MUTHAYAMMAL ENGINEERING COLLEGE

(An Autonomous Institution)

(Approved by AICTE, New Delhi, Accredited by NAAC, NBA & Affiliated to Anna University)
Rasipuram - 637 408, Namakkal Dist., Tamil Nadu.

Curriculum/Syllabus

Programme Code	:	**CS**
Programme Name	:	**B.E- COMPUTER SCIENCE AND ENGINEERING**
Regulation	:	**R-2021**

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Rasipuram - 637 408, Namakkal Dt, Tamil Nadu.

Ph. No.: 04287-220837

Email: principal@mec.edu.in

INSTITUTION VISION &MISSION

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Estd. 2000

INSTITUTION VISION &MISSION

INSTITUTION VISION

To be a Centre of Excellence in Engineering, Technology and Management on par with International Standards.

INSTITUTION MISSION

- To prepare the students with high professional skills and ethical values
- To impart knowledge through best practices
- To instill a spirit of innovation through Training, Research and Development
- To undertake continuous assessment and remedial measures
- To achieve academic excellence through intellectual, emotional and social stimulation

INSTITUTION MOTTO

Rural upliftment through Technical Education.

DEPARTMENT VISION & MISSION

Estd. 2000

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DEPARTMENT VISION & MISSION

DEPARTMENT VISION

To produce the Computer Science and Engineering students with the Innovative and Entrepreneur skills to face the challenges ahead

DEPARTMENT MISSION

- To impart knowledge in the state of art technologies in Computer Science and Engineering
- To inculcate the analytical and logical skills in the field of Computer Science and Engineering
- To produce the graduates to examine the issues and propose solutions with Ethical values

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DEPARTMENT PROGRAM EDUCATIONAL OBJECTIVES, PROGRAM OUTCOMES & PROGRAM SPECIFIC OUTCOMES

PROGRAM EDUCATIONAL OBJECTIVES

The Computer Science and Engineering Graduates should be able to

PEO1: Graduates will be able to Practice as an IT Professional in Multinational Companies

PEO2: Graduates will be able to Gain necessary skills and to pursue higher education for career growth

PEO3: Graduates will be able to Exhibit the leadership skills and ethical values in the day to day life

PROGRAM OUTCOMES

PO1 - Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2 - Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3 - Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4 - Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

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PO5 - Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6 - The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7 - Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8 - Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9 - Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10 - Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 - Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12 - Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES

PSO1: Graduates should be able to design and analyze the algorithms to develop an Intelligent Systems

PSO2: Graduates should be able to apply the acquired skills to provide efficient solutions for real time problems

PSO3: Graduates should be able to exhibit an understanding of System Architecture, Networking and Information Security

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B.E. - COMPUTER SCIENCE AND ENGINEERING

REGULATION – 2021

GROUPING OF COURSES

1. Humanities and Social Sciences Courses (HS)

S.No.	Course Code	Course Title	Category	Contact Hours	Instruction Hours/Week			C
					L	T	P	
1	21HSS01	Business English	HS	3	2	0	0	2
2	21HSS02	Communicative English Practices Laboratory	HS	2	0	0	2	1
3	21HSS03	Life Skills and Workplace Psychology	HS	3	2	0	0	2
4	21HSS04	Technical English For Engineers	HS	3	2	0	0	2
5	21HSS05	Communicative English for Engineers	HS	3	2	0	0	2
6	21HSS06	Basics of Japanese Language	HS	3	2	0	0	2
7	21HSS07	Basics of French Language	HS	3	2	0	0	2

2. Basic Sciences Courses (BS)

S. No.	Course Code	Course Title	Category	Contact Hours	Instruction Hours/Week			C
					L	T	P	
1.	21BSS01	Engineering Physics	BS	4	3	0	0	3
2.	21BSS02	Physics and Chemistry Laboratory	BS	2	0	0	2	1
3.	21BSS03	Bio and Nanomaterials Science	BS	4	3	0	0	3
4.	21BSS04	Materials Science	BS	4	3	0	0	3
5.	21BSS05	Physics for Mechanical Engineers	BS	4	3	0	0	3
6.	21BSS11	Engineering Chemistry	BS	4	3	0	0	3
7.	21BSS12	Environmental Science and Engineering	BS	4	3	0	0	3

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8.	21BSS13	Applied Chemistry	BS	4	3	0	0	3
9.	21BSS21	Algebra and Calculus	BS	5	3	1	0	4
10.	21BSS22	Advanced Calculus and Complex Analysis	BS	5	3	1	0	4
11.	21BSS23	Transforms and Partial Differential Equations	BS	5	3	1	0	4
12.	21BSS24	Discrete Mathematics	BS	5	3	1	0	4
13.	21BSS25	Statistic and Queuing Model	BS	5	3	1	0	4
14.	21BSS26	Numerical Methods	BS	5	3	1	0	4
15.	21BSS27	Probability and Random Processes	BS	5	3	1	0	4
16.	21BSS28	Statistics and Numerical Methods	BS	5	3	1	0	4

3. General Engineering Science Courses (GES)

S. No.	Course Code	Course Title	Category	Contact Hours	Instruction Hours/Week			C
					L	T	P	
1.	21GES01	Programming for Problem Solving Using C	GES	3	3	0	0	3
2.	21GES02	Programming for Problem Solving Techniques	GES	3	3	0	0	3
3.	21GES03	Programming in C Laboratory	GES	3	0	0	2	1
4.	21GES04	Programming in C and Python Laboratory	GES	3	0	0	2	1
5.	21GES05	Electrical and Electronic Sciences	GES	3	3	0	0	3
6.	21GES06	Mechanical and Building Sciences	GES	3	3	0	0	3
7.	21GES07	Computer Aided Drafting Laboratory	GES	3	0	0	3	1
8.	21GES08	Python Programming	GES	3	3	0	0	3
9.	21GES09	Programming in Python Laboratory	GES	3	0	0	2	1
10.	21GES10	Soft Skills Laboratory	GES	3	0	0	2	1
11.	21GES11	Electronic Devices	GES	3	3	0	0	3
12.	21GES12	Electronic Simulation Laboratory	GES	3	0	0	2	1
13.	21GES13	Electric Circuits	GES	3	2	1	0	3
14.	21GES14	Electric Circuits Laboratory	GES	3	0	0	2	1
15.	21GES15	Manufacturing Processes	GES	3	3	0	0	3
16.	21GES16	Manufacturing Processes Laboratory	GES	3	0	0	2	1
17.	21GES17	Mechanical and Building Sciences Laboratory	GES	3	0	0	2	1
18.	21GES18	Fundamentals of Civil Engineering	GES	3	3	0	0	3
19.	21GES19	Concepts in Product Design	GES	3	3	0	0	3
20.	21GES20	Renewable Energy Sources	GES	3	3	0	0	3
21.	21GES21	Electrical Drives and Controls	GES	3	3	0	0	3

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22.	21GES22	Electrical Drives and Controls Laboratory	GES	3	0	0	2	1
23.	21GES23	Analog and digital communication	GES	3	3	0	0	3
24.	21GES24	Digital Principles and System Design	GES	3	3	0	0	3
25.	21GES25	Digital Principles and System Design Laboratory	GES	3	0	0	2	1
26.	21GES26	Engineering Drawing	GES	4	1	0	2	2
27.	21GES27	Engineering Geology	GES	3	3	0	0	3
28.	21GES28	Engineering Mechanics	GES	4	3	1	0	4
29.	21GES29	Wireless Communication	GES	4	3	0	0	3
30.	21GES30	Electronics And Microprocessors	GES	3	3	0	0	3
31.	21GES31	Electronics And Microprocessors Laboratory	GES	2	0	0	2	1
32.	21GES32	Data Structure using Python	GES	3	3	0	0	3
33.	21GES33	Electronic Devices And Circuits	GES	3	3	0	0	3
34.	21GES34	Electronic Simulation Laboratory	GES	2	0	0	2	1

4. PROFESSIONAL CORE COURSES (PC)

S. No.	Course Code	Course Title	Category	Contact Hours	Instruction Hours/Week			C
					L	T	P	
1	21CSF01	Data Structures and Algorithms	PC	3	3	0	0	3
2	21CSF02	Data Structures using C++ Lab	PC	2	0	0	2	1
3	21CSF03	Database Management Systems	PC	3	3	0	0	3
4	21CSF04	Database Management Systems Lab	PC	2	0	0	2	1
5	21CSF05	Computer Organization and Architecture	PC	3	3	0	0	3
6	21CSF06	Object Oriented Programming	PC	3	3	0	0	3
7	21CSF07	Computer Networks	PC	3	3	0	0	3
8	21CSF08	Computer Networks Lab	PC	2	0	0	2	1
9	21CSF09	Operating Systems'	PC	3	3	0	0	3
10	21CSF10	Operating Systems Lab	PC	2	0	0	2	1
11	21CSF11	Design and Analysis of Algorithms	PC	3	3	0	0	3
12	21CSF12	Software Engineering	PC	3	3	0	0	3
13	21CSF13	Service Oriented Architecture	PC	3	3	0	0	3
14	21CSF14	Mobile Communication	PC	3	3	0	0	3

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15	21CSF15	Mobile Application Lab	PC	2	0	0	2	1
16	21CSF16	Data Analytics using R and Python	PC	3	3	0	0	3
17	21CSF17	Theory of Computation	PC	3	3	0	0	3
18	21CSF18	Cloud Computing	PC	3	3	0	0	3
19	21CSF19	Cloud Computing Lab	PC	2	0	0	2	1
20	21CSF20	Compiler Design	PC	3	3	0	0	3
21	21CSF21	Compiler Design Lab	PC	2	0	0	2	1
22	21CSF22	Artificial Intelligence for Industry 4.0	PC	3	3	0	0	3
23	21CSF23	Object Oriented Analysis and Design	PC	3	3	0	0	3
24	21CSF24	Case Tools Lab	PC	2	0	0	2	1
25	21CSF25	Cryptography and Network Security	PC	3	3	0	0	3
26	21CSF26	Cryptography and Network Security Lab	PC	2	0	0	2	1
27	21CSF27	Big Data and Analytics	PC	3	3	0	0	3
28	21CSF28	Animation: Theory and Practice	PC	3	3	0	0	3
29	21CSF29	Machine Learning Techniques	PC	3	3	0	0	3
30	21CSF30	Data Analystics and Modeling Techniques	PC	3	3	0	0	3
31	21CSF31	Software Project Management	PC	3	3	0	0	3
32	21CSF32	Principles of Programming Languages	PC	3	3	0	0	3
33	21CSF33	Distributed Operating Systems	PC	3	3	0	0	3

5. PROFESSIONAL ELECTIVE COURSES (PE)

S. No	Course Code	Course Title	Category	Contact Hours	Instruction Hours/Week			C
					L	T	P	
1	21CSE01	Internet of Things	PE	3	3	0	0	3
2	21CSE02	Internet of Things Lab	PE	2	0	0	2	1
3	21CSE03	Salesforce CRM and Platform	PE	3	3	0	0	3
4	21CSE04	Salesforce CRM and Platform Lab	PE	2	0	0	2	1
5	21CSE05	AWS Academy Cloud Developing	PE	3	3	0	0	3
6	21CSE06	AWS Academy Cloud Developing Lab	PE	2	0	0	2	1
7	21CSE07	AWS Academy Cloud Architecting	PE	3	3	0	0	3

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Programme Code & Name: CS & B.E-Computer Science and Engineering

8	21CSE08	AWS Academy Cloud Architecting Lab	PE	2	0	0	2	1
9	21CSE09	Internet Programming	PE	3	3	0	0	3
10	21CSE10	Current Practices in Software Engineering	PE	3	3	0	0	3
11	21CSE11	Computer Graphics	PE	3	3	0	0	3
12	21CSE12	Distributed Programming	PE	3	3	0	0	3
13	21CSE13	Enterprise Project Development using FOSS	PE	3	3	0	0	3
14	21CSE14	Parallel Computing	PE	3	3	0	0	3
15	21CSE15	Kernel Programming	PE	3	3	0	0	3
16	21CSE16	Soft Computing Techniques	PE	3	3	0	0	3
17	21CSE17	Virtual Reality	PE	3	3	0	0	3
18	21CSE18	Storage infrastructure Management	PE	3	3	0	0	3
19	21CSE19	Total Quality Management	PE	3	3	0	0	3
20	21CSE20	Cloud infrastructure services	PE	3	3	0	0	3
21	21CSE21	Graphics and multimedia	PE	3	3	0	0	3
22	21CSE22	Graphics and multimedia lab	PE	3	0	0	2	1
23	21CSE23	Data warehousing and data mining	PE	3	3	0	0	3
24	21CSE24	Software quality assurance	PE	3	3	0	0	3
25	21CSE25	Network and routing protocols	PE	3	3	0	0	3
26	21CSE26	Scaling and connecting networks	PE	3	3	0	0	3
27	21CSE27	Open stack essentials	PE	3	3	0	0	3
28	21CSE28	Software Defined Networks	PE	3	3	0	0	3
29	21CSE29	Docker and Kubernetes	PE	3	3	0	0	3
30	21CSE30	Blockchain	PE	3	3	0	0	3
31	21CSE31	User Centric Design	PE	3	3	0	0	3
32	21CSE32	Node.js and React.js	PE	3	3	0	0	3
33	21CSE33	C# and .NET Core	PE	3	3	0	0	3
34	21CSE34	Agile Methodology	PE	3	3	0	0	3
35	21CSE35	Text Mining	PE	3	3	0	0	3
36	21CSE36	Angular JS	PE	3	3	0	0	3
37	21CSE37	Deep Learning	PE	3	3	0	0	3
38	21CSE38	Ubiquitous Computing	PE	3	3	0	0	3
39	21CSE39	Fog Computing	PE	3	3	0	0	3
40	21CSE40	Machine Learning using R	PE	3	3	0	0	3

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41	21CSE41	Human Computer Interaction	PE	3	3	0	0	3
42	21CSE42	J2EE Technologies	PE	3	3	0	0	3
43	21CSE43	Web user interface Design	PE	3	3	0	0	3
44	21CSE44	Speech and Language processing	PE	3	3	0	0	3
45	21CSE45	Advanced Java Programming	PE	3	3	0	0	3
46	21CSE46	Parallel and Distributed Computing	PE	3	3	0	0	3
47	21CSE47	Computer Vision	PE	3	3	0	0	3
48	21CSE48	Advanced Data Structures and Algorithms	PE	3	3	0	0	3
49	21CSE49	Software Testing	PE	3	3	0	0	3
50	21CSE50	Information Security	PE	3	3	0	0	3
51	21CSE51	Data Visualization	PE	3	3	0	0	3
52	21CSE52	Soft Computing	PE	3	3	0	0	3
53	21CSE53	Speech Recognition	PE	3	3	0	0	3
54	21CSE54	Python for Data Science	PE	3	3	0	0	3
55	21CSE55	Bio-inspired Computing	PE	3	3	0	0	3
56	21CSE56	Virtual and Augmented Reality	PE	3	3	0	0	3
57	21CSE57	Natural Language Processing	PE	3	3	0	0	3
58	21CSE58	Video Analytics	PE	3	3	0	0	3
59	21CSE59	Web Frameworks	PE	3	3	0	0	3
60	21CSE60	Quantum Computing	PE	3	3	0	0	3
61	21CSE61	Network Programming and Management	PE	3	3	0	0	3
62	21CSE62	Information Retrieval Systems	PE	3	3	0	0	3
63	21CSE63	Fundamentals of Devops	PE	3	3	0	0	3
64	21CSE64	Unix Internals	PE	3	3	0	0	3

6. EMPLOYABILITY ENHANCEMENT COURSES (EEC)

S. No	Course Code	Course Title	Category	Contact Hours	Instruction Hours/Week			C
					L	T	P	
1	21CSP01	Project work-Phase I	EC	6	0	0	6	3
2	21CSP02	Project work-Phase II	EC	15	0	0	15	12
3	21CSP03	Comprehension	EC	4	0	0	4	2
4	21CSP04	Technical Seminar	EC	4	0	4	0	2
5	21CSP05	Entrepreneurship Development	EC	3	3	0	0	3

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6	21CSP06	Professional Practices	EC	6	0	0	6	3
7	21CSP07	NPTEL- Introduction to Industry 4.0 and Industrial Internet of Things	EC	-	-	-	-	-
8	21CSP8	NPTEL- Introduction to Machine Learning	EC	-	-	-	-	-
9	21CSP9	NPTEL- The Joy of Computing using Python	EC	-	-	-	-	-
10	21CSP10	NPTEL-Data Analytics with Python	EC	-	-	-	-	-
11	21CSP11	Indian Constitution	EC	-	-	-	-	-
12	21CSP12	Value Education	EC	-	-	-	-	-
13	21CSP13	Disaster Management	EC	-	-	-	-	-
14	21CSP14	Pedagogy Studies	EC	-	-	-	-	-
15	21CSP15	Stress Management by Yoga	EC	-	-	-	-	-

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Department	Computer Science & Engineering
Programme	B.E

SEMESTER – VII

Sl. No.	Course Code	Course Name	Hours/ Week			Credit	Contact Hours
			L	T	P	C	
THEORY							
1	21CSF27	Big Data Analytics	3	0	0	3	3
2.	21CSF30	Data Analytics and Modeling Techniques	3	0	0	3	3
3.	PE	Professional Elective - IV	3	0	0	3	3
4.	PE	Professional Elective - V	3	0	0	3	3
5.	PE	Professional Elective - VI	3	0	0	3	3
6.	OE	Open Elective- III	3	0	0	3	3
PRACTICAL							
7.	21CSP01	Project Work I	0	0	6	3	6
		Total Credits				**21**	

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Department	Computer Science & Engineering
Programme	B.E

SEMESTER – VIII

Sl. No.	Course Code	Course Name	Hours/ Week			Credit	Contact Hours
			L	T	P	C	
THEORY							
1.		Mandatory Course(NPTEL)	-	-	-	-	-
PRACTICAL							
2.	21CSP02	Project Work II	0	0	15	12	15
		Total Credits				**12**	

Total credits to be earned for the award of the degree 160

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Department	Computer Science & Engineering	
Programme	B.E	

SEMESTER – V

Sl. No.	Course Code	Course Name	Hours/ Week			Credit	Contact Hours
			L	T	P	C	
THEORY							
1.	21CSF14	Mobile Communication	3	0	0	3	3
2.	21CSF17	Theory of Computation	3	0	0	3	3
3.	21CSF18	Cloud Computing	3	0	0	3	3
4.	21BSS24	Discrete Mathematics	3	1	0	4	5
5.	PE	Professional Elective - II	3	0	0	3	3
6.	PE	Open Elective – I	3	0	0	3	3
PRACTICALS							
7.	21CSF15	Mobile Application Lab	0	0	2	1	2
8.	21CSF19	Cloud Computing Lab	0	0	2	1	2
9.	PE	Professional Elective II - Lab	0	0	2	1	2
		Total Credits				**22**	

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Department	Computer Science & Engineering	
Programme	B.E	

