, PaaS, and IaaS)", 1st Edition, Wiley, 2014.
2. Kai Hwang, Geoffery C. Fox and Jack J. Dongarra, "Distributed and Cloud Computing: Clusters, Grids, Clouds and the Future of Internet", First Edition, Morgan Kaufman Publisher, an Imprint of Elsevier, 2012.
3. Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, "Cloud Computing: Principles and Paradigms", Wiley, 2011

WEB REFERENCES:

- https://www.tutorialspoint.com/cloud_computing/cloud_computing_security.htm
- https://www.javatpoint.com/what-is-cloud-security
- https://www.ibm.com/topics/cloud-security
- https://www.box.com/resources/what-is-cloud-security
- https://cloud.google.com/learn/what-is-cloud-security

CO-PO MAPPINGS:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	3	3	-	2	3	1	-	1	-	-	1	1
CO-2	2	1	2	-	-	-	-	-	-	1	1	1
CO-3	-	1	3	2	1	-	-	-	1	-	-	-
CO-4	3	3	3	3	1	2	1	1	1	2	1	-
CO-5	1	2	2	3	-	-	1	1	2	1	-	1

JCB1603	ETHICAL HACKING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES
- To study about the fundamentals of hacking.
- To learn different types of hacking in web.
- To understand attacks in networking.
- To learn about wireless hacking, attacks and various agents in hacking.
- To understand about automation and authentication.

PREREQUISITE:
- Cryptography and Cryptanalysis

UNIT-I INTRODUCTION TO HACKING   9
Introduction to hacking – Terminologies – Penetration test – Vulnerability assessments versus penetration test – Pre-engagement – Rules of engagement -Penetration testing methodologies – OSSTMM – Categories of penetration test – Types of penetration tests – Vulnerability assessment summary -Reports.

UNIT-II ETHICAL HACKING IN WEB   9
Introduction to ethical hacking – Foot printing - Reconnaissance - Scanning networks - Enumeration - System hacking - Malware Threats – Sniffing- Social engineering - Denial of service - Session hijacking - Hacking web servers - Web applications – SQL Injection - Hacking wireless networks - Mobile platforms.

UNIT-III NETWORK ATTACKS   9
Vulnerability data resources – Exploit databases –Promiscuous versus non promiscuous mode – MITM attacks – ARP attacks –SSL strip: stripping https traffic -DNS spoofing – ARP spoofing– DHCP Spoofing -Remote exploitation – Attacking network remote services – Overview of brute force attacks.

UNIT-IV WIRELESS HACKING   9
Wireless hacking – Air crack- Cracking WEP – WPA/WPA2 wireless network using air crack – Evil twin attack –Log-in protection mechanisms – Captcha validation flaw – Captcha RESET flaw – Manipulating user-Agents to bypass captcha.

Authentication bypass attacks – Testing for vulnerability – Automating with burp suite – Session attacks – SQL injection attacks – XSS (Cross-Site Scripting) - Types of cross-Site scripting – Cross-site request forgery (CSRF) – SSRF attacks.

TOTAL: 45 PERIODS

COURSE OUTCOMES:
At the end of the course, the student should be able to:
- Understand the fundamentals of hacking and different methodologies in testing.
- Demonstrate the different types of hacking and various applications in web.
- Explain about different attacks, testing, and authentication in networking.
- Understand about wireless hacking, cracking and protection mechanisms.
- Explain the various Authentication schemes to simulate different applications.

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. Marjie T.Britz, "Computer Forensics and Cyber Crime: An Introduction", 3rd Edition, Prentice Hall, 2013.
2. Kenneth C.Brancik, "Insider Computer Fraud‖ ",Auerbach Publications Taylor & Francis Group–2008.
3. AnkitFadia , "Ethical Hacking‖", Second Edition, Macmillan India Ltd, 2006
4. John R.Vacca, "Computer Forensics", Cengage Learning, 2005