SEMESTER – VI

Sl. No.	Course Code	Course Name	Hours/ Week			Credit	Contact Hours
			L	T	P	C	
THEORY							
1.	21CSF31	Machine Learning	3	0	0	3	3
2.	21CSF20	Compiler Design	3	0	0	3	3
3.	21CSF22	Artificial Intelligence for Industry 4.0	3	0	0	3	3
4.	21CSF23	Object Oriented Analysis and Design	3	0	0	3	3
5.	PE	Professional Elective – III	3	0	0	3	3
6.	OE	Open Elective – II	3	0	0	3	3
PRACTICALS							
7.	21CSF21	Compiler Design Lab	0	0	2	1	2
8.	21CSF24	Case Tools Lab	0	0	2	1	2
9.	PE	Professional Elective III - Lab	0	0	2	1	2
		Total Credits				**21**	

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	MUTHAYAMMAL ENGINEERING COLLEGE (Autonomous) (Approved by AICTE & Affiliated to Anna University), RASIPURAM – 637 408	CURRICULUM UG R - 2021
Department	Computer Science & Engineering	
Programme	B.E	

SEMESTER – III

Sl. No.	Course Code	Course Name	Hours/ Week			Credit	Contact Hours
			L	T	P	C	
THEORY							
1.	21CSF01	Data Structures and Algorithms	3	0	0	3	3
2.	21CSF06	Object Oriented Programming	3	0	0	3	3
3.	21GES24	Digital Principles and System Design	3	0	0	3	3
4.	21BSS23	Transforms and Partial Differential Equations	3	1	0	4	5
5.	21CSF03	Database Management Systems	3	0	0	3	3
6.	21CSF05	Computer Organization and Architecture	3	0	0	3	3
PRACTICALS							
7.	21CSF04	Database Management Systems Laboratory	0	0	2	1	2
8.	21CSF02	Data Structures Lab using C++ Laboratory	0	0	2	1	2
9.	21GES25	Digital Principles and System Design Lab	0	0	2	1	2
		Total Credits				**22**	

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Department	Computer Science & Engineering	
Programme	B.E	

SEMESTER – IV

Sl. No.	Course Code	Course Name	Hours/ Week			Credit	Contact Hours
			L	T	P	C	
THEORY							
1.	21CSF07	Computer Networks	3	0	0	3	3
2.	21CSF09	Operating Systems	3	0	0	3	3
3.	21CSF11	Design and Analysis of Algorithms	3	0	0	3	3
4.	21CSF12	Software Engineering	3	0	0	3	3
5.	21CSF13	Service Oriented Architecture	3	0	0	3	3
6.	PE	Professional Elective - I	3	0	0	3	3
PRACTICALS							
7.	21CSF08	Computer Networks Lab	0	0	2	1	2
8.	21CSF10	Operating Systems Lab	0	0	2	1	2
9.	PE	Professional Elective I - Lab	0	0	2	1	2
		Total Credits				**21**	

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Department	Computer Science & Engineering
Programme	B.E

SEMESTER – I

Sl. No.	Course Code	Course Name	Hours/ Week			Credit	Contact Hours
			L	T	P	C	
THEORY							
1.	21HSS01	Business English	2	0	0	2	2
2.	21BSS21	Algebra and Calculus	3	2	0	4	5
3.	21BSS01	Engineering Physics	3	0	0	3	3
4.	21BSS11	Engineering Chemistry	3	0	0	3	3
5.	21GES01	Programming for Problem Solving Using C	3	0	0	3	3
6.	21GES06	Mechanical and Building Sciences	3	0	0	3	3
PRACTICALS							
7.	21BSS02	Physics and Chemistry Laboratory	0	0	2	1	2
8.	21GES03	Programming in C Laboratory	0	0	3	1	3
		Total Credits				**20**	

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SEMESTER – II

Sl. No.	Course Code	Course Name	Hours/ Week			Credit	Contact Hours
			L	T	P	C	
THEORY							
1.	21HSS03	Life Skills and Workplace Psychology	2	0	0	2	2
2.	21BSS22	Advanced Calculus and Complex Analysis	3	2	0	4	5
3.	21BSS03	Bio and Nanomaterials Sciences	3	0	0	3	3
4.	21BSS12	Environmental Science and Engineering	3	0	0	3	3
5.	21GES19	Concepts in Product Design	3	0	0	3	3
6.	21GES08	Python Programming	3	0	0	3	3
PRACTICALS							
7.	21GES10	Soft Skills Laboratory	0	0	3	1	3
8.	21GES09	Programming in Python Laboratory	0	0	3	1	3
9.	21HSS02	Communicative English Practices Laboratory	0	0	2	1	2
		Total Credits				**21**	

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Programme Code & Name: CS & B.E-Computer Science and Engineering

GENERAL ENGINEERING SCIENCE (GES)

21GES01 **PROGRAMMING FOR PROBLEM SOLVING USING C**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

To understand basic programming concepts using C
To gather knowledge for problem solving using function and array.
To illustrate the structure and union.
To examine the memory allocation using pointer.
To construct file handling operations.

COURSE OUTCOMES

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

21GES01.CO1 Understand the fundamentals of C programming
21GES01.CO2 Implement different Operations on arrays and Use functions to pass the arguments.
21GES01.CO3 Illustrate structures and union to store different data items in a single name.
21GES01.CO4 Construct pointer to store address.
21GES01.CO5 Implement file handling operations to read and write the files.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21GES01.CO1	x	x	x	-	x	-	x	-	-	-	-	x	x	-	-
21GES01.CO2	x	x	x	-	x	-	-	-	-	-	-	x	x	-	-
21GES01.CO3	x	x	x	-	x	-	-	-	-	-	-	x	x	-	-
21GES01.CO4	x	x	x	x	x	-	-	-	-	-	-	x	x	x	-
21GES01.CO5	x	x	x	x	x	x	-	-	-	-	-	x	-	x	-

UNIT I **INTRODUCTION TO C PROGRAMMING** **9**

Structure of a C program, Keywords, Identifiers, Data Types, Variables, Constants, Input / Output Statements, Operators, Type conversion and Typecasting, Writing the first C program. Conditional statements: if, if-else, if-else-if, nested if and switch statements. Looping statements: while, do-while and for loop statements, Nested loops. Jumping statements: break and continue.

UNIT II **FUNCTIONS, ARRAYS AND STRINGS** **9**

Functions: Function Declaration/Function Prototype, Function definition, Function call, passing parameters to functions, Recursion function. Arrays: Declaration of arrays, accessing the elements of an array, storing values in arrays , operations on 1-d arrays – Inserting an Element of an array, Deleting an Element from an Array, searching for a Value in an Array, two-dimensional arrays, operations on two dimensional arrays – Sum, Difference. String manipulation : Operations on string - finding the length of a String, Concatenation of given strings.

UNIT III **STRUCTURES AND UNION** **9**

Introduction – need for structure data type – structure definition – Structure declaration – Structure within a structure - Nested structures – Array of structures – Example Program using structures. Union – declare, initialize an union, Example Program using union.

UNIT IV **POINTERS** **9**

Pointers - Introduction to Pointers, Declaring and initializing pointer variables – Pointer to Pointer, Pointer to Array, Pointer to Structure, Pointer Arithmetic, Pointer with Functions, Passing arguments to function using pointers, types of pointers - Null pointer, Void pointer, Wild pointer, Dangling pointer, Complex pointer, Near pointer, Far pointer, Huge pointer.

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UNIT V **FILE PROCESSING** 9

Files – Types of file processing: Sequential access– Sequential access file, Random access - Random access file – Operations on file – open, Read, Write, close, Modes of file, File handling concepts – File read – write – binary and Stdio – File Manipulations, Command line arguments.

TOTAL : L:45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Reema Thareja	Computer Fundamentals and Programming in C	Oxford University Press	Second Edition.
2.	Reema Thareja	Programming in C	Oxford University Press	Second Edition.

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Kernighan, B.W and Ritchie,D.M	The C Programming language	Second Edition, Pearson Education	2006
2.	Paul Deitel and Harvey Deitel	C How to Program	Second Edition, Pearson Education	1994
3.	Pradip Dey, Manas Ghosh	Fundamentals of Computing and Programming in C	First Edition, Oxford University Press	2009

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21GES02 PROGRAMMING FOR PROBLEM SOLVING TECHNIQUES

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

1. To understand basic programming concepts
2. To provide knowledge for problem solving through programming
3. To provide hands-on experience with the concepts

COURSE OUTCOMES

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

21GES02.CO1 Understand the fundamentals of C programming
21GES02.CO2 Choose the loops and decision making statements to solve the problem
21GES02.CO3 Implement different Operations on arrays and Use functions to solve the given problem
21GES02.CO4 Develop Simple Python Programs using Appropriate Syntax, Control Structure and Expression
21GES02.CO5 Explain the Concept of Tuples and Files in Python Programming Language

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21GES02.CO1	x	-	x	x	-	-	-	-	-	x	-	x	x	x	x
21GES02.CO2	x	x	-	-	x	-	-	-	-	-	-	-	x	-	-
21GES02.CO3	x	x	x	x	x	-	-	-	-	-	x	x	x	x	-
21GES02.CO4	x	-	x	x	x	-	-	-	x	-	-	-	x	-	x
21GES02.CO5	x	-	x	x	x	-	-	-	x	-	-	x	x	x	x

UNIT I INTRODUCTION TO C PROGRAMMING 9

Introduction to computer software, Program Design Tools: Algorithms, Flowcharts, Pseudo codes, Structure of a C program, Writing the first C program, Keywords, Identifiers, Basic Data Types in C, Variables, Constants, Input / Output Statements in C, Operators in CArithmetic, Relational, Logical, Conditional, Type conversion and Typecasting.

UNIT II CONDITIONAL AND LOOPING STATEMENTS 9

Conditional branching statements, if, if-else, if-else-if and switch statements, Iterative statements, while, do-while and for loop statements, Nested loops, the break and continue statements.

UNIT III FUNCTIONS AND ARRAYS 9

Functions: Function Declaration/Function Prototype, Function definition, Function call, passing parameters to functions. Arrays: Declaration of arrays, accessing the elements of an array, storing values in arrays, operations on 1-d arrays – Inserting an Element of an array, Deleting an Element from an Array, searching for a Value in an Array, two-dimensional arrays, operations on twodimensional arrays – Sum, Difference.

UNIT IV INTRODUCTION TO PYTHON PROGRAMMING 9

Introduction- Python interpreter and interactive mode- Creating and executing Python program- Data types: Numeric, Boolean, string, List, tuple and Dictionary-Comments- Expressions- Conditional statements: if, if-else and if-elif-else- Iterative statements: while, for, continue and pass- Functions- Fruitful functions- Recursive functions- Illustrative programs: Linear search and Binary search

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UNIT V **STRINGS, LISTS, TUPLES AND DICTIONARIES** **9**

Strings: Assignment- String slices and String methods- Lists: List operations and list methods-Tuples: Tuple assignment and Tuple operations- Dictionaries: Operations and methods. Illustrative Programs: Quick sort and Merge sort.

TOTAL:L: 45

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Reema Thareja	Computer Fundamentals and Programming in C	Oxford University Press	Second Edition

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Reema Thareja	Programming in C	Oxford University Press	Second Edition
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.

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21GES03	PROGRAMMING IN C LAB	L	T	P	C
		0	0	2	1

COURSE OBJECTIVES :

1. Write a basic C Program
2. Learn the knowledge about Array.
3. Execute the programs using String and pointer.
4. Understand the concept about Structure and Union.
5. Develop the program using File concept.

COURSE OUTCOMES:

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

21GES03.CO1 summarize the looping statement and decision making statements to work out various C programs.

21GES03.CO2 Illustrate one dimensional and two dimensional array for matrix.

21GES03.CO3 Construct Structures and Union to store information in a single name.

21GES03.CO4 Formulate to handling string operations.

21GES03.CO5 Implement file handling operations to read and write the files

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21GES03.CO1	x	x	x	-	-	-	-	-	-	-	-	-	x	x	-
21GES03.CO2	x	x	x	-	-	-	-	-	-	-	-	-	-	x	x
21GES03.CO3	x	x	x	-	-	-	-	-	-	-	-	-	-	x	x
21GES03.CO4	-	x	x	-	x	-	-	-	-	-	-	-	-	x	x
21GES03.CO5	-	x	x	-	x	-	-	-	-	-	-	-	-	x	x

LIST OF PROGRAMS

1. Develop a program to find the largest of three numbers.
2. Develop an interactive program to calculate roots of quadratic equation by accepting the coefficients.
3. Develop a program to sum the series: 1/1! + 4/2! + 27/3! +..... using functions.
4. Develop a program to insert a number at a given location in an array.
5. Develop a program to read a two dimensional array "marks" which stores marks of 5 students in three subjects. Display the highest marks in each subject
6. Develop a program to concatenate two strings and determine the length of the concatenated string
7. Develop a program to read and display the information about a student using structures.
8. Develop a program to read and display the information about an employee using Union.
9. Implement a program to enter a character and then determine whether it is a vowel or not using pointers.
10. Develop a program to read data from the keyboard, write it to a file called "Input", again read the same data from the "Input" file and display it on the screen.

TOTAL :P: 30

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21GES04	PROGRAMMING IN C AND PYTHON LAB	L	T	P	C
		0	0	2	1

COURSE OBJECTIVES

1. Write a basic C Program and Python program.
2. Learn the knowledge about Array in C.
3. Execute the Matrix programs using C.
4 Understand the concept about list in Python.
5. Analysis searching techniques in python.

COURSE OUTCOMES

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

21GES04.CO1 Implement the program using loop and functions in C.
21GES04.CO2 Illustrate two dimensional array in C.
21GES43.CO3 Work out various basic programs in Python.
21GES04.CO4 Print the maximum number from the list using python.
21GES04.CO5 Build searching using python

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21GES04.CO1	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X
21GES04.CO2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
21GES04.CO3	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X
21GES04.CO4	X	X	X	X	X	X	X	-	-	X	X	X	X	X	X
21GES04.CO5	X	X	X	X	X	X	X	-	-	-	X	X	X	X	X

LIST OF PROGRAMS

1. Develop a C program to find the largest of three numbers.
2. Develop an interactive C program to calculate roots of quadratic equation by accepting the coefficients.
3. Develop a C program to sum the series: 1/1! + 4/2! + 27/3! +..... using functions.
4. Develop a C program to insert a number at a given location in an array.
5. Implement a C program to perform a Fibonacci series.
6. Develop a C program to read a two dimensional array "marks" which stores marks of 5 students in three subjects. Display the highest marks in each subject.
7. Write a Python program to find GCD of two numbers.
8. Write a Python Program to find the square root of a number by Newton's Method.
9. Write a Python program to find the exponentiation of a number.
10. Write a Python Program to find the maximum from a list of numbers.
11. Write a Python Program to perform Linear Search.

TOTAL :P: 30

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21GES08 **PYTHON PROGRAMMING**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

1. To understand basic programming concepts using C
2. To know about function and string
3. Python data types Lists, Tuples and Dictionaries
4. To construct file handling operations, modules and packages using python.
5. To Exemplify the concept of Tensorflow and Keras.

COURSE OUTCOMES

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

21GES08.CO1 Understand the fundamental concepts of python programming.
21GES08.CO2 Classify various string operations and passing arguments using function.
21GES08.CO3 Explicate python data types Lists, Tuples and Dictionaries
21GES08.CO4 Implement file handling operations and exception handling.
21GES08.CO5 Exemplify the concept of Tensorflow and Keras.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21GES08.CO1	x	x	-	-	x	x	-	x	x	-	x	-	x	x	-
21GES08.CO2	x	x	x	x	x	x	-	x	-	x	x	x	x	x	x
21GES08.CO3	x	x	-	x	-	x	-	x	x	x	x	-	x	-	x
21GES08.CO4	x	x	x	x	x	-	x	x	-	x	x	x	-	x	x
21GES08.CO5	x	x	x	x	-	-	x	x	x	x	x	x	x	x	x

UNIT I **INTRODUCTION** 9

The way of programming-What is programming- debugging – formal and natural languages - Python: Features - Installing - Running – Python interpreter and interactive mode. Values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass.

UNIT II **FUNCTIONS, STRINGS** 9

Functions, function definition and use, flow of execution. Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays.

UNIT III **LISTS, TUPLES, DICTIONARIES** 9

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension.

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UNIT IV **FILES, MODULES, PACKAGES** 9

Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages.

UNIT V **TENSOR FLOW, KERAS** 9

Tensorflow : Introduction to Tensorflow, Tensorflow - graphs, Variables, placeholders. Download and install Tensorflow. Keras – Introduction to Keras, Keras installation, Keras layers and modules.

TOTAL:L: 45

TEXT BOOK

Sl.no	Author(s)	Title of the book	Publisher	Year of publication
1.	Allen B. Downey	Think Python: How to Think Like a Computer Scientist	O'Reilly Publishers	2016
2.	Guido van Rossum and Fred L. Drake Jr	An Introduction to Python	Network Theory Ltd	2011
3.	Matthew Scarpino	TensorFlow For Dummies	Wiley Publication	2018
4.	Antonio Gulli, Sujit Pal	Deep Learning with Keras	Packt Publishing	2017

REFERENCE BOOK

Sl.no	Author(s)	Title of the book	Publisher	Year of publication
1.	Charles Dierbach	Introduction to Computer Science using Python: A Computational Problem-Solving Focus	Wiley India Edition	2013
2.	John V Guttag	Introduction to Computation and Programming Using Python	MIT Press	2013
3.	Kenneth A. Lambert	Fundamentals of Python: First Programs	CENGAGE Learning	2012
4.	Paul Gries, Jennifer Campbell and Jason Montojo	Practical Programming: An Introduction to Computer Science using Python 3	Pragmatic Programmers,LLC	2013
5.	Timothy A. Budd	Exploring Python	Mc-Graw Hill Education (India) Private Ltd	2015

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PROFESSIONAL CORE (PC)

21GES09	PROGRAMMING IN PYTHON LAB	L	T	P	C
		0	0	2	1

COURSE OBJECTIVES :

1. Write basic Python program.
2. Learn the knowledge about searching and sorting techniques.
3. Understand command line arguments.
4. Simulate the game.

   To illustrate Tensorflow and Keras.

COURSE OUTCOMES:

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

21GES09.CO1 Summarize the basic programs using python.

21GES09.CO2 Build various searching and sorting techniques.

21GES09.CO3 Implement the coding for matrices.

21GES09.CO4 Evaluate Command line arguments.

21GES09.CO5 Simulate game using python program.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21GES09.CO1	x	x	-	x	x	x	-	x	x	x	x	x	x	x	-
21GES09.CO2	x	x	x	x	x	x	-	x	-	x	x	x	x	x	x
21GES09.CO3	x	x	-	-	x	x	-	x	x	x	x	-	x	-	x
21GES09.CO4	x	x	x	x	x	-	x	x	-	x	x	x	-	x	x
21GES09.CO5	x	x	x	x	-	-	x	x	x	-	x	x	X	x	x

LIST OF PROGRAMS

1. Compute the GCD of two numbers.
2. Find the square root of a number (Newton's method)
3. Develop a python program for Exponentiation (power of a number)
4. Find the maximum of a list of numbers
5. Develop a python program to Selection sort, Insertion sort
6. Implement divide and conquer method using Merge sort
7. Find first n prime numbers using python
8. Implement matrix multiplication using 2 dimensional array.
9. Programs that take command line arguments (word count)
10. Find the most frequent words in a text read from a file

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11. Simulate elliptical orbits in Pygame
12. Simulate bouncing ball using Pygame
13. Object detection using Tensorflow.
14. Object detection using Keras.

TOTAL :P: 30

PLATFORM NEEDED
Python 3 interpreter for Windows/Linux

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		L	T	P	C
21CSF01	DATA STRUCTURES AND ALGORITHMS	3	0	0	3

COURSE OBJECTIVES

1. To know about the basic concepts of data structures and algorithms.
2. Apply the different linear and non-linear data structures for problem Solutions.
3. To understand the limitations of Algorithm Notations.
4. Exemplify the concept of Stack and Queue with suitable Applications
5. Classify the Tree Data structures and explain the suitable Applications.

COURSE OUTCOMES

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

21CSF01.CO1	Identify the appropriate efficient data structure for given problem
21CSF01.CO2	Develop applications using stack and queue data structures
21CSF01.CO3	Design linked list data structures for various applications
21CSF01.CO4	Implement various tree data structure
21CSF01.CO5	Compare efficiency of various sorting techniques and Demonstrate the hash function concepts of collision and its resolution methods

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSF01.CO1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
21CSF01.CO2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
21CSF01.CO3	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X
21CSF01.CO4	X	X	X	X	X	X	X	-	-	X	X	X	X	X	X
21CSF01.CO5	X	X	X	X	X	X	X	-	-	X	X	X	X	X	X

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

Basic Terminologies: Elementary Data Organizations, Data Structure Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time Space trade off. Searching: Linear Search and Binary Search Techniques and their complexity analysis.

UNIT II **STACKS AND QUEUES** **9**

ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: E pression Conversion and evaluation – corresponding algorithms and complexity analysis. ADT queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each types of Queues: Algorithms and their analysis.

UNIT III **LINKED LIST** **9**

Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of stack and queue ,header nodes, doubly linked list ; operations on it and algorithm Analysis; circular linked list :all operations their algorithms and complexity analysis.

UNIT IV **TREES** **9**

Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with Complexity analysis. Applications of Binary Trees. B Tree, B+ Tree: definitions, algorithms and analysis.

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UNIT V **SORTING AND HASHING** **9**

Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods, Hashing Techniques

TOTAL:L: 45

TEXT BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	M.A.Weiss	Data Structures and Algorithm Analysis in C++	Pearson Education Asia	2013
2.	Ellis Horowitz, SartajSahni	Fundamentals of Data Structures	Computer Science Press	2004

REFERENCE BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Michael T. Goodrich, Roberto Tamassia, David M. Mount	Data Structures and Algorithms in C++	Second Edition	2009
2.	G. A. V. PAI	Data structures and algorithms in C++	1st Edition	2008

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21CSF02	DATA STRUCTURES USING C++ LAB	L	T	P	C
		0	0	2	1

COURSE OBJECTIVES :

2. write a C++ Program
2. Learn the knowledge about linked list
3. Execute the programs in Stack, Queue, Tree
4. Provide the knowledge about various searching and sorting techniques.

COURSE OUTCOMES:

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

21CSF02.CO1 Classify various operations on singly and doubly linked list

21CSF02.CO2 Illustrate stack programs using C++.

21CSF02.CO3 Apply the concept of queue using an array.

21CSF02.CO4 Develop binary search tree and B-tree

21CSF02.CO5 Build various sorting techniques

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSF02.CO1	X	X	X	X	X	X	X		X	X	X	X	X	X	X
21CSF02.CO2	X	X	X	X	X	X	X		X	X	X	X	X	X	X
21CSF02.CO3	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X
21CSF02.CO4	X	X	X	X	X	X	X	-	-	X	X	X	X	X	X
21CSF02.CO5	X	X	X	X	X	X	X	-	-	X	X	X	X	X	X

LIST OF PROGRAMS

1. Write a C++ program that uses functions to perform the following: a) Create a singly linked list of integers. b) Delete a given integer from the above linked list. c) Display the contents of the above list after deletion
2. Write a template based C++ program that uses functions to perform the following: a) Create a doubly linked list of elements. b) Delete a given element from the above doubly linked list. c) Display the contents of the above list after deletion.
3. Write a C++ program that uses stack operations to convert a given infix expression into its postfix equivalent, Implement the stack using an array.
4. Write a C++ program to implement a double ended queue ADT using an array, using a doubly linked list.
5. Write a C++ program that uses functions to perform the following: a) Create a binary search tree of characters. b) Traverse the above Binary search tree recursively in preorder, in order and post order
6. Write a C++ program that uses function templates to perform the following: a) Search for a key element in a list of elements using linear search. b) Search for a key element in a list of sorted elements using binary search.
7. Write a C++ program that implements Insertion sort algorithm to arrange a list of integers in ascending order.

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8. Write a template based C++ program that implements selection sort algorithm to arrange a list of elements in descending order.
9. Write a C++ program that implements Heap sort algorithm for sorting a list of integers in ascending order.
10. Write a C++ program that implements Merge sort algorithm for sorting a list of integers in ascending order

TOTAL :P: 30

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21CSF03 **DATABASE MANAGEMENT SYSTEMS**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

1. Identify the basic concepts and various data model used in database design ER modeling concepts and architecture
2. Recognize the use of normalization and functional dependency, indexing and hashing technique used in database design.
3. Apply the concept of transaction, concurrency control and recovery in database
4. Formulate the solution to data retrieval and data update using SQL
5. Demonstrate PL/SQL programming using Cursor Management and Triggers

COURSE OUTCOMES

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

21CSF03.CO1	Understand to draw the E-R diagram for the given Relation and use the Data model in Database Design
21CSF03.CO2	Apply the Normalization in optimize storage space
21CSF03.CO3	Design the Hashing Techniques and B+ Tree
21CSF03.CO4	Analysis the Concept of Transaction with Concurrency Control and Timestamp in Database
21CSF03.CO5	Evaluate SQL queries on Data Retrieval

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSF03.CO1	X	X	X	-	-	-	-	-	X	-	X	X	X	X	-
21CSF03.CO2	X	X	X	X	X	X	-	-	-	-	X	X	X	X	X
21CSF03.CO3	X	X	X	X	X	-	-	X		X	X	X	X	-	X
21CSF03.CO4	X	X	X	X	-	-	-	X	-	X	X	X	X	X	X
21CSF03.CO5	X	X	X	X	-	X	-	X	-	-	X	X	X	X	X

UNIT I **INTRODUCTION AND CONCEPTUAL MODELING** 9

Introduction to File and Database systems- Database system structure – Data Models – Introduction to Network and Hierarchical Models – ER model – Relational Model – Relational Algebra and Calculus.

UNIT II **RELATIONAL MODEL** 11

SQL – Data definition- Queries in SQL- Updates- Views – Integrity and Security – Relational Database design – Functional dependencies and Normalization for Relational Databases (up to BCNF).

UNIT III **DATA STORAGE AND QUERY PROCESSING** 9

Record storage and Primary file organization- Secondary storage Devices- Operations on Files- Heap File- Sorted Files- Hashing Techniques – Index Structure for files –Different types of Indexes- B-Tree - B+Tree – Query Processing.

UNIT IV **TRANSACTION MANAGEMENT** 9

Transaction Processing – Introduction- Need for Concurrency control- Desirable properties of Transaction- Schedule and Recoverability- Serializability and Schedules – Concurrency Control – Types of Locks- Two Phases locking- Deadlock- Time stamp based concurrency control – Recovery Techniques – Concepts- Immediate Update- Deferred Update - Shadow Paging.

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UNIT V **CURRENT TRENDS** 7

Object Oriented Databases – Need for Complex Data types- OO data Model- Nested relations- Complex Types- Inheritance Reference Types - Distributed databases- Homogenous and Heterogeneous- Distributed data Storage – XML – Structure of XML- Data- XML Document- Schema- Querying and Transformation. – Data Mining and Data Warehousing

TOTAL:L : 45

TEXT BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Abraham Silberschatz, Henry F.Korth S.Sudharshan	Database System Concepts	Tata McGraw-Hill	2013
2.	Ramez Elma sri Shamkant B.Navathe	Fundamentals of Database Systems	Pearson Education	2011

REFERENCE BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Raghu Ramakrishnan Johannes Gehrke	Database Management Systems	Tata McGraw-Hill	2014
2.	Hector Garcia-Molina Jeffrey D.Ullman Jennifer Widom	Database Systems: The Complete book	Pearson Education	2013
3.	Shefali Naik	Concepts of Database Management Systems	Pearson Education	2013
4.	G.K.Gupta	Database Management Systems	Tata McGraw Hill	2011
5.	RobCornell	Database Systems Design and Implementation	Cengage Learning	2011

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21CSF04 **DATABASE MANAGEMENT SYSTEMS LAB**

L	T	P	C
0	0	2	1

COURSE OBJECTIVES:

1.	Understand and Write a query
2.	To design a simple DB using data modeling techniques.
3.	Analysis various DB tool.
4.	Construct the VB as front end and DB SQL as back end.
5.	Implement PL/SQL program in real time.

COURSE OUTCOMES:

At the end of the course, the students will be able to	
21CSF04.CO1	Execute query using SQL DML/DDL Commands.
21CSF04CO2	Implement programs using PL/SQL including stored procedures, cursors, packages etc
21CSF04.CO3	Construct real time database application using current techniques.
21CSF04.CO4	Analyses the DB tool in various real time application.
21CSF04.CO5	Develop the VB as front end and SQL as back end.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSF04.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	X
21CSF04CO2	X	X	X	X	X	X	-	-	-	-	X	X	X	X	X
21CSF04.CO3	X	X	X	X	X	-	-	X		X	X	X	X	X	X
21CSF04.CO4	X	X	X	X	-	X	-	X	-	X	X	X	X	X	X
21CSF04.CO5	X	X	X	X	X	X	-	X	-	-	X	X	X	X	X

LIST OF PROGRAMS

1. Implementation of DDL commands in RDBMS.
2. Implementation of DML and DCL commands in RDBMS.
3. Implementation of Date and Built in Functions of SQL.
4. Implementation of Simple Programs in PL/SQL
5. Implementation of High-level language extension with Cursors.
6. Implementation of High-level language extension with Triggers
7. Implementation of stored Procedures and Functions.
8. Embedded SQL.
9. Database design using E-R model and Normalization.
10. Database Connectivity using ADO
11. Database Connectivity using ODBC
12. Database Connectivity using JDBC

TOTAL :P: 30

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21CSF05 **COMPUTER ORGANIZATION AND ARCHITECTURE**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

1. To understand the basic structure of a digital computer
2. To familiarize with implementation of fixed point and floating-point arithmetic operations
3. To enhance the processor operation by employing pipelining
4. To understand the concept of various memories and interfacing
5. To expose with different ways of communicating with I/O devices and standard I/O interfaces

COURSE OUTCOMES

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

21CSF05.C01	Describe data representation, instruction formats and the operation of a digital computer
21CSF05.CO2	Illustrate the fixed point and floating-point arithmetic for ALU operation
21CSF05CO3	Discuss about implementation schemes of control unit and analyze pipeline performance
21CSF05.CO4	Evaluate performance of memory systems
21CSF05.CO5	Identify the methods of accessing I/O devices and the use of standard I/O interfaces

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSF05.C01	X	-	-	-	X	-	-	X	-	-	-	-	-	-	X
21CSF05.CO2	x	-	-	x	x	x	-	-	-	-	x	-	-	x	-
21CSF05CO3	-	x	x	-	x	-	x	-	-	-	-	-	-	x	-
21CSF05.CO4	-	-	x	x	x	-	x	-	-	-	-	-	x	-	-
21CSF05.CO5	-	-	x	-	x	-	x	-	-	-	x	-	-	x	-

UNIT I **BASIC STRUCTURE OF COMPUTERS** **9**

Functional Units - Basic Operational Concepts - Bus Structures - Performance - Memory Locations and Addresses - Memory Operations - Instruction and Instruction Sequencing - Addressing Modes - Basic I/O Operations

UNIT II **ARITHMETIC UNIT** **9**

Addition and Subtraction of Signed Numbers - Design of Fast Adders - Multiplication of Positive Numbers - Signed Operand Multiplication - Fast Multiplication - Integer Division - Floating Point Numbers and Operations

UNIT III **BASIC PROCESSING UNIT AND PIPELINING** **9**

Fundamental Concepts - Execution of a Complete Instruction - Multiple Bus Organization - Hardwired Control - Microprogrammed Control - Pipelining - Basic Concepts - Data Hazards - Instruction Hazards - Influence on Instruction Sets - Datapath and control considerations - Superscalar operation

UNIT IV **MEMORY SYSTEM** **9**

Basic Concepts - Semiconductor RAM - ROM - Speed, Size and Cost - Cache Memories -Performance Considerations - Virtual Memory - Memory Management Requirements Secondary Storages.

UNIT V **INPUT / OUTPUT ORGANIZATION** **9**

Accessing I/O Devices – Interrupts – Direct Memory Access – Buses—Standard I/O Interfaces (PCI, SCSI, USB).

TOTAL:L : 45

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TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Carl Hamacher, ZvonkoVranesic and SafwatZaky	Computer Organization	Fifth Edition, McGraw-Hill	2002
2.	V.P. Heuring, H.F. Jordan	Computer Systems Design and Architecture	Second Edition, Pearson Education	2004
3.	Govindarajalu	Computer Architecture and Organization, Design Principles and Applications	First edition, Tata Mc Graw Hill	2005

REFERENCE BOOKS :

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	William Stallings	Computer Organization and Architecture - Designing for Performance	Ninth Edition, Prentice Hall	2012
2.	David A.Patterson and John L.Hennessy	Computer Organization and Design: The hardware/ software interface	Fourth Edition, Morgan Kaufmann	2012
3.	John P.Hayes	Computer Architecture and Organization	Third Edition, McGraw Hill	2012
4.	J. Murdocca and Vincent P. Heuring	Computer Architecture and Organization: An Integrated approach	Second edition, Wiley India Pvt Ltd	2015
5.	Behrooz Parhami	Computer Architecture	Oxford University Press	2007

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21CSF06 **OBJECT ORIENTED PROGRAMMING**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

1. Understand Object Oriented Programming concepts and basic characteristics of Java
2. Illustrate the principles of packages, inheritance and interfaces
3. Describe exceptions and use I/O streams
4. Develop a java application with threads and generics classes
5. Build simple Graphical User Interfaces

COURSE OUTCOMES

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

21CSF06.CO1 Understand Java programs using OOP principles
21CSF06.CO2 Apply Java programs with the concepts inheritance and interfaces
21CSF06.CO3 Construct Java applications using exceptions and I/O streams
21CSF06.CO4 Develop Java applications with threads and generics classes
21CSF06.CO5 Implement interactive Java programs using swings

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSF06.CO1	X	-	-	-	X	-	-	X	-	-	-	-	-	-	X
21CSF06.CO2	x	-	-	x	x	x	-	-	-	-	x	-	-	x	-
21CSF06.CO3	-	x	x	-	x	-	x	-	-	-	-	-	-	x	-
21CSF06.CO4	-	-	x	x	x	-	x	-	-	-	-	-	x	-	-
21CSF06.CO5	-	-	x	-	x	-	x	-	-	-	x	-	-	x	-

UNIT I INTRODUCTION TO OOP AND JAVA FUNDAMENTALS 9

Object Oriented Programming - Abstraction – objects and classes - Encapsulation- Inheritance - Polymorphism- OOP in Java – Characteristics of Java – The Java Environment - Java Source File -Structure – Compilation. Fundamental Programming Structures in Java – Defining classes in Java – constructors, methods -access specifiers - static members - Comments, Data Types, Variables, Operators, Control Flow, Arrays , Packages - JavaDoc comments.

UNIT II INHERITANCE AND INTERFACES 9

Inheritance – Super classes- sub classes –Protected members – constructors in sub classes- the Object class – abstract classes and methods- final methods and classes – Interfaces – defining an interface, implementing interface, differences between classes and interfaces and extending interfaces - Object cloning -inner classes, Array Lists – Strings.

UNIT III EXCEPTION HANDLING AND I/O 9

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

UNIT IV : MULTITHREADING AND GENERIC PROGRAMMING 9

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

UNIT V EVENT DRIVEN PROGRAMMING 9

Graphics programming - Frame – Components - working with 2D shapes - Using color, fonts, and images - Basics of event handling - event handlers - adapter classes - actions - mouse events - 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.

TOTAL:L : 45

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TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Herbert Schildt	Java The complete reference", 8th Edition	McGrawHill Education	2011
2.	Cay S. Horstmann, Gary cornell	"Core Java Volume –I Fundamentals", 9th Edition	Prentice Hall	2013

REFERENCE BOOKS :

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
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	Pearson Education	2000
4.	Robert Lafore	Object-oriented programming in Microsoft C++	Pearson Education	1991
5.	Vaskaran Sarcar	Interactive Object-Oriented Programming in Java: Learn and Test Your Programming Skills	Apress	2016

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21CSF07	COMPUTER NETWORKS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES :

1. To Understand the state-of-the-art in network protocols, architectures and applications.
2. To Gain knowledge about the functions of different network layers
3. To be familiar with the transmission media and tools
4. To learn about IEEE standards in computer networking
5. To get familiarized with different protocols and network components

COURSE OUTCOMES :

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

21CSF07.CO1 Paraphrase the role of each layer in computer networks and its protocols.

21CSF07.CO2 Develop scheme for error detection and correction and Select flow control algorithm at link to link level.

21CSF07.CO3 Evaluate the performance of various routing algorithms in networks.

21CSF07.CO4 Analyze the flow control and congestion control algorithms for QoS at end to end level.

21CSF07.CO5 Define the actual communication and cryptographic authentication.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSF07.CO1	x	-	x	-	-	x	-	-	-	-	-	x	-	x	-
21CSF07.CO2	-	x	-	-	x	x	-	-	-	x	x	-	x	x	-
21CSF07.CO3	-	-	x	-	-	x	-	-	x	-	-	x	-	-	x
21CSF07.CO4	x	x	-	x	-	-	x	-	-	x	-	-	x	-	-
21CSF07.CO5	x	-	-	-	-	x	x	-	-	x	-	x	x	-	-

UNIT I **INTRODUCTION** **8**

Overview: Data Communication -Network Types–Topology-Network model: OSI Model, T C P /IP Protocol Suite-Performance-Transmission Media: Guided Media-Unguided Media .