WEB REFERENCES:
- https://www.geeksforgeeks.org/introduction-to-ethical-hacking/
- https://www.hackittech.com/Resources%20pdf/hacking_resources/HackitTech_20210523130501.pdf
- https://www.javatpoint.com/ethical-hacking
- https://www.synopsys.com/glossary/what-is-ethical-hacking.html
- https://www.knowledgehut.com/blog/security/introduction-to-ethical-hacking

CO-PO MAPPINGS:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	2	2	1	1	2	-	1	1	1	-	2	-
CO-2	1	1	2	1	-	1	1	-	-	1	-	1
CO-3	-	2	1	-	1	-	-	2	2	-	1	2
CO-4	2	2	-	2	1	1	-	1	2	-	-	-
CO-5	1	1	1	2	1	-	3	1	-	2	-	-

JCB1702	WEB APPLICATION SECURITY	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To reveal the underlying in web application.
- To identify and aid in fixing any security vulnerabilities during the web development process.
- To understand the security principles in developing a reliable web application.
- To learn about different industry tools in web security.
- To understand about various testing and security.

PREREQUISITE:

- Web Technology

UNIT-I INTRODUCTION TO WEB APPLICATIONS   9

History of web applications interface -Web application Vs Cloud application -Security fundamentals- Input validation - Attack surface reduction rules of thumb- Classifying and prioritizing threats

UNIT-II WEB APPLICATION SECURITY FUNDAMENTALS   9

Origin policy - Exceptions to the same- Cross-site scripting and cross-site request forgery – Reflected XSS - HTML injection

UNIT-III WEB APPLICATION VULNERABILITIES   9

Vulnerabilities in traditional client server application and web applications- Client state manipulation-Cookie based attacks,-SQL injection, Cross domain attack (XSS/XSRF/XSSI)- Http header injection - SSL vulnerabilities and testing - Proper encryption use in web application- Session vulnerabilities and testing - Cross-site request forgery.

UNIT-IV WEB APPLICATION MITIGATIONS   9

Http request - Http response, rendering and events - Html image tags - Image tag security - Issue - Java script on error – Java script timing - Port scanning - Remote scripting - Running remote code - frame and iframe - Browser sandbox - policy goals, same origin policy - Library import - Domain relaxation

UNIT-V SECURE WEBSITE DESIGN   9

Introduction- Architecture and Design Issues for Web Applications - Deployment Considerations Input Validation – Authentication – Authorization - Configuration Management - Sensitive Data - Session Management – Cryptography - Parameter Manipulation - Exception Management.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Identify the vulnerabilities in the web applications.
- Identify the various types of threats and mitigation measures of web applications.
- Apply the security principles in developing a reliable web application.
- Use industry standard tools for web application security.
- Apply Penetration testing to improve the security of web application

TEXT BOOKS:

- Sullivan, Bryan, and Vincent Liu. Web Application Security, A Beginner's Guide. McGraw
  Hill Profe ssional, 2011.
- Stuttard, Dafydd, and Marcus Pinto. The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws. John Wiley Sons, 2011

REFERENCES:

3. Behrouz A. Ferouzan, DebdeepMukhopadhyay, "Cryptography and Network Security", 3rd Edition, Tata McGraw Hill, 2015.
4. Charles Pfleeger, Shari Pfleeger, Jonathan Margulies, "Security in Computing", Fifth Edition, Prentice Hall, New Delhi, 2015.

WEB REFERENCES:

- Web Application Security [Book] (oreilly.com)
- Web Application Security: Exploitation and Countermeasures for Modern Web ... - Andrew Hoffman - Google Books amazon.com/Web-Application-Security-Beginners-Guide/dp/0071776168 https://www.garykessler.net/library/crypto.html
- https://www.cryptomathic.com/news-events/blog/summary-of-cryptographic-algorithms-according-to-nist

CO-PO MAPPINGS:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	2	-	2	2	-	-	1	-	-	1	2	1
CO-2	2	2	2	2	2	-	-	-	-	2	1	1
CO-3	2	2	2	2	1	-	2	-	-	-	-	2
CO-4	2	-	-	2	-	-	1	-	-	1	2	1
CO-5	2	1	2	2	2	-	2	-	-	1	1	2