UNIT II **DATA LINK LAYER** **10**

Error Detection and Correction - Flow Control-Data Link Control-Data Link Layer Protocols- HDLC- PPP- Media Access Control-Ethernet- WirelessLANs:IEEE802.11,Bluetooth

UNIT III **NETWORK LAYER** **9**

Logical Addressing: IPv4Addresses – subnetting – CIDR - IPv6Addresses–Internetworking -IPv4-IPv6-Transition from IPv4 to IPv6–AddressMapping: ARP- RARP- DHCP

UNIT IV **ROUTING AND TRANSPORT LAYER** **9**

Routing Protocols : Distance Vector Routing – Link state Routing- RIP–OSPF–BGP- Multicast Routing. Transport Layer: UDP - Overview of TCP- TCP flow control- TCP Error control - Congestion Control - Quality of Service

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UNIT V **APPLICATION LAYER AND SECURITY** **9**

World Wide Web and HTTP - FTP - Electronic Mail -Domain Name System - Cryptographic Algorithms - Authentication Protocols - Message Integrity Protocols - Firewalls.

TOTAL: L : 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	William Stallings	Data and Computer Communications	Pearson Education	2013
2.	Behrouz A Forouzan	Data Communications and Networking	Tata McGraw–Hill, New Delhi	2013

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Larry L. Peterson, Bruce S. Davie	Computer Networks: A Systems Approach	Morgan Kaufmann Publishers Inc.,	2011
2.	James F. Kurose, Keith W. Ross	Computer Networking, A Top–Down Approach Featuring the Internet	Pearson Education	2012

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21CSF08 **COMPUTER NETWORKS LAB**

L	T	P	C
0	0	2	1

COURSE OBJECTIVES:

1. To Learn a communicate between two desktop computers
2. Learn to implement the different protocols
3. To Be familiar with IP Configuration
4. To Be familiar with the various routing algorithms
5. To Be familiar with simulation tools in NS

COURSE OUTCOMES:

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

21CSF08.CO1 Demonstrate the Communication Error between two desktop computers

21CSF08.CO2 Select the different protocols in link-to-link level

21CSF08.CO3 Design a Program using sockets for command

21CSF08.CO4 Illustrate and compare the various routing algorithms

21CSF08.CO5 Use the simulation tool and code for classical Encryption Techniques

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSF08.CO1	-	-	x	-	-	x	-	-	-	-	-	x	-	x	-
21CSF08.CO2	-	x	-	-	x	x	-	-	-	x	x	-	x	x	-
21CSF08.CO3	-	-	x	-	-	x	-	-	x	-	-	x	-	-	x
21CSF08.CO4	x	x	-	x	-	-	x	-	-	x	-	-	x	-	-
21CSF08.CO5	x	-	-	-	-	x	x	-	-	x	-	x	x	-	-

LIST OF PROGRAMS

. 1. Implementation of Error Detection / Error Correction Techniques

. 2. Implementation of Stop and Wait Protocol

. 3. Implementation of Sliding window Protocol

. 4. Implementation of Go Back NARQ

. 5. Implementation of Socket Programming, Echo, Ping Command and Talk Command

. 6. Implementation of Network Topology

. 7. Implementation of Distance Vector Routing Algorithm (RIP on Packet Tracer)

. 8. Implementation of Link State Routing Algorithm (OSPF on Packet Tracer)

. 9. Study the performance of network with CSMA / CA protocol and compare with CSMA/CD protocols

10. Implementation of High-Level Data Link Control

11. Study and Implementation of Network simulator (NS)

12. Implementation of Encryption and Decryption Algorithm

TOTAL: P : 30

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21CSF09 **OPERATING SYSTEMS**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

1. Understand the Fundamental Concepts of Operating Systems
2. Analysis Threads and Scheduling Algorithm.
3. Summarize on Memory management that includes deadlock detection algorithms .
4. Examine the mechanisms involved in Storage management.
5. Illustrate different OS and compare their features.

COURSE OUTCOMES

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

21CSF09.CO1 Recall the basic architectural components involved in design an operating system.

21CSF09.CO2 Recognize the various scheduling algorithms for different types of operating system.

21CSF09.CO3 Construct resource management techniques and handling Deadlock issues.

21CSF09.CO4 Investigate to change the disk structure and access the files.

21CSF09.CO5 Integrate the different operating systems.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSF09.CO1	-	-	x	-	-	x	-	-	-	-	-	x	-	x	-
21CSF09.CO2	-	x	-	-	x	x	-	-	-	x	x	-	x	x	-
21CSF09.CO3	-	-	x	-	-	x	-	-	x	-	-	x	-	-	x
21CSF09.CO4	x	x	-	x	-	-	x	-	-	x	-	-	x	-	-
21CSF09.CO5	x	-	-	-	-	x	x	-	-	x	-	x	x	-	-

UNIT I **OPERATING SYSTEMS OVERVIEW** 9

Operating system functions, Operating system structure, operating systems Operations, protection and security, Computing Environments, Open- Source Operating Systems System Structures: Operating System Services, User and Operating-System Interface, systems calls, Types of System Calls, system programs, operating system structure, operating system debugging, System Boot. Processes: Process concept, process Scheduling, Operations on processes, Inter process Communication, Examples of IPC systems.

UNIT II **THREADS AND SCHEDULING ALGORITHMS** 9

Multicore Programming, Multithreading Models, Thread Libraries, Threading Issues. Process Synchronization: The critical-section problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic problems of synchronization, Monitors, Synchronization examples, Alternative approaches. CPU Scheduling: Scheduling-Criteria, Scheduling Algorithms, Thread Scheduling, Multiple Processor Scheduling, Real-Time CPU Scheduling, Algorithm Evaluation

UNIT III **MEMORY MANAGEMENT** 9

SSwapping, contiguous memory allocation, segmentation, paging, structure of the page table. Virtual memory: demand paging, page-replacement. Allocation of frames, Thrashing, Memory Mapped Files, Allocating Kernel Memory Deadlocks: System Model, deadlock characterization, Methods of handling Deadlocks, Deadlock prevention, Detection and Avoidance, Recovery from deadlock.

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UNIT IV **STORAGE AND FILE MANAGEMENT** **9**

Mass-storage structure, Disk structure, Disk attachment, Disk scheduling, Swap-space management, RAID structure, Stable-storage implementation. File system Interface: The concept of a file, Access Methods, Directory and Disk structure, File system mounting, File sharing, Protection. File system Implementation: File-system structure, File-system Implementation, Directory Implementation, Allocation Methods, Free-Space management..

UNIT V **CASE STUDY – LINUX SYSTEM** **9**

Linux System- Basic Concepts; System Administration-Requirements for Linux System Administrator, Setting up a LINUX Multifunction Server, Domain Name System, Setting Up Local Network Services; Virtualization- Basic Concepts, Setting Up Xen, VMware on Linux Host and Adding Guest OS.

TOTAL:L : 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Abrham Silberchatz, Peter B. Galvin, Greg Gagne	Operating System Concepts	Wiley,9th Edition	2014
2.	William. Stallings	Operating Systems – internals and Design Principles	Pearson,7th Edition	2012

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Andrew S Tanenbaum,	Modern Operating Systems	PHI, Second Edition	2009
2.	D M Dhamdhere	Operating Systems: A Concept-Based Approach	Tata Mc-graw Hill Publishing3rd Edition	2012
3.	Charles Crowley	Operating System: A Design-Oriented A pproach	Tata Mc-graw Hill Publishing 1ST edition	2009
4.	Evi Nemeth , Garth Snyder, Trent R. Hein , Ben Whaley , Dan Mackin	UNIX and Linux System Administration Handbook	Prentice Hall of India, 4th Edition	2010
5.	Harvey M. Deitel	Operating Systems	Pearson Education, 3rd Edition.	2007

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21CSF10 **OPERATING SYSTEMS LAB**

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Course Objectives:

1. Remember programs in Linux environment using system call.
2. Understand the scheduling algorithms.
3. Apply page replacement algorithms.
4. Analyze file allocation methods.
5. Create and implement IPC mechanism using named and unnamed pipes.

Course Outcomes:

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

21CSF10.CO1	Enumerate to develop application programs using system calls in Unix.
21CSF10.CO2	Estimate interprosses communication between two processes.
21CSF10.CO3	Develop and solve synchronization problems.
21CSF10.CO4	Analyze to simulate operating system concepts such as scheduling, deadlock management, file management, and memory management.
21CSF10.CO5	Integrate to develop application programs using system calls in Unix.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSF10.CO1	-	-	X	-	-	X	-	-	-	-	-	X	-	X	-
21CSF10.CO2	-	X	-	-	x	X	-	-	-	X	x	-	X	x	-
21CSF10.CO3	-	-	X	-	-	X	-	-	X	-	-	X	-	-	X
21CSF10.CO4	X	X	-	X	-	-	X	-	-	X	-	-	X	-	-
21CSF10.CO5	X	-	-	-	-	X	X	-	-	X	-	X	X	-	-

LIST OF PROGRAMS

1. Basics of Unix Commands
2. Write C programs to simulate the following CPU scheduling algorithms: a) Round Robin b) SJF
3. Write C programs to simulate the following CPU scheduling algorithms: a) FCFS b) Priority.
4. Write a C program to copy the contents of one file to another using system calls.
5 Write a C program to simulate Bankers Algorithm for Dead Lock Avoidance
6. Write a C program to simulate Bankers Algorithm for Dead Lock Prevention
7 Write C programs to simulate the following page replacement algorithms: a) FIFO b) LRU c) LFU
8. Write C programs to simulate the following techniques of memory management: a) Paging b) Segmentation
9. Write a C program to implement the ls | sort command. (Use unnamed Pipe)
10. Write a C program to solve the Dining- Philosopher problem using semaphores.
11. Write C programs to simulate the following File organization techniques: a) Single level directory b) Two level c) Hierarchical
12. Write C programs to simulate the following File allocation methods: a) Contiguous b) Linked c) Indexed

TOTAL:P : 30

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21CSF11 **DESIGN AND ANALYSIS OF ALGORITHMS**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

1. Introduce various Mathematical techniques for representation and manipulation of the data in the real world.
2. Expose students to a variety of technique for designing and analyzing algorithms
3. Summarize the choice of Data Structures and algorithms by designing the performance of programs
4. Formulate the time order analysis for an algorithm to prove the correctness of an algorithm
5. To understand the differences between tractable and intractable problems.

COURSE OUTCOMES

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

21CSF11.CO1 Identify algorithm design methodology to solve problems.
21CSF11.CO2 Analyze the algorithm efficiency by means of mathematical Notations
21CSF11.CO3 Empathize the limitation of Computations
21CSF11.CO4 Design algorithms for network flows
21CSF11.CO5 Differentiate algorithm design techniques of P and NP classes of problems

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSF11.CO1	x	x	x	x	x	x	x	-	x	-	x	x	x	x	x
21CSF11.CO2	x	x	x	x	x	x	x	-	x	x	x	x	x	x	x
21CSF11.CO3	x	x	x	x	x	x	x	x	-	x	x	x	x	x	x
21CSF11.CO4	x	x	x	x	x	x	x	-	-	x	x	x	x	x	x
21CSF11.CO5	x	x	x	x	x	x	x	-	-	-	x	x	x	x	x

UNIT I **INTRODUCTION** 9

Introduction-Algorithm definition, Algorithm Specification, Performance Analysis-Space complexity, Time complexity, Randomized Algorithms. Divide and conquer- General method, applications - Binary search, Merge sort, Quick sort, Strassen's Matrix Multiplication.

UNIT II **BACKTRACKING** 9

Disjoint set operations, union and find algorithms, AND/OR graphs, Connected Components and Spanning trees, Bi-connected components, Backtracking-General method, applications-The 8-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles.

UNIT III **GREEDY METHOD** 9

Greedy method- General method, applications- Knapsack problem, Job sequencing with deadlines, Minimum cost spanning trees, Single source shortest path problem.

UNIT IV **DYNAMIC PROGRAMMING** 9

Dynamic Programming- General Method, applications- Chained matrix multiplication, All pairs shortest path problem, Optimal binary search trees, 0/1 knapsack problem, Reliability design, Traveling sales person problem.

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UNIT V **BRANCH AND BOUND & NP-HARD, NP-COMPLETE PROBLEMS** 9

Branch and Bound- General Method, applications-0/1 Knapsack problem, LC Branch and Bound solution, FIFO Branch and Bound solution, Traveling sales person problem.NP-Hard and NP-Complete problems- Basic concepts, Non-deterministic algorithms, NP -Hard and NP- Complete classes, Cook's theorem.

TOTAL:L : 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Ellis Horowitz, SartajSahni and S. Rajasekharan	Fundamentals of Computer Algorithms, 2nd Edition	Universities Press	2008
2.	P. H. Dave	Design and Analysis of Algorithms	H.B.Dave,2nd edition, Pearson Education	2013

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	M. T. Goodrich and R. Tomassia	Algorithm Design: Foundations, Analysis and Internet examples	John Wiley and sons	2006
2.	S. Sridhar	Design and Analysis of Algorithms	Oxford Univ. Press	2014
3.	Aho, Ullman and Hopcroft	Design and Analysis of algorithms	Pearson Education	1974
4.	R. Neapolitan and K. Naimipour	Foundations of Algorithms	4th edition,Jones and Bartlett Student edition	2011
5.	T. H. Cormen, C. E.Leiserson, R. L. Rivest and C. Stein	Introduction to Algorithms	PHI,3rd Edition	2009

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21CSF12 **SOFTWARE ENGINEERING**

L	T	P	C
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COURSE OBJECTIVES :

1. To Understand the software life cycle models
2. Learn Requirement analysis and fundamental concepts
3. Understand the various software design methodologies
4. Acquire knowledge on Software testing and risk management
5. Apply different techniques to measure software performance

COURSE OUTCOMES :

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

21CSF12.CO1 Apply the concepts of life cycle models to choose the appropriate model.
21CSF12.CO2 Analysis the requirements and design the software.
21CSF12.CO3 Construct a design for a real-world problem.
21CSF12.CO4 Design and develop test cases.
21CSF12.CO5 Work with version control and work on configuration and release management plans.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSF12.CO1	x	-	-	-	x	-	-	x	-	-	-	-	-	-	x
21CSF12.CO2	x	-	-	x	x	x	-	-	-	-	x	-	-	x	-
21CSF12.CO3	-	x	x	-	x	-	x	-	-	-	-	-	-	x	-
21CSF12.CO4	-	-	x	x	x	-	x	-	-	-	-	-	x	-	-
21CSF12.CO5	-	-	x	-	x	-	x	-	-	-	x	-	-	x	-

UNIT I **SOFTWARE PROCESS AND AGILE DEVELOPMENT** 9

Introduction to Software Engineering, Software Process, Perspective and Specialized Process Models –Introduction to Agility-Agile process-Extreme programming-XP Process.

UNIT II **REQUIREMENTS ANALYSIS AND SPECIFICATION** 9

Software Requirements: Functional and Non-Functional, User requirements, System requirements, Software Requirements Document – Requirement Engineering Process: Feasibility Studies, Requirements elicitation and analysis, requirements validation, requirements management Classical analysis: Structured system Analysis, Petri Nets-Data Dictionary.

UNIT III **SOFTWARE DESIGN** 9

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

UNIT IV **TESTING AND IMPLEMENTATION** 9

Software testing fundamentals-Internal and external views of Testing-white box testing - basis path testing-control structure testing-black box testing- Regression Testing – Unit Testing – Integration Testing – Validation Testing – System Testing and Debugging – Software Implementation Techniques: Coding practices-Refactoring.

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UNIT V **PROJECT MANAGEMENT** **9**

Estimation – FP Based, LOC Based, Make/Buy Decision, COCOMO Model I,II - Planning – Project Plan, Planning Process, RFP Risk Management – Identification, Projection, RMMM - Scheduling and Tracking –Relationship between people and effort, Task Set & Network, Scheduling, EVA - Process and Project Metrics.

TOTAL:L : 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Roger S.Pressman	Software Engineering – A Practitioner`s Approach	7th Edition McGraw-Hill Education	2010
2.	Pankaj Jalote	Software Engineering- A Precise Approach	Wiley India	2010
3.	Sommerville	Software Engineering	9th edition, Pearson education	2001

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	K. K. Agarval, Yogesh Singh	Software Engineering	3rd edition, New Age International Publishers	2007
2.	Lames F. Peters, Witold Pedrycz	Software Engineering an Engineering approach	John Wiely & Sons	2000
3.	Shely Cashman Rosenblatt	Systems Analysis and Design	6th edition, Thomson, Publications	2006
4.	Ali Behforooz and Frederick J Hudson	Software Engineering Fundamentals	Oxford University Press, New Delhi,	1996
5.	Sheikh Umar Farooq, S. M. K Quadri and Nesar Ahmad	Software Testing Techniques Evaluation – An Empirical Approach	Lambert Academic Publishing, Germany,	Dec 2012 (ISBN: 978-3-659-19538-9)

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21CSF13 **SERVICE ORIENTED ARCHITECTURE**

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COURSE OBJECTIVES :

1. Provide a foundation upon which all technologies and strategies around XML are based.
2. Analysis the tools and techniques needed to make use of XML in a robust manner
3. Understand the basic concepts of SOA, comparison with older architectures and principles of service orientation and different service layers of SOA.
4. Illustrate about web services, messaging with SOAP and to learn about advanced concepts such as Orchestration and Choreography
5. Describe about various WS-* specification standards

COURSE OUTCOMES :

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

21CSF13.CO1 Design the XML based application to transfer and store the data in network application.
21CSF13.CO2 Evaluate the XML document with the help of parsing, DOM and XSLT.
21CSF13.CO3 Creation of service based program and SOA features to design client server program.
21CSF13.CO4 Develop web services and web programs with SOAP, WSDL and UDDI.
21CSF13.CO5 Building SOA-Based Applications with J2EE, .Net and ASP.Net technologies.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSF13.CO1	-	-	x	x	x	-	-	x	-	-	x	-	x	-	-
21CSF13.CO2	x	-	x	x	x	-	x	-	-	-	x	-	-	-	x
21CSF13.CO3	-	x	x	-	x	-	x	-	-	-	-	-	-	x	-
21CSF13.CO4	-	-	x	x	x	-	x	-	-	-	-	-	x	-	-
21CSF13.CO5	-	-	x	-	x	-	x	-	-	-	x	-	-	x	-

UNIT I **XML INTRODUCTION** 9

XML document structure –Elements - Well formed and valid documents – Namespaces – DTD – XML Schema X-Files-XML Query – XML link –XML path.

UNIT II **BUILDING XML - BASED APPLICATIONS** 9

Parsing XML – using DOM, - XML Tree – XML Attributes - SAX – XML Transformation and XSLT – XSL Formatting – Modeling Databases in XML.

UNIT III **SERVICE ORIENTED ARCHITECTURE** 9

Roots of SOA - Characteristics of SOA - Comparing SOA with Client-Server and Distributed architectures – Benefits of SOA - Principles of Service orientation – Service layer abstraction – Application Service Layer – Business Service Layer – Orchestration Service Layer- Anatomy of SOA- How components in an SOA interrelate - Principles of service orientation

UNIT IV **WEB SERVICES** 9

Service descriptions – WSDL – Messaging with SOAP – Service discovery – UDDI – Message Exchange Patterns – Coordination –Atomic Transactions – Business activities - Orchestration – Choreography –WS Transactions.

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UNIT V **BUILDING SOA-BASED APPLICATIONS** **9**

Service Oriented Analysis and Design – Service Modeling – Design standards and guidelines - Composition – WS-BPEL – WS-Coordination – WS-Policy – WS-Security – SOA support in J2EE - SOA support in .NET - ASP.NET web forms – ASP.NET web services.

TOTAL:L : 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Ron Schmelzer et al	XML and Web Services	Pearson Education	2002
2.	Thomas Erl	Service Oriented Architecture: Concepts, Technology, and Design	Pearson Education	2005

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Frank P.Coyle	XML, Web Services and the Data Revolution	Pearson Education	2002
2.	Eric Newcomer, Greg Lomow	Understanding SOA with Web Services	Pearson Education	2005
3.	Sandeep Chatterjee , James Webber	Developing Enterprise Web Services: An Architect's Guide	Prentice Hall	2004
4.	James McGovern,Sameer Tyagi, Michael E.Stevens, Sunil Mathew	Java Web. Services Architecture	Morgan Kaufmann Publishers	2003
5.	Dmitri Ilkaev, Art Sedighi	SOA eBook Patterns, Mashups, Governance, Service Modeling, and More	Pearson Education	2009

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21CSF14 **MOBILE COMMUNICATION** **L T P C**
3 0 0 3

COURSE OBJECTIVES :

1. Understand the fundamentals of mobile communication
2. Apply the typical mobile networking infrastructure through a popular GSM protocol
3. Summarize the basics of mobile telecommunication system.
4. Identify the Mobile Network Layer Functionalities of Mobile communication.
5. Define the functions of Transport and Application layers

COURSE OUTCOMES :

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

21CSF14.CO1 State the basics of mobile telecommunication system
21CSF14.CO2 Illustrate the generations of telecommunication systems in wireless network
21CSF14.CO3 Understand the architectures, the challenges and the Solutions of Wireless Communication
21CSF14.CO4 Identify solution for each functionality at each layer
21CSF14.CO5 Analyze the functionality of Transport and Application layer

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSF14.CO1	-	-	X	-	-	X	-	-	-	-	-	X	-	X	-
21CSF14.CO2	-	X	-	-	x	X	-	-	-	X	x	-	X	x	-
21CSF14.CO3	-	-	X	-	-	X	-	-	X	-	-	X	-	-	X
21CSF14.CO4	X	X	-	X	-	-	X	-	-	X	-	-	X	-	-
21CSF14.CO5	X	-	-	-	-	X	X	-	-	X	-	X	X	-	-

UNIT I **WIRELESS COMMUNICATION FUNDAMENTALS** **9**

Introduction – Wireless transmission – Frequencies for radio transmission – Signals – Antennas – Signal Propagation – Multiplexing – Modulations – Spread spectrum – MAC – SDMA – FDMA – TDMA – CDMA – Cellular Wireless Networks.

UNIT II **TELECOMMUNICATION NETWORKS** **11**

Telecommunication systems – GSM – GPRS – DECT – Satellite Networks - Basics – Parameters and Configurations – Capacity Allocation – FAMA and DAMA – Broadcast Systems – DAB - DVB.

UNIT III **WIRELESS LAN** **9**

Wireless LAN – IEEE 802.11 - Architecture – services – MAC – Physical layer – IEEE 802.11a - HIPERLAN – Blue Tooth.

UNIT IV **MOBILE NETWORK LAYER** **9**

Mobile IP – Dynamic Host Configuration Protocol - Routing – DSDV – DSR – Alternative Metrics.

Unit V **TRANSPORT AND APPLICATION LAYERS** **7**

Traditional TCP – Classical TCP improvements – WAP- Introduction to 4G mobile networks- Case study – Mobile multimedia networks.

TOTAL: L : 45

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TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Jochen Schiller	Mobile Communications	PHI/Pearson Education.Second Edition	2003
2.	William Stallings	Wireless Communications and Networks	PHI/Pearson Education	2002

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Kaveh Pahlavan, Prasanth Krishnamoorthy	Principles of Wireless Networks	PHI/Pearson Education	2003
2.	Uwe Hansmann, Lothar Merk, Martin S, Nicklons and Thomas Stober	Principles of Mobile Computing	Springer, New York	2003
3.	Hazysztof Wesolowshi	Mobile Communication Systems	John Wiley and Sons Ltd	2002

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21CSF15 **MOBILE APPLICATION LAB** **L T P C**
0 0 2 1

COURSE OBJECTIVES:

1.Apply the fundamental design paradigms and technologies to mobile computing applications

2. Design consumer and enterprise mobile applications using representative mobile devices and platforms using modern development methodologies.

3.Implement the skills of finding solutions and building software for mobile computing applications

4. Discuss wireless communication and networking principles, which support connectivity to cellular networks, wireless internet and sensor devices.

5. Classify user Interfaces for the Android platform.

COURSE OUTCOMES :

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

21CSF15.CO1	Understand the characteristics and limitations of mobile hardware devices including their user-interface modalities.
21CSF15.CO2	The ability to develop applications that are mobile-device specific and demonstrate current practice in mobile computing contexts.
21CSF15.CO3	A comprehension of the design of context-aware solutions for mobile devices.
21CSF15.CO4	Develop various Android applications related to layouts & rich uses interactive interfaces
21CSF15.CO5	Illustrate the Mobile Network performance parameters and design decisions.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSF15.CO1	-	-	x	-	-	x	-	-	-	-	-	x	-	x	-
21CSF15.CO2	-	x	-	-	x	x	-	-	-	x	x	-	x	x	-
21CSF15.CO3	-	-	x	-	-	x	-	-	x	-	-	x	-	-	x
21CSF15.CO4	x	x	-	x	-	-	x	-	-	x	-	-	x	-	-
21CSF15.CO5	x	-	-	-	-	x	x	-	-	x	-	x	x	-	-

LIST OF PROGRAMS

1. Study of WML and J2ME simulators
2. Design of simple Calculator having +,,,* and / using WML/J2ME
3. Design of Calendar for any given month and year using WML/J2ME
4. Design a Timer to System Time using WML/J2ME
5. Design of simple game using WML/J2ME
6. Animate an image using WML/J2ME
7. Design a personal phone book containing the name, phone no., address, e-mail, etc
8. Simulation of Authentication and encryption technique used in GSM
9. Browsing the Internet using Mobile phone simulator
10. Study of GlomoSim Simulator

TOTAL:P : 30

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21CSF16 **DATA ANALYTICS USING R AND PYTHON**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES :

1. Understand the important keywords in R like Business Intelligence, Business Analytics
2. Analysis the sample of a dirty data set and perform Data Cleaning on it, resulting in a data set, which is ready for any analysis
3. Apply the basic concepts of clustering techniques in real time application
4. Implement the Practical Data Science Using Python
5. Construct using Numpy, pandas and Jupyter Notebook environment for writing, testing, and debugging Python code

COURSE OUTCOMES :

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

21CSF16.CO1	Understand the basics in R programming in terms of constructs, control statements, string functions
21CSF16.CO2	Apply critical programming language concepts such as data types, iteration, control structures, functions, and boolean operators
21CSF16.CO3	Implement a variety of data formats into R using RStudio
21CSF16.CO4	Analyze a data set in numpy and pandas
21CSF16.CO5	Visualize data attributes using matplotlib and other R packages

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSF16.CO1	x	x	-	-	-	-	-	-	-	-	-	-	x	x	-
21CSF16.CO2	x	-	x	-	x	-	-	-	-	-	-	x	-	-	-
21CSF16.CO3	x	-	-	x	x	-	-	-	-	-	-	-	-	x	-
21CSF16.CO4	-	x	x	x	x	-	-	-	x	-	-	x	-	x	x
21CSF16.CO5	-	x	x	x	x	-	-	-	x	-	-	x	x	-	x

UNIT I **INTRODUCTION TO DATA ANALYTICS** 9

Introduction to terms like Business Intelligence, Business Analytics, Data, Information, how information hierarchy can be improved/introduced, understanding Business Analytics and R, knowledge about the R language, its community and ecosystem, understand the use of 'R' in the industry, compare R with other software in analytics, , perform basic operations in R using command line, learn the use of IDE R Studio and Various GUI, use the 'R help' feature in R, knowledge about the worldwide R community collaboration.

UNIT II **DATA MANIPULATION IN R** 9

Import data from spreadsheets and text files into R, import data from other statistical formats like sas7bdat and spss, packages installation used for database import, connect to RDBMS from R using ODBC and basic SQL queries in R, basics of Web Scraping.

UNIT III **CLUSTERING TECHNIQUES** 9

The Matplotlib 2D plotting library Understanding the shell, Using Git and GitHub, Best-practice software engineering techniques, Nlp, Recommended System

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UNIT IV **INTRODUCTION TO NUMPY PANDAS** 9

Python 3.5,The Numpy package for scientific computing, The pandas data analysis library, including reading and writing of CSVfiles,The Juypter and PyDev development environments.

UNIT V **APPLICATION OF PYTHON** 9

The Matplot lib 2D plotting library Understanding the shell, Using Git and GitHub, Best-practice software engineering techniques, Nlp, Recommended System.

TOTAL:L : 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Gareth James,Daniela Written	An introduction to statistical iearning with application R	Springer	2019
2.	Mark Lutz, O'Reilly Media	Learning Python	ISBN 978-1-4493-5573-9	5th Edition, 2013
3.	Gareth James,Daniela Written	An introduction to statistical learning with application R	Springer	2019

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	KOSUKE IMAI	Quantitative social science an Introduction	Springer	2017
2.	by Wes McKinny, O'Reilly Media	Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython	ISBN 978-1-4493-1979-3	2012
3.	Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar,	Introduction to Parallel Computing	Pearson; 2 edition ISBN 978	January 26, 2003
4.	Nathan Marz, James Warren	Principles and best practices of scalable real-time data systems	1st Edition, , ISBN 978	2017
5.	Bharti Motwani	Data Analytics with R	Kindle Edition	1 January 2019

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21CSF17 **THEORY OF COMPUTATION** **L T P C**
3 0 0 3

COURSE OBJECTIVES :

1. Introduce the models of Finite Automata.
2. Describe about types of Grammar and its properties.
3. Demonstrate the conversion of Context Free Grammars in to CNF and GNF.
4. Provide an overview of Pushdown automata
5. Discuss about the implementation of Turing machines.

COURSE OUTCOMES :

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

21CSF17.CO1 Design Finite Automata using its theoretical concept.
21CSF17.CO2 Convert Regular expressions to FA and minimize Automata.
21CSF17.CO3 Simplify CFG to CNF and GNF
21CSF17.CO4 Design PDA for the Given Grammar.
21CSF17.CO5 Construct Turing Machine for given grammar

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSF17.CO1	x	x	x	-	-	-	-	-	-		-		x	x	-
21CSF17.CO2	x	x	-	-	x	-	-	-	-	-	-	-	x	x	-
21CSF17.CO3	x	x	x	-	-	-	-	-	-	-	-	-	-	x	x
21CSF17.CO4	x	x	x	-	-	-	-	-	-	-	-	-	-	x	x
21CSF17.CO5	-	x	x	-	-	-	-	x	-	-	-	-	x	x	-

UNIT I **FINITE AUTOMATA** **9**

Introduction- Basic Mathematical Notation and techniques- Finite State systems – Basic Definitions – Finite Automaton – DFA &NDFA– Finite Automaton with ϵ- moves — Equivalence of NFA and DFA – Equivalence of NDFA's with and without ϵ-moves – Minimization of DFA.

UNIT II **REGULAR EXPRESSIONS AND LANGUAGES** **9**

Chomsky hierarchy of languages. -Types of Grammar -Regular Expression – Proving languages not to be regular – Problems based on Pumping Lemma-Equivalence of Finite Automaton and Regular expressions -Minimization of FA-Pumping Lemma for Regular sets –Closure Properties of Regular Languages.

UNIT III **CONTEXT-FREE GRAMMAR AND LANGUAGES** **9**

Grammar Introduction–Context Free Grammars and Languages– Derivations -Parse Trees – Ambiguity – Simplification of CFG – Elimination of Useless symbols - Unit productions – Null productions – Greiback Normal form –Chomsky normal form – Problems related to CNF and GNF.

UNIT IV **PUSHDOWN AUTOMATA** **9**

Pushdown Automata- Definitions – Moves – Instantaneous descriptions – Deterministic and Non- Deterministic pushdown automata – Equivalence of Pushdown automata and CFG - Pumping lemma for CFL – Problems based on pumping Lemma. Closure Properties of CFL.

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UNIT V **TURING MACHINES & UNDECIDABILITY** 9

Turing machines: Models –Techniques for TM construction – Multi head and Multi tape Turing Machines -Universal Turing machine – Problems on Turing machine. Recursive and recursively enumerable languages-The Halting Problem –An undecidable problem that is RE – Undecidable problems about Turing Machine-.Post's Correspondence Problem - The classes P and NP Problems.

TOTAL:L : 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Hopcroft J.E., Motwani R. and Ullman J.D	Introduction to Automata Theory, Languages and Computations	Pearson Education Second Edition	2008
2.	John C Martin	Introduction to Languages and the Theory of Computation	Tata McGraw Hill Publishing Company Third Edition	2007

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Mishra K L P and Chandrasekaran N	Theory of Computer Science - Automata, Languages and Computation	Prentice Hall of India Third Edition	2004
2.	Harry R Lewis and Christos H Papadimitriou	Elements of the Theory of Computation	Prentice Hall of India, Pearson Education Second	2003
3.	Peter Linz	An Introduction to Formal Language and Automata	Narosa Publishers	2002
4.	Kamala Krithivasan and Rama. R	Introduction to Formal Languages, Automata Theory and Computation	Pearson Education	2009
5.	Wayne Goddard	Introducing the Theory of Computation	Clemson University	2008

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21CSF18 **CLOUD COMPUTING** **L T P C**
3 0 0 3

COURSE OBJECTIVES:

1. Describe three cloud deployment models, and Overview of AWS Global infrastructure.
2. Understand the different AWS core services.
3. Formulate virtual firewalls with security groups.
4. Review the availability differences of alternative database solutions.
5. Summarize the AWS Shared Responsibility Model, Examine IAM users, groups, and roles.

COURSE OUTCOMES:

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

21CSF18.CO1 Construct three cloud deployment models, and Overview of AWS Global infrastructure.
21CSF18.CO2 Implement the different AWS compute services.
21CSF18.CO3 Create virtual firewalls with security groups.
21CSF18.CO4 Construct the availability of different alternative database solutions.
21CSF18.CO5 Implement AWS Shared Responsibility Model, Examine IAM users, groups, and roles.

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO2	PO3	PO4	PO5	PO6	FO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSF18.CO1	x	x	x	-	-	-	-	-	-		-		x	x	-
21CSF18.CO2	x	x	-	-	x	-	-	-	-	-	-	-	x	x	-
21CSF18.CO3	x	x	x	-	-	-	-	-	-	-	-	-	-	x	x
21CSF18.CO4	x	x	x	-	-	-	-	-	-	-	-	-	-	x	x
21CSF18.CO5	-	x	x	-	-	-	-	x	-	-	-	-	x	x	-

UNIT I **CLOUD CONCEPTS** 9

Cloud Concepts Overview - Introduction to Cloud Computing, Advantages of Cloud Computing, CC Reference Model, Introduction to Amazon Web Services (AWS), AWS Cloud Adoption Framework (CAF). Cloud Economics - Fundamentals of Pricing, Total Cost of Ownership, AWS Global Infrastructure Overview - AWS Global Infrastructure, AWS Service and Service Category Overview.

UNIT II **AWS CORE SERVICES** 9

Compute - Compute Services Overview, Introduction to Amazon Elastic Compute Cloud (EC2), Amazon EC2 Cost Optimization, Introduction to AWS Lambda, Introduction to AWS Elastic Beanstalk. Storage - Amazon Elastic Block Store (EBS), Amazon Simple Storage Service (S3), Amazon Elastic File System (EFS), Amazon Glacier. VPC - Amazon Virtual Private Cloud (VPC), Amazon VPC Security Groups, Amazon CloudFront,. Database - Amazon Relational Database Service (RDS), Amazon DynamoDB, Amazon Redshift, Amazon Aurora. Balancing, Scaling, Monitoring - Elastic Load Balancing (ELB), Amazon CloudWatch, Auto Scaling.

UNIT III **CLOUD SECURITY** 9

AWS Shared Responsibility Model, AWS Identity and Access Management (IAM), AWS Trusted Advisor, AWS CloudTrail, AWS Config, AWS Day One Best Practice Review, AWS Security and Compliance Programs, AWS Security Resources.

UNIT IV **CLOUD ARCHITECTING** 9

Introduction to the Well-Architected Framework, Well-Architected Design Principles, Understanding Reliability and High Availability.

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UNIT V **CLOUD SUPPORT** **9**

Introduction to AWS Organizations, AWS Cost Explorer, Overview of AWS Technical Support Plans and Costs, Microsoft azure, Google app Engine.

TOTAL :L: 45

TEXT BOOKS:

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
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.	Rajkumar Buyya, Christian Vecchiola, S Thamarai Selvi	Mastering Cloud Computing	Tata McGraw Hill	2013

REFERENCE BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	John W. Rittinghouse and James F. Ransome	Cloud Computing: Implementation, Management, and Security	CRC Press	2010
2.	Bernard Golden	Amazon Web Service For Dummies	John Wiley & Sons, Inc	2013
3.	Mitch Tulloch with the Windows Azure Team	Introducing Windows Azure	Microsoft Press	2013
4.	Barrie Sosinsky	Cloud Computing Bible	Wiley India	2015
5.	Gautam Shroff	Enterprise Cloud Computing	Cambridge	2010

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21CSF19 **CLOUD COMPUTING LAB**

L	T	P	C
0	0	2	1

COURSE OBJECTIVES:

1.To understand and study Amazon EC2

2. To work with EBS.

3.To build VPC, web server and DB server

4.To build the DB Server.

5.To construct scale and load balance of cloud architecture.

COURSE OUTCOMES:

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

21CSF19.CO1 Construct Amazon EC2

21CSF19.CO2 Examine with EBS

21CSF19.CO3 Develop VPC, web server and DB server

21CSF19.CO4 Assemble DB Server.

21CSF19.CO5 Implement scale and load balance of cloud architecture.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSF19.CO1	x	x	x	-	-	-	-	-	-	x	-		x	x	-
21CSF19.CO2	x	x	-	-	x	-	x	-	-	-	-	-	x	x	-
21CSF19.CO3	x	x	x	-	-	-	-	-	-	x	-	-	-	x	x
21CSF19.CO4	x	x	x	-	-	-	-	-	-	-	-	-	-	x	x
21CSF19.CO5	-	x	x	-	-	-	-	x	-	-	-	-	x	x	-

LIST OF PROGRAMS

1. Introduction to Amazon EC2
2. Working with EBS
3. Build VPC and Launch a Web Server
4. Build DB Server and Interact with DB Using an App
5. Scale and Load Balance Architecture
6. Introduction to AWS IAM
7. Sandbox.
8. Use GAE launcher to launch the web applications.
9. Simulate a Cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim.
10. Install Hadoop single node cluster and run simple applications like word count.

TOTAL:P : 30

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21CSF20 **COMPILER DESIGN**

L	T	P	C
3	0	0	3

Course Objectives :

1. To understand the basic concepts of compilers.
2. To explore the functions of Lexical Analyzer.
3. Be familiar with various parsing techniques.
4. To describe the process of Syntax directed translation and Intermediate Code Generation.
5. To learn the concepts of Code Generation and Code Optimization

Course Outcomes :
At the end of the course, the students will able to

21CSF20.CO1	Construct the various phases of compiler using compiler construction tools
21CSF20.CO2	Design a lexical analyzer using LEX language
21CSF20.CO3	Apply different parsing algorithms to develop parser for a grammar
21CSF20.CO4	Generate the Intermediate Languages for code generation
21CSF20.CO5	Implement code generation schemes and optimized compilers

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSF20.CO1	x	-	-	-	-	-	x	x	-	x	-	x	x	-	-
21CSF20.CO2	-	-	x	-	x	x	-	x	x	x	-	-	x	-	x
21CSF20.CO3	-	x	-	-	-	x	x	-	-	-	x	x	-	x	-
21CSF20.CO4	x	-	x	x	x	-	-	-	x	-	x	-	x	-	x
21CSF20.CO5	x	x	x	x	-	-	-	-	x	-	-	x	x	x	-

UNIT I **INTRODUCTION TO COMPILERS** 7

Translators-Compilation and Interpretation-Language processors -The Phases of Compiler-Errors Encountered in Different Phases-The Grouping of Phases-Compiler Construction Tools.

UNIT II **LEXICAL ANALYSIS** 9

Role of Lexical Analyzer-Lexical Errors-Expressing Tokens by Regular Expressions-Converting Regular Expression to DFA- Minimization of DFA-Language for Specifying Lexical Analyzers-LEX-Design of Lexical Analyzer for a sample Language.

UNIT III **SYNTAX ANALYSIS** 10

Role of the Parser-Context Free Grammars -Top Down Parsing -General Strategies-Recursive Descent Parser, Predictive Parser-LL(1) Parser-Shift Reduce Parser-LR Parser -LR(0) Item Construction of SLR Parsing Table - Introduction to LALR Parser - Error Handling and Recovery in Syntax Analyzer-YACC-Design of a syntax Analyzer for a Sample Language .

UNIT IV **SYNTAX DIRECTED TRANSLATION & INTERMEDIATE CODE GENERATION** 9

Syntax directed Definitions- Run-Time Environments- Storage Organization-Storage Allocation Strategies. Intermediate Code Generation – Intermediate languages – Declarations – Assignment Statements-Boolean expressions – Case statements- Backpatching - Procedure calls.

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UNIT V **CODE OPTIMIZATION AND CODE GENERATION** **10**

Principal Sources of Optimization-DAG- Optimization of Basic Blocks-Issues in Design of a Code Generator - A Simple Code Generator Algorithm. Case Study: Single pass and two pass compilers.

TOTAL:L: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Alfred V Aho, Monica S. Lam, Ravi Sethi and Jeffrey D Ullman	Compilers – Principles, Techniques and Tools	Pearson Education	2014

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Randy Allen, Ken Kennedy	Optimizing Compilers for Modern Architectures: A Dependence-based Approach	Morgan Kaufmann Publishers	2002
2.	Steven S. Muchnick	Advanced Compiler Design and Implementation	Morgan Kaufmann Publishers	2003
3.	Keith D Cooper and Linda Torczon	Engineering a Compiler	Elsevier Science	2004
4.	Charles N. Fischer, Richard. J. LeBlanc	Crafting a Compiler with C	Crafting a Compiler with C	2008

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21CSF21 **COMPILER DESIGN LAB**

L	T	P	C
0	0	2	1

COURSE OBJECTIVES :

1. To study and understand Lexical Analyzer using Lex tool & Syntax Analyzer or parser using YACC Tool
2. To implement NFA and DFA from a given regular expression
3. To design front end of the compiler by means of generating Intermediate codes.
4. To construct symbol table.
5. To apply code optimization techniques.

COURSE OBJECTIVES :

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

21CSF21.CO1 Design Lexical analyzer for given language using C and LEX tools.

21CSF21.CO2 Convert BNF rules into YACC form to generate various parsers.

21CSF21.CO3 Generate machine code from the intermediate code forms

21CSF21.CO4 Evaluate the Symbol table

21CSF21.CO5 Implement code optimization techniques.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSF21.CO1	x	-	-	-	-	-	x	x	-	x	-	x	x	-	-
21CSF21.CO2	-	-	x	-	x	x	-	x	x	x	-	-	x	-	x
21CSF21.CO3	-	x	-	-	-	x	x	-	-	-	x	x	-	x	-
21CSF21.CO4	x	-	x	x	x	-	-	-	x	-	x	-	x	-	x
21CSF21.CO5	x	x	x	x	-	-	-	-	x	-	-	x	x	x	-

LIST OF PROGRAMS

1. Construction of NFA.
2. Construction of minimized DFA from a given regular expression.
3. Use LEX tool to implement a lexical analyzer.
4. Use YACC and LEX to implement a parser for the grammar.
5. Implement a recursive descent parser for an expression grammar that generates arithmetic expressions with digits, + and *.
6. Implementation of symbol table
7. Implementation of shift reduced parsing algorithms.
8. Construction of LR parsing table.
9. Generation of code for a given intermediate code.
10. Implementation of code optimization techniques.

TOTAL:P : 30

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21CSF22 ARTIFICIAL INTELLIGENCE FOR INDUSTRY 4.0

L	T	P	C
3	0	0	3

COURSE OBJECTIVES :

1 Align the theory and concepts with Industrial application of computers
2 Introduce the basic concepts of Industry 4.0
3. To gather knowledge about Big Data and Internet of Things.
4. Learn the applications and tools of Industry 4.0
5. To equip the skills for future.

COURSE OUTCOMES :

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

21CSF22.CO1 Understand the basic concepts of Industry 4.0
21CSF22.CO2 Outline the features of Artificial Intelligence
21CSF22.CO3 Summarize the Big data domain stack and Internet of Things
21CSF22.CO4 Identify the applications and Tools of Industry 4.0
21CSF22.CO5 Analyze the skills required for future

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSF22.CO1	X	-	-	-	X	-	-	X	-	-	-	-	-	-	X
21CSF22.CO2	x	-	-	x	x	x	-	-	-	-	x	-	-	x	-
21CSF22.CO3	-	x	x	-	x	-	x	-	-	-	-	-	-	x	-
21CSF22.CO4	-	-	x	x	x	-	x	-	-	-	-	-	x	-	-
21CSF22.CO5	-	-	x	-	x	-	x	-	-	-	x	-	-	x	-

UNIT I INDUSTRY 4.0 9

Need – Reason for Adopting Industry 4.0 - Definition – Goals and Design Principles - Technologies of Industry 4.0 – Big Data – Artificial Intelligence (AI) – Industrial Internet of Things - Cyber Security – Cloud – Augmented Reality.

UNIT II ARTIFICIAL INTELLIGENCE 9

Artificial Intelligence: Artificial Intelligence (AI) – What & Why? - History of AI - Foundations of AI -The AI - Environment - Societal Influences of AI - Application Domains and Tools - Associated Technologies of AI - Future Prospects of AI - Challenges of AI.

UNIT III BIG DATA AND IOT 9

Big Data : Evolution - Data Evolution - Data : Terminologies - Big Data Definitions - Essential of Big Data in Industry 4.0 - Big Data Merits and Advantages - Big Data Components : Big Data Characteristics - Big Data Processing Frameworks - Big Data Applications - Big Data Tools - Big Data Domain Stack : Big Data in Data Science - Big Data in IoT - Big Data in Machine Learning - Big Data in Databases - Big Data Use cases : Big Data in Social Causes - Big Data for Industry - Big Data Roles and Skills - Big Data Roles - Learning Platforms; Internet of Things (IoT) : Introduction to IoT - Architecture of IoT - Technologies for IoT - Developing IoT Applications - Applications of IoT - Security in IoT.

UNIT IV APPLICATIONS AND TOOLS OF INDUSTRY 4.0 9

Applications of IoT – Manufacturing – Healthcare – Education – Aerospace and Defence – Agriculture – Transportation and Logistics – Impact of Industry 4.0 on Society: Impact on Business, Government, People. Tools for Artificial Intelligence, Big Data and Data Analytics, Virtual Reality, Augmented Reality, IoT, Robotics.

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UNIT V **JOBS 2030** 9

Industry 4.0 – Education 4.0 – Curriculum 4.0 – Faculty 4.0 – Skills required for Future - Tools for Education – Artificial Intelligence Jobs in 2030 – Jobs 2030 - Framework for aligning Education with Industry 4.0.

TOTAL:L : 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	P. Kaliraj, T. Devi,	Higher Education for Industry 4.0 and Transformation to Education 5.0	-	-
2.	Alexiei Dingli Foaad Haddod Christina Klüver	Artificial Intelligence in Industry 4.0	First Edition Springer International Publishing	2021

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Alasdair Gilchrist	Industry 4.0: The Industrial Internet of Things	Apress Publications	2017
2.	Prof.SudipMisra	Introduction to Industry 4.0 and Industrial Internet of Things		-

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21CSF23 **OBJECT ORIENTED ANALYSIS AND DESIGN** **L T P C**
3 0 0 3

COURSE OBJECTIVES :

1. Understand the basic concepts of Object Oriented Systems Development
2. Describe how objects change over time.
3. Simplify a pattern using generalization and abstract classes.
4. Validate the UML Interaction diagrams drawn
5. Implementing object mapping to database system

COURSE OUTCOMES :

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

21CSF23.CO1 Analyze the requirements through Unified approach
21CSF23.CO2 Identify the objects, relationships, services and attributes through UML.
21CSF23.CO3 Design the real time application by using General Responsibility Assignment Software Patterns
21CSF23.CO4 Relate class diagrams to equivalent program outlines.
21CSF23.CO5 Develop an appropriate test design for a given test object

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSF23.CO1	X	-	-	-	X	-	-	X	-	-	-	-	-	-	X
21CSF23.CO2	x	-	-	x	x	x	-	-	-	-	x	-	-	x	-
21CSF23.CO3	-	x	x	-	x	-	x	-	-	-	-	-	-	x	-
21CSF23.CO4	-	-	x	x	x	-	x	-	-	-	-	-	x	-	-
21CSF23.CO5	-	-	x	-	x	-	x	-	-	-	x	-	-	x	-

UNIT I **INTRODUCTION TO OOAD** 9

An Overview of Object Oriented Systems Development - Object Basics- object oriented methodologies -Rumbaugh Methodology - Booch Methodology - Jacobson Methodology - Patterns -Frameworks - Unified Approach- Unified Modeling Language

UNIT II **OBJECT ORIENTED ANALYSIS** 9

Identifying use cases - Object Analysis - Classification - Identifying Object relationships - Attributes and Methods. Elaboration - Domain Models - Finding conceptual classes and description classes -Associations - Domain model refinement - Aggregation and Composition- UML activity diagrams and modeling

UNIT III **OBJECT ORIENTED DESIGN** 9

Design axioms - Designing Classes - Access Layer - Object Storage - Object Interoperability- GRASP: Designing objects with responsibilities - Creator - Information expert - Low Coupling - High Cohesion – Controller

UNIT IV **APPLYING DESIGN PATTERNS** 9

System sequence diagrams - Relationship between sequence diagrams and use cases - Logical architecture and UML package diagram - Logical architecture refinement - UML class diagrams - UML interaction diagrams - Applying GoF design patterns- adapter, singleton, factory and observer patterns

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UNIT V **TESTING** **9**

Designing Interface Objects - Software Quality Assurance –Testing strategies-Test cases-Test plan- Continuous Testing -System Usability -Measuring User Satisfaction- Case study- the Next Gen POS system

TOTAL:L : 45

TEXT BOOKS:

Sl.No	Author(s)	Title of The Book	Publisher	Year of Publication
1.	Ali Bahrami,	Object Oriented Systems Development (UNIT I, II, III, V)	Tata McGraw-Hill, New Delhi.	2008
2.	Craig Larman	Applying UML and Patterns: An Introduction to object-oriented Analysis and Design and iterative development (UNIT II,III, IV, V)	Third Edition, Pearson Education	2005

REFERENCE BOOKS:

Sl.No	Author(s)	Title of The Book	Publisher	Year of Publication
1.	Mike O'Docherty	Object-Oriented Analysis & Design: Understanding System Development with UML 2.0	John Wiley & Sons	2005
2.	James W- Cooper	Java Design Patterns – A Tutorial	Addison-Wesley	2000
3.	Micheal Blaha, James Rambaugh,	Object-Oriented Modeling and Design with UML	Second Edition, Prentice Hall of India Private Limited	2007
4.	Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides,	Design patterns Elements of Reusable object-oriented software	Addison-Wesley	1995
5	John Deacon	Object Oriented Analysis and Design	Pearson Education	2009

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21CSF24 **CASE TOOLS LAB** **L T P C**
0 0 2 1

COURSE OBJECTIVES :

1 Understand the concept of d mechanism involved in UML

2. Study the different types of relationships in classes, objects and terms related to diagrams

3. Develop and test the Domain objects layer

4. Apply GOF patterns for viewing a system as a set of procedures.

5.Prepare case studies for Testing techniques

COURSE OUTCOME:

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

21CSF24.CO1 Identify the requirements of project according to the objective

21CSF24.CO2 Design the individual module of the given project

21CSF24.CO3 Implement use case diagrams and add interface to class diagrams.

21CSF24.CO4 Demonstrate Software Development

21CSF24.CO5 Perform a different software testing methods

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSF24.CO1	x	-	-	-	-	-	x	x	-	x	-	x	x	-	-
21CSF24.CO2	-	-	x	-	x	x	-	x	x	x	-	-	x	-	x
21CSF24.CO3	-	x	-	-	-	x	x	-	-	-	x	x	-	x	-
21CSF24.CO4	x	-	x	x	x	-	-	-	x	-	x	-	x	-	x
21CSF24.CO5	x	x	x	x	-	-	-	-	x	-	-	x	x	x	-

LIST OF PROGRAMS

1. To develop a problem statement.
2. Identify Use Cases and develop the Use Case model.
3. Identify the conceptual classes and develop a domain model with UML Class diagram.
4. Using the identified scenarios, find the interaction between objects and represent them using UML Sequence diagrams.
5. Draw relevant state charts and activity diagrams.
6. Identify the User Interface, Domain objects, and Technical services. Draw the partial Layered, logical architecture diagram with UML package diagram notation.
7. Develop and test the Technical services layer.
8. Develop and test the Domain objects layer.
9. Develop and test the User interface layer.

SUGGESTED DOMAINS FOR MINI-PROJECT:

1. Passport automation system.
2. Book bank
3. Exam Registration
4. Stock maintenance system.
5. Online course reservation system
6. E-ticketing
7. Software personnel management system

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8. Credit card processing
9. e-book management system
10. Recruitment system
11. Foreign trading system
12. Conference Management System
13. BPO Management System
14. Library Management System
15. Student Information System

SUGGESTED SOFTWARE TOOLS:

Argo UML, Eclipse IDE, Visual Paradigm, Star UML and Rational Rose Suite.

TOTAL:P:30

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21CSF25 **CRYPTOGRAPHY AND NETWORK SECURITY**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

1. To define the OSI security architecture and classical encryption techniques
2. To describe various block cipher and stream cipher models.
3. To provide necessary Approaches and Techniques to build protection mechanisms in order to secure computer networks
4. To gain the principles of public key cryptosystems, hash functions and digital signature
5. To make the techniques used for message authentication and confidentiality maintenance

COURSE OUTCOMES:

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

21CSF25.CO1 Understand the fundamentals of networks security, security architecture, threats and Vulnerabilities.
21CSF25.CO2 Apply the different cryptographic operations of symmetric cryptographic algorithms.
21CSF25.CO3 Analyze the different cryptographic operations of public key cryptography.
21CSF25.CO4 Evaluate the various Authentication schemes to simulate different applications.
21CSF25.CO5 Design various Security practices and System security standards.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSF25.CO1	x	-	-	x	x	-	x	-	x	-	-	-	x	-	-
21CSF25.CO2	x	-	-	-	-	x	-	x	x	x	-	-	x		-
21CSF25.CO3	x	x	x	-	-	x	-	x	x	x	-	-	-	x	-
21CSF25.CO4	x	x	x	x	x	-	-	-	x	x	x	x	-	x	x
21CSF25.CO5	x	x	x	x	x	-	x	-	x	x	x	x	-	x	x

UNIT I **INTRODUCTION** 9

Computer Security Concepts - OSI Security Architecture - Security Attacks - Services - Mechanisms - Model for Network Security - Classical Encryption Techniques: Symmetric Cipher Model, Substitution: Ceaser cipher, Playfair cipher, Hill Cipher, Vigenere cipher, Vernam cipher - Transposition Techniques: Rail fence, Row and Column Transposition - Steganography.

UNIT II **SYMMETRIC KEY CRYPTOGRAPHY** 9

Number Theory and Finite Fields: The Euclidean Algorithm, Modular Arithmetic, Groups, Rings, and Fields - Traditional Block Cipher Structure - Data Encryption Standard, The Strength of DES - Advanced Encryption Standard - Block Cipher Operation

UNIT III **ASYMMETRIC CIPHERS** 9

Number Theory: Prime Numbers, Fermat's and Euler's Theorems, Primality Testing, The Chinese Remainder Theorem, Public-Key Cryptography: Principles of Public-Key Cryptosystems, The RSA Algorithm - Diffie-Hellman Key Exchange- Elliptic Curve Arithmetic - Elliptic Curve Cryptography

UNIT IV **DATA INTEGRITY ALGORITHMS AND MUTUAL TRUST** 9

Authentication requirement - Authentication function - MAC - Hash function - Security of hash function and SHA – MD5 -Digital Signatures: DSS - Elgamal Digital Signature Scheme - Key Management and Distribution: X.509 Certificates - Kerberos.

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UNIT V **INTERNET AND SYSTEM SECURITY** 9

Electronic Mail security - PGP- IP security - Web Security: SSL - SET- System Security: Malicious Software - Intruders - Firewalls.

TOTAL :L: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	William Stallings	Cryptography and Network Security: Principles and Practice	Pearson Education	2014
2.	Atul Kahate	Cryptography and Network Security	Tata McGraw Hill	2013

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	CharlesB. Pfleeger, Shari Lawrence P fleeger	Security in Computing	Pearson Education	2011
2.	Behrouz A.Foruzan	Cryptography and Network Security	Tata McGraw Hill	2007
3.	William Stallings	Cryptography and Network security Principles and Practices	Pearson Education	2006
4.	Javier López, Gene T sudik	Applied Cryptography and Network Security	Springer	2011
5.	Niels Ferguson	Cryptography Engineering: Design Principles and Practical Applications	JohnWiley	2010

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21CSF26 **CRYPTOGRAPHY AND NETWORK SECURITY LAB** **L T P C**
0 0 2 1

COURSE OBJECTIVES:

1. To know different cipher techniques
2. Develop the Various Security Algorithm
3. To study network security tools and vulnerability assessment tools
4. To generate different open source tools for network security and analysis

COURSE OUTCOMES:

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

21CSF26.CO1 Develop code for classical Encryption Techniques to solve the problems

21CSF26.CO2 Build cryptosystems by applying symmetric and public key encryption algorithms

21CSF26.CO3 Construct code for authentication algorithms

21CSF26.CO4 Develop a signature scheme using Digital signature standard

21CSF26.CO5 Demonstrate the network security system using open source tools

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSF26.CO1	X	-	-	X	X	-	X	-	X	-	-	-	X	-	-
21CSF26.CO2	X	-	-	-	-	X	-	X	X	X	-	-	X		-
21CSF26.CO3	X	X	X	-	-	X	-	X	X	X	-	-	-	X	-
21CSF26.CO4	X	X	X	X	X	-	-	-	X	X	X	X	-	X	X
21CSF26.CO5	X	X	X	X	X	-	X	-	X	X	X	x	-	X	X

LIST OF PROGRAMS

1. Perform encryption, decryption using the following substitution techniques
(i) Ceaser cipher, (ii) Playfair cipher iii) Hill Cipher iv) Vigenere cipher
2. Perform encryption and decryption using following transposition technique - Row & Column Transformation
3. Implement the practical applications for the following algorithm DES
4. Implement the practical applications for the following algorithm AES
5. Implement RSA Algorithm using HTML and JavaScript
6. Implement the Diffie-Hellman Key Exchange algorithm for a given problem.
7. Implement the (i) Message Digest Algorithm – MD5 (ii) Secure Hash Algorithm – SHA 1
8. Implement the SIGNATURE SCHEME - Digital Signature Standard.
9. Setup a Honey Pot and Monitor the Honeypot on Network
10. Demonstrate intrusion detection system (ids) using any tool eg. Snort or any other s/w.

TOTAL:P: 30

SOFTWARE: C / C++ / Java or equivalent compiler, Snort, KF Senor or Equivalent

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21CSF27 **BIG DATA ANALYTICS** **L T P C**
3 0 0 3

COURSE OBJECTIVES :

1 To understand the basic concepts of Hadoop.
2 To explore the functions with PIG.
3 To learn the functions of HIVE.
4 To describe use of Recommendation system .
5 To describe the concepts of Hadoop security

COURSE OUTCOMES :

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

21CSF27.CO1 Identify the components of Hadoop Distributed File System for big data processing
21CSF27.CO2 Develop Big Data Solutions using Hadoop Eco System
21CSF27.CO3 Examine various framework in Big data Processing
21CSF27.CO4 Implement various Recommendation System
21CSF27.CO5 Illustrate the big data security issues with Hadoop and the need of AWS for Hadoop environment

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSF27.CO1	x	-	-	-	-	-	x	x	-	x	-	x	x	-	-
21CSF27.CO2	-	-	x	-	x	x	-	x	x	x	-	-	x	-	x
21CSF27.CO3	-	x	-	-	-	x	x	-	-	-	x	x	-	x	-
21CSF27.CO4	x	-	x	x	x	-	-	-	x	-	x	-	x	-	x
21CSF27.CO5	x	x	x	x	-	-	-	-	x	-	-	x	x	x	-

UNIT I **INTRODUCTION TO HADOOP ECO SYSTEM** 9

Introduction to Hadoop Eco system- Hadoop core components- Hadoop distributions- HDFS- Common Hadoop Shell commands- Processing data with Hadoop- Name Node- Secondary Name Node, and Data Node – Hadoop Map Reduce paradigm- Map and Reduce tasks, Job, Task trackers - Cluster Setup – SSH & Hadoop Configuration – HDFS Administering –Monitoring & Maintenance.

UNIT II **HADOOP ECOSYSTEM COMPONENTS-PIG** 9

Big: Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, Pig Latin, User Defined Functions, Data Processing operators.

UNIT III **HADOOP ECOSYSTEM COMPONENTS-HIVE** 9

Hive : Hive Shell, Hive Services, Hive Meta store, HiveQL, Tables, Querying Data and User Defined Functions. Base: HBase Concepts, Clients, Example, Zookeeper - Building applications with Zookeeper, Oozie- Workflows of Oozie

UNIT IV **RECOMMENDATION SYSTEM** 9

Collaborative Recommendation- Content Based Recommendation – Knowledge Based Recommendation- Hybrid Recommendation Approaches.

UNIT V **HADOOP SECURITY AND AWS** 9

Security challenges – Authentication – Authorization – Network encryption – Security enhancement – Introduction to AWS- Running Hadoop on AWS – EMR Hadoop relationship – AWS S3

TOTAL:L : 45

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TEXT BOOK:

Sl.No	Author(s)	Title of The Book	Publisher	Year of Publication
1.	Seema Acharya, Subhashini Chellappan	Big Data and Analytics	Wiley, First Edition	2015

REFERENCE BOOKS:

Sl.No	Author(s)	Title of The Book	Publisher	Year of Publication
1.	Boris lublinsky, Kevin t. Smith, Alexey Yakubovich	Professional Hadoop Solutions	Wiley	2015
2.	Chris Eaton, Dirk deroos et al.	Understanding Big data	McGraw Hill	2012
3.	Tom White	HADOOP: The definitive Guide	O Reilly	2012
4.	VigneshPrajapati	Big Data Analytics with R and Haoop	Packet Publishing	2013
5	Tom Plunkett, Brian Macdonald et al	Oracle Big Data Handbook	Oracle Press	2014

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21CSF28 **ANIMATION: THEORY AND PRACTICE** **L T P C**
3 0 0 3

COURSE OBJECTIVES :

1 To State and identify animation
2 Understand the major technological developments
3 Analyze about aesthetic movements in the history of animated filmmaking.
4 Apply the early technologies used in animation
5 Illustrate the industry perspective

COURSE OUTCOMES :

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

21CSF28.CO1 Understand the film history to provide a discussion on experimental animation and abstract cinema.
21CSF28.CO2 Analysis the evolution of animation, and how animation came into existence.
21CSF28.CO3 Apply the animation techniques developed with various equipment and how the process was performed
21CSF28.CO4 Develop techniques such as cell animation, classic characters, cut out animation, stop- motion effects, puppet stop motion, pixilation, optical printing,
21CSF28.CO5 Construct great animators helped to improvise animation to Indian directors.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSF28.CO1	x	-	-	-	-	-	x	x	-	x	-	x	x	-	-
21CSF28.CO2	-	-	x	-	x	x	-	x	x	x	-	-	x	-	x
21CSF28.CO3	-	x	-	-	-	x	x	-	-	-	x	x	-	x	-
21CSF28.CO4	x	-	x	x	x	-	-	-	x	-	x	-	x	-	x
21CSF28.CO5	x	x	x	x	-	-	-	-	x	-	-	x	x	x	-

UNIT I **EARLY ANIMATION** 9

Introduction to film history, basic cinematic terms and concepts, early animation and primitive forms, the beginnings of animation and special effects in film. It also provides a discussion on experimental animation and abstract cinema

UNIT II **EARLY STUDIOS AND ANIMATION PIONEERS** 9

An overview of the evolution of animation pioneers such as Walt Disney, Max Fleischer, Tex Avery, Warner bros and Loony Tunes etc.,

UNIT III **EARLY APPROACHES TO MOTION IN ART** 9

Animation before film: The magic lantern, Thaumatrope, Phenakistoscope, Zoetrope, Flip book and Praxinoscope.

UNIT IV **ANIMATION TECHNIQUES** 9

Cell animation, classic characters, cut out animation, stop motion effects, puppet stop motion, pixilation, optical printing, vector / key framed animation, sand animation, silhouette animation, pin-screen animation, Chinese shadow puppetry and rotoscope

UNIT V **A HISTORY OF INDIAN ANIMATION, INDUSTRIES AND STUDIOS** 9

Growth of Indian animation companies and studios. Traces the beginnings of animation art in India and discusses the emerging trends in Indian animation industry and outsourcing demands.

TOTAL:L : 45

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TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Stephen cavalier	The world history of animation hardcover "Disney animation	Disney editions	1, 9 Sep 2011.
2.	Frank thomas "the illusion of life	Disney animation	(Disney editions deluxe)hardcover	import, 5 oct 1995

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Preston Blair, Walter T.	Cartoon Animation	Foster, Apple Press, Limited, Eighth Edition, ISBN 1560100842	2018
2.	Facts and Ficgures, Bredson , Philps Cardiff,	History of Animation	Pearson Publications,	2015
3.	Fell, John L., Berkeley Emmanuel,	Film and the narrative tradition	University of California Press,	1990
4.	Barry Keith Grant,	The Film Studies Dictionary	Dum Publications, Edition III	2008
5.	Emmons	Film and television: a guide to the reference literature",R	ISBN: 1563089149	ACEL Release, First Edition, Year 2009

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21CSF29 **MACHINE LEARNING TECHNIQUES**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES :

1 To understand the need for machine learning for various problem solving.
2 To analyze parametric methods and semi-parametric methods
3 To use neural networks for learning.
4 To explore different algorithms for Instance based learning
5 To apply appropriate machine learning algorithms for problem solving.

COURSE OUTCOMES :

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

21CSF29.CO1 Understand supervised learning algorithms.
21CSF29.CO2 Describe the parametric and semi-parametric models.
21CSF29.CO3 Implement artificial neural network.
21CSF29.CO4 Apply machine learning techniques using neural networks to solve problems of interest
21CSF29.CO5 Develop graphical models and multiple learners

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSF29.CO1	x	x	x	x	x	x	x	-	x	-	x	x	x	x	x
21CSF29.CO2	x	x	x	x	x	x	x	-	x	x	x	x	x	x	x
21CSF29.CO3	x	x	x	x	x	x	x	x	-	x	x	x	x	x	x
21CSF29.CO4	x	x	x	x	x	x	x	-	-	x	x	x	x	x	x
21CSF29.CO5	x	x	x	x	x	x	x	-	-	-	x	x	x	x	x

UNIT I **INTRODUCTION AND SUPERVISED LEARNING** 9

Introduction to Machine Learning – basic concepts in machine learning - Examples of machine learning applications-Supervised Learning: Learning a Class from Examples–Noise–Learning Multiple Classes–Regression–Model Selection and Generalization. Bayesian Decision Theory: Classification–Losses and Risks–Discriminant Functions– Association rules.

UNIT II **PARAMETRIC AND SEMI-PARAMETRIC METHODS** 9

Parametric Classification–Regression–Tuning Model Complexity–Model Selection Procedures. Multivariate Methods: Data–Parameter Estimation–Estimation of Missing Values–Multivariate Normal Distribution–Multivariate Classification and Regression. Semi parametric method: Clustering k–Means Clustering–Hierarchical Clustering.

UNIT III **ARTIFICIAL NEURAL NETWORKS** 9

Introduction-Neural Network representation- Appropriate problems for Neural Network Learning- Perceptron : Representational power of Perceptron- Training rule- Gradient descent and Delta rule-Multi layer networks and Back propagation algorithm-A differentiable threshold unit-Back propagation algorithm-Derivation of the back propagation rule-remarks on back propagation algorithm-Advanced topics in Neural Networks: Alternative error function-Error minimization procedures-Recurrent networks-Dynamically modified Network structure.

UNIT IV **INSTANCE BASED LEARNING** 9

Introduction-K-Nearest Neighbor learning- Distance- Weighted Nearest Neighbor algorithm- Locally weighted regression- Remarks on locally weighted regression-Radial basis functions-case –Based reasoning- Remarks on Lazy and Eager Learning.

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UNIT V **ADVANCED LEARNING** 9

Graphical model: Canonical cases for conditional independence-Combining multiple learners: Voting, Bagging, Boosting, Stacked generalization-Reinforcement Learning: Learning task –Q learning-Example.

TOTAL:L:45

TEXT BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publicatio
1.	Ethem Alpaydin	Introduction to Machine Learning	Second Edition, MIT Press	2013
2.	Tom M.Mitchell	Machine Learning	Mc Graw,First Edition	2015

REFERENCE BOOKS:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1	Y. S. Abu- Mostafa, M. Magdon-Ismail, and H.-T. Lin	Learning from Data	AML Book Publishers	2012
2.	K. P. Murphy	Machine Learning: A probabilistic perspective	MIT Press	2012
3.	M. Mohri, A. Rostamizadeh, and A. Talwalkar	Foundations of Machine Learning	MIT Press	2012
4.	Peter Flach	Machine Learning The Art and Science of Algorithms that	Cambridge University Press.	2012
5.	Richard Sutton and Andrew Barto	Reinforcement Learning: An Introduction	MIT Press	1998.

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21CSF30 DATA ANALYTICS AND MODELING TECHNIQUES

L	T	P	C
3	0	0	3

COURSE OBJECTIVES :

1 To understand the basic principles of Data Analytics
2 To learn the various Data Analytic methods
3 To understand the various clustering algorithms and its application on data
4 To work with stream data model and computing
5 To understand the Advanced techniques in Data Analytics

COURSE OUTCOMES :

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

21CSF30.CO1 Evaluate the use of data from acquisition through cleaning, warehousing, analytics, and visualization to the ultimate business decision
21CSF30.CO2 Mine data and carry out predictive modeling and analytics to support business decision-making
21CSF30.CO3 Suggest prescriptive modeling techniques for real-world problems
21CSF30.CO4 Execute real-time analytical methods on streaming datasets to react quickly to customer needs
21CSF30.CO5 Demonstrate the advanced techniques in data analytics

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSF30.CO1	x	-	-	x	x	-	x	-	x	-	-	-	x	-	-
21CSF30.CO2	x	-	-	-	-	x	-	x	x	x	-	-	x		-
21CSF30.CO3	x	x	x	-	-	x	-	x	x	x	-	-	-	x	-
21CSF30.CO4	x	x	x	x	x	-	-	-	x	x	x	x	-	x	x
21CSF30.CO5	x	x	x	x	x	-	x	-	x	x	x	x	-	x	x

UNIT I INTRODUCTION TO DATA ANALYTICS 9

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

UNIT II DATA ANALYTICS METHODS 9

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

UNIT III Clustering Algorithms 9

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

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UNIT IV **GRAPH ANALYTICS** **9**

Using Graph Analytics for Big Data: Graph Analytics - The Graph Model - Representation as Triples - Graphs and Network Organization - Choosing Graph Analytics - Graph Analytics Use Cases - Graph Analytics Algorithms and Solution Approaches - Technical Complexity of Analyzing Graphs - Features of a Graph Analytics Platform - Considerations: Dedicated Appliances for Graph - Graph QL.

UNIT V **ADVANCED TECHNIQUES IN DATA ANALYTICS** **9**

NoSQL Databases - Schema-less Models - Increasing Flexibility for Data Manipulation - Key Value Stores - Document Stores - Tabuiar 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:L:45

TEXT BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publicatio
1.	Jiawei Han, MichelineKamber, Jian Pei	"Data Mining Concepts and Techniques"	Third Edition, Elsevier	2011
2.	A. Rajaraman, J. Ullman	"Mining Massive Data Sets"	Cambridge University Press, 2012	2012
3.	David Loshin	"Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, No SQL, and		2013

REFERENCE BOOKS:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1	Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye	"Probability & Statistics for Engineers & Scientists"	Ninth Edition, Prentice Hall Inc.	
2.	Trevor Hastie, Robert Tibshirani, Jerome Friedman	"The Elements of Statistical Learning, Data Mining, Inference, and Prediction"	Second Edition, Springer,	2014
3.	G.James, D. Witten, T Hastie, R. Tibshirani	"An Introduction to Statistical Learning: With Applications in R"	Springer,	2013

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19CSF31 **SOFTWARE PROJECT MANAGEMENT** **L T P C**
3 0 0 3

COURSE OBJECTIVES

- To outline the need for Software Project Management
- To highlight different techniques for software cost estimation
- To plan and monitor projects for the risk management
- To manage people and organization of teams
- To estimate the cost associated with a project

COURSE OUTCOMES:

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

19CSF31.CO1	Able to practice the process of project management and its application in delivering successful projects
19CSF31.CO2	Deconstructing the activities in the project management
19CSF31.CO3	Evaluate the risks and hazards in the project management
19CSF31.CO4	Apprise the right person to managing people and organizing team.
19CSF31.CO5	Evaluate a project to develop the scope of work, provide accurate effort estimation methods for software.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19CSF31.CO1	x	x	-	-	-	x	x	-	-	-	x	-	x	-	-
19CSF31.CO2	x	x	x	-	x	-	-	-	x	-	-	-	x	-	-
19CSF31.CO3	-	-	-	-	-	x	x	-	-	-	x	-	-	x	-
19CSF31.CO4	-	-	-	-	x	x	x	-	x	-	x	-	-	x	-
19CSF31.CO5	-	x	-	x	x	-	-	-	-	-	x	x	x	-	-

UNIT I **INTRODUCTION AND PROJECT EVALUATION** 9

Project Definition – Importance of Software Project Management – Contract Management – Activities covered by Software Project Management – Setting objectives – Stakeholders - Management Control – Overview of Project Planning – Stepwise Project Planning – Project evaluation - Strategic Assessment – Technical Assessment – Cost Benefit Analysis – Cash Flow Forecasting – Cost Benefit Evaluation Techniques.

UNIT II **ACTIVITY PLANNING AND RISK MANAGEMENT** 9

Objectives – Project Schedule – Sequencing and Scheduling Activities – Network Planning Models – Forward Pass – Backward Pass – Critical path (CRM) method – Activity Float – Shortening the Project Duration – Activity on Arrow Networks – Risk Management – Nature of Risk – Types of Risk – Managing Risk – Hazard Identification – Hazard Analysis.

UNIT III **PROJECT MANAGEMENT AND CONTROL** 9

Introduction – Creating the Framework – Collecting the Data – Visualizing Progress – Cost Monitoring – Earned Value – Prioritizing Monitoring – Getting Project Back To Target – Change Control – Managing Contracts – Introduction – Types of Contract – Stages in Contract Placement – Typical Terms of a Contract – Contract Management –Acceptance

UNIT IV **MANAGING PEOPLE AND ORGANIZING TEAMS** 9

Introduction – Understanding Behavior – Organizational Behavior – Selecting The Right Person For The Job – Instruction in the Best Methods – Motivation – The Oldham Hackman Job Characteristics Model – Working In Groups – Becoming A Team – Decision Making – Leadership – Organizational Structures – Stress – Health And Safety.

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UNIT V **SOFTWARE EFFORT ESTIMATION** **9**

Introduction – The basics for software estimation – Software effort estimation techniques – Expert judgment – Estimating by analogy – Albrecht function point analysis –Function points Mark II – COSMIC Full function points - COCOMO: A Parametric Productivity Model.

TOTAL: L: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Bob Hughes, Mike Cotterell	Software Project Management	Tata McGraw Hill, Fifth Edition	2011
2.	Robert K.Wysocki	Effective Software Project Management	Wiley Publication	2011

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Adolfo Villafiorita	Introduction to SoftwareProject Management	CRC Press	2014
2.	Jalote	Software Project Management in Practice	Pearson Education	2010
3.	Murali k. chemuturi, Thomas m cagly	Mastering software project management- best practicestools and Techniques	j ross Publication	2010
4.	Richard E. Fairly	Managing and LeadingSoftware projects	Weilly and sons	2009
5.	Ramesh, Gopalaswamy	Managing Global Projects	Tata McGraw Hill	2001

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21CSF32 **PRINCIPLES OF PROGRAMMING LANGUAGES** **L T P C**
3 0 0 3

COURSE OBJECTIVES

- To outline the need programming language and basic concepts.
- To highlight names, binding and scopes of programming language
- To illustrate the concept of subprogram and block.
- To understand the concept of concurrency
- To Summarize the concept of functional programming language

COURSE OUTCOMES:

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

21CSF32.CO1 Acquire the skills for expressing syntax and semantics in formal notation
21CSF32.CO2 Explain Names, Bindings, and Scopes of programming languages.
21CSF32.CO3 Illustrate the concept of subprogram.
21CSF32.CO4 Demonstrate the concepts of concurrency.
21CSF32.CO5 Summarize the concept of functional programming language.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSF32.CO1	x	x	-	-	-	x	x	-	-	-	x	-	x	-	-
21CSF32.CO2	x	x	x	-	x	-	-	-	x	-	-	-	x	-	-
21CSF32.CO3	-	-	-	-	-	x	x	-	-	-	x	-	-	x	-
21CSF32.CO4	-	-	-	-	x	x	x	-	x	-	x	-	-	x	-
21CSF32.CO5	-	x	-	x	x	-	-	-	-	-	x	x	x	-	-

UNIT I **PRELIMINARY CONCEPTS** 9

Preliminary Concepts - Reasons for Studying Concepts of Programming Languages, Programming Domains, Language Evaluation Criteria, Influences on Language Design, Language Categories, Language Design Trade-Offs, Implementation Methods, Programming Environments.

Syntax and Semantics - General Problem of Describing Syntax and Semantics, Formal Methods of Describing Syntax, Attribute Grammars, Describing the Meanings of Programs.

UNIT II **NAMES, BINDINGS, AND SCOPES** 10

Names, Bindings, and Scopes - Introduction, Names, Variables, Concept of Binding, Scope, Scope and Lifetime, Referencing Environments, Named Constants.

Data Types - Introduction, Primitive Data Types, Character String Types, User Defined Ordinal Types, Array, Associative Arrays, Record, Union, Tuple Types, List Types, Pointer and Reference Types, Type Checking, Strong Typing, Type Equivalence.

Expressions and Statements - Arithmetic Expressions, Overloaded Operators, Type Conversions, Relational and Boolean Expressions, Short Circuit Evaluation, Assignment Statements, Mixed-Mode Assignment

Control Structures – Introduction, Selection Statements, Iterative Statements, Unconditional Branching, Guarded Commands.

UNIT III **SUBPROGRAMS AND BLOCKS** 10

Subprograms and Blocks - Fundamentals of Sub-Programs, Design Issues for Subprograms, Local Referencing Environments, Parameter Passing Methods, Parameters that Are Subprograms, Calling Subprograms Indirectly, Overloaded Subprograms, Generic Subprograms, Design Issues for Functions, User Defined Overloaded Operators, Closures, Coroutines.

Implementing Subprograms - General Semantics of Calls and Returns, Implementing Simple Subprograms, Implementing Subprograms with Stack-Dynamic Local Variables, Nested Subprograms, Blocks, Implementing

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Dynamic Scoping

Abstract Data Types - The Concept of Abstraction, Introductions to Data Abstraction, Design Issues, Language Examples, Parameterized ADT, Encapsulation Constructs, Naming Encapsulations

UNIT IV **CONCURRENCY** 7

Concurrency - Introduction, Introduction to Subprogram Level Concurrency, Semaphores, Monitors, Message Passing, Java Threads, Concurrency in Function Languages, Statement Level Concurrency. Exception Handling and Event Handling: Introduction, Exception Handling in Ada, C++, Java, Introduction to Event Handling, Event Handling with Java and C#.

UNIT V **FUNCTIONAL PROGRAMMING LANGUAGES** 9

Functional Programming Languages - Introduction, Mathematical Functions, Fundamentals of Functional Programming Language, LISP, Support for Functional Programming in Primarily Imperative Languages, Comparison of Functional and Imperative Languages

Logic Programming Language - Introduction, an Overview of Logic Programming, Basic Elements of Prolog, Applications of Logic Programming.

Scripting Language - Pragmatics, Key Concepts, Case Study: Python – Values and Types, Variables, Storage and Control, Bindings and Scope, Procedural Abstraction, Data Abstraction, Separate Compilation, Module Library.

TOTAL: L: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Robert. W. Sebesta	Concepts of Programming Languages	10/E, Pearson Education.	2012
2.	D. A. Watt	Programming Language Design Concepts	Wiley Dreamtech	2007

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	A.B. Tucker, R. E. Noonan	Programming Languages	2nd Edition, Noonan, TMH	2006
2.	K. C. Louden	Programming Languages	2nd Edition, Thomson	2003

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21CSF33 **DISTRIBUTED OPERATING SYSTEMS** **L T P C**
3 0 0 3

COURSE OBJECTIVES

- To study the concepts of Distributed Operating System
- Methods of understanding communication in distributed operating system
- Introduce the concepts of distributed shared memory and synchronization.
- To manage resources and handling file systems
- To assure the security and naming in distributed operating systems

COURSE OUTCOMES:

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

21CSF33.CO1 Overview of Distributed Operating Systems
21CSF33.CO2 Understand the concepts of communication in distributed operating systems
21CSF33.CO3 Know how the memory are shared and synchronization in DOS
21CSF33.CO4 Access resources in DOS and handling files in DOS
21CSF33.CO5 Describe the security level in DOS

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSF33.CO1	x	x	-	-	-	x	x	-	-	-	x	-	x	-	-
21CSF33.CO2	x	x	x	-	x	-	-	-	x	-	-	-	x	-	-
21CSF33.CO3	-	-	-	-	-	x	x	-	-	-	x	-	-	x	-
21CSF33.CO4	-	-	-	-	x	x	x	-	x	-	x	-	-	x	-
21CSF33.CO5	-	x	-	x	x	-	-	-	-	-	x	x	x	-	-

UNIT I **INTRODUCTION IN DISTRIBUTED SYSTEM** **9**

Introduction: Design Issues - Distributed Computing Environment - Message Passing - Features of Good Message Passing System-Issues in IPC by Message Passing-Synchronization- Buffering

UNIT II **COMMUNICATION IN DISTRIBUTED SYSTEM** 9

Remote Procedure Calls: The RPC Model - Transparency of RPC- Implementing RPC Mechanism - Stub Generation - RPC Messages - Marshaling Arguments and Results - Server Management - Parameter-Passing Semantics- Call Semantics

UNIT III **DISTRIBUTED SHARED MEMORY AND SYNCHRONIZATION** 9

Distributed Shared Memory: General Architecture of DSM Systems- Design and Implementation Issues of DSM – Granularity - Structure of Shared Memory Space

Synchronization: Clock Synchronization - Event Ordering - Mutual Exclusion –Deadlocks- Election Algorithms .

UNIT IV **RESOURCE MANAGEMENT AND DISTRIBUTED FILE SYSTEMS** **9**

Resource Management: Features of a Good Global Scheduling Algorithm - Task Assignment Approach – Load Balancing Approach – Load Sharing Approach

Distributed File Systems: Introduction -Desirable Features of a Good Distributed File System - File Models – File Accessing Models – File Sharing Semantics – File Caching Schemes - File Replication

UNIT V **NAMING AND SECURITY** **9**

Naming: Desirable Features of a Good Naming System - Fundamental Terminologies and Concepts - System-Oriented Names - Object-Locating Mechanisms - Human-Oriented Names - Name Caches

Security: Potential Attacks to Computer Systems - Cryptography – Authentication

TOTAL: L: 45

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TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Pradeep K Sinha	Distributed Operating Systems: Concepts and Design	Prentice Hall of India	2009
2.	Andrew S Tannebaum	Distributed Operating Systems	Pearson Education	2007

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	George Coulouris, Jean Dollimore and Tim Kindberg	Distributed Systems Concepts and Design	Fifth Edition, Pearson Education	2012
2.	Tanenbaum A.S., Van Steen M	Distributed Systems: Principles and Paradigms	Pearson Education	2007
3.	Liu M.L.	Mastering software project management- best practicestools and Techniques	Pearson Education	2004
4.	Nancy A Lynch	Distributed Algorithms	Weilly and sons	2009
5.	Ramesh, Gopalaswamy	Managing Global Projects	Morgan Kaufman Publishers, USA	2003

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PROFESSIONAL ELECTIVE (PE)

21CSE01	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 be exposed to web, cloud in the context of IoT
- To develop different models for network dynamics
- To analyze applications of IoT in realtime scenario

COURSE OUTCOMES:

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

21CSE01.CO1	Summarize the underlying architectures and models in IoT.
21CSE01.CO2	Analyze various protocols for IoT at the different layers for IoT
21CSE01.CO3	Apply the web of things and cloud of things Models
21CSE01.CO4	Develop different models for network dynamics
21CSE01.CO5	Study the needs and suggest appropriate solutions for Industrial applications

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE01.CO1	x	-	x	-	x	-	-	x	-	x	-	x	x	x	-
21CSE01.CO2	x	x	-	-	x	-	-	x	x	x	-	-	x	-	-
21CSE01.CO3	x	x	x	x	-	x	-	-	x	x	x	x	-	x	-
21CSE01.CO4	x	x	x	x	-	x	-	-	x	x	x	-	x	-	x
21CSE01.CO5	x	x	x	x	-	x	-	-	x	x	x	x	x	x	-

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

Definitions and Functional Requirements –Motivation – Architecture - Web 3.0 View of IoT– Ubiquitous IoT Applications – Four Pillars of IoT – DNA of IoT - The Toolkit Approach for End-user Participation in the Internet of Things. Middleware for IoT: Overview – Communication middleware for IoT – IoT Information Security

UNIT II **IOT PROTOCALS** 9

Sockets – secure sockets – custom sockets – UDP datagrams – multicast sockets – URL classes – Reading Data from the server – writing data – configuring the connection – Reading the header – telnet application – Java Messaging services.

UNIT III **WEB OF THINGS** 9

Web of Things versus Internet of Things – Two Pillars of the Web – Architecture standardization for WoT– Platform Middleware for WoT – Unified Multitier WoT Architecture – WoT Portals and Business Intelligence. Cloud of Things: Grid/SOA and Cloud Computing–Cloud Middleware – Cloud Standards – Cloud Providers and Systems – Mobile Cloud Computing – The Cloud of Things Architecture.

UNIT IV **IOT BUSINESS MODELS** **9**

Integrated Billing Solutions in the Internet of Things Business Models for the Internet of Things - Network Dynamics: Population Models – Information Cascades - Network Effects – Network Dynamics: Structural Models - Cascading Behavior in Networks - The Small-World Phenomenon.

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UNIT V **APPLICATIONS** 9

The Role of the Internet of Things for Increased Autonomy and Agility in Collaborative Production Environments - Resource Management in the Internet of Things: Clustering, Synchronisation and Software Agents. Applications - Smart Grid – Electrical Vehicle Charging.

TOTAL: L: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	David Hanes.Gonzalo Salgueiro,Patrick,Grossetete, Rob Barton and Jerome Henry	Fundamentals:Networking Technologies, Protocols and Use Cases for Internet of Things	Cisco Press	2017
2.	Arshdeep Bahga,Vijay Madisetti	Internet of Things	A hands-on approach, Universities press	2015

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	David Easley and Jon Kleinberg	Networks, Crowds, and Markets: Reasoning About a Highly Connected World	Cambridge University Press	2010
2.	Olivier Hersent, David Boswarthick, Omar Elloumi	The Internet of Things	A John Wiley & Sons, Ltd	2012
3.	Honbo Zhou	The Internet of Things in the Cloud: A Middleware Perspective	CRC Press	2012
4.	Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds)	Architecting the Internet of Things	Springer	2011
5.	Olivier Hersent, Omar Elloumi and David Boswarthick	The Internet of Things: Applications to the Smart Grid and Building Automation	Wiley	2012

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21CSE02	INTERNET OF THINGS LAB	L	T	P	C
		0	0	2	1

COURSE OBJECTIVES

- To study the assembly language using simulator and kit.
- To implement ALU operations.
- To generate waveforms and test timers
- To develop applications using Embedded C language.
- To design IoT applications using Aurdino, Raspberry Pi, and Bluemix.

COURSE OUTCOMES:

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

21CSE02.CO1	Execute Assembly Language experiments using simulator.
21CSE02.CO2	Implement ALU operations.
21CSE02.CO3	Design waveforms and test timers.
21CSE02.CO4	Develop real time applications and explore ARM/PIC using Embedded C.
21CSE02.CO5	Demonstrate real time applications using Aurdino, Raspberry Pi, and Bluemix..

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE02.CO1	x	-	x	x	-	-	x	-	-	x	-	x	x	x	-
21CSE02.CO2	x	x	-	-	x	-	x	x	x	x	-	-	x	-	-
21CSE02.CO3	x	x	x	x	-	x	-	-	x	x	x	x	x	-	-
21CSE02.CO4	x	x	x	-	x	x	-	x	x	x	x	-	-	-	x
21CSE02.CO5	x	x	x	x	-	x	-	-	x	x	x	x	x	x	-

LIST OF PROGRAMS

1. Write 8051 Assembly Language experiments using simulator.
2. Test data transfer between registers and memory.
3. Perform ALU operations.
4. Using interrupts generate waveforms and test Timers.
5. Write assembly language experiments using Kit to test interfaces and interrupts using Traffic Generator, DAC, ADC, Stepper Motor (2).
6. Write Basic and arithmetic Programs Using Embedded C.
7. Write Embedded C program to test interrupt and timers.
8. Develop Real time applications – clock generation, wave form generation, counter using embedded C.
9. Explore ARM/PIC based controllers using Embedded C.
10. Explore different communication methods with IoT devices
11. Develop simple application – testing infrared sensor – IoT Applications – using Aurdino.
12. Develop simple application – testing temperature, light sensor – IOT Application using open platform/Raspberry Pi.
13. Deploy IOT applications using platforms such as Bluemix.

TOTAL : P : 30

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21CSE03	SALESFORCE CRM AND PLATFORM	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To understand the basics of Salesforce as a CRM and a Platform
- To apply the administrative and configurable capabilities of Salesforce
- To implement business logic customizations using Apex triggers and classes customized using SOQL and DML
- To describe how trigger code works within the basics of the Save Order of Execution and transactions
- To illustrate Visual force markup code to customize the user interface

COURSE OUTCOMES:

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

21CSE03.CO1 Understand the basics of Salesforce platform
21CSE03.CO2 Leverage configurable aspects of Salesforce for business process automation
21CSE03.CO3 Implement Apex Programming and Visual force
21CSE03.CO4 Develop Apex program with SOQL & DML, Testing and Execution of Triggers.
21CSE03.CO5 Apply Visualforce pages with various controllers.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19CSE03.CO1	x	x	x	x	x	-	-	x	x	x	x	x	x	x	x
19CSE03.CO2	x	x	x	x	x	x	-	x	x	-	x	x	x	x	-
19CSE03.CO3	x	x	x	x	x	x	-	x	x	x	x	x	x	x	x
19CSE03.CO4	x	x	x	x	x	x	-	x	x	-	-	x	x	x	x
19CSE03.CO5	x	x	x	x	x	x	-	x	x	-	x	x	x	x	x

UNIT I INTRODUCTION TO SALESFORCE 9

Salesforce Overview - Architecture – Environment - Sales Cloud - Service Cloud - Navigating Setup - Salesforce Objects - Standard Objects - Custom Objects & Fields - Field Types - Master Detail - Lookup Relationship - Schema Builder - Global Search. Standard UI Configuration - Page Layouts - Record Types - Record Type Based Picklist Values. Process Automation - Validation Rules, Workflow Rules and Actions - Process Builder - Approval Process. Salesforce Security Model - Role Hierarchy - Profiles and Permission Sets - Access Controls - Object and Field Level Security - Record Level Security - Org Wide Defaults - Record Ownership - Sharing Rules.

UNIT II SALESFORCE CRM FUNCTIONALITY 9

CRM Basics : Introduction to CRM - Sales Objects - Service Objects. Sales Process: Lead - Web-to-Lead - Lead Conversion - Opportunities - Accounts & Contacts – Products. Service Process: Case, Email-to-Case, Web-to-Case. Automation Rules: Lead/Case Assignment Rules - Escalation Rules - Merge Records - Duplication Rules

UNIT III APEX PROGRAMMING BASICS 9

Programming with Apex: Introduction to Apex - Statements & Collections - Introduction to Apex Classes. SOQL: Syntax, SOQL in Apex, Dynamic SOQL. Query using relationships: Relationship name, child-to-parent relationship – parent-to-child relationship. DML essentials: DML operations with Apex - Transaction Controls - DML errors

UNIT IV APEX PROGRAMMING DEVELOPMENT 9

Apex Trigger Essentials: Introduction - Trigger Events - Syntax - Trigger context variables. Apex Class Implementation: Implement Business Logic in Apex class - Trigger Handlers and Controllers - Best Practices (Bulkification, No DML & queries inside loops) - Apex Test Classes. Advanced Apex: Asynchronous Apex - Apex Scheduler - Batch Apex - Future methods - Queueable Apex API Callouts - Apex Web Services - Standard APIs. Transactions: Lifecycle of a transaction – Memory life cycle for static variable - Salesforce order of Execution - Execution Governor Limits. Development Tools: Developer Console - Debug Logs - Eclipse & Force.com IDE - Visual Studio – Workbench

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UNIT V **VISUALFORCE DEVELOPMENT** **9**

Visualforce: Introduction – Creating Visualforce pages – Important Visualforce Tags - Exploring the View and Controller layers of Visualforce – Standard Controller – Display data from a record in a Visualforce page – Display related data – Invoke standard controller actions – Using standard list controller in a Visualforce page – Using custom controllers and extensions – Security concerns.

TOTAL: L: 45

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Paul Goodey, - Fourth Edition,	Salesforce CRM - The Definitive Admin Handbook	4th Revised edition Edition, PACKT enterprises, Kindle edition	2016
2.	Matt Kaufmann and Michael Wicherski	Learning Apex Programming	PACKT enterprises, Kindle edition	2015
3.	David Taber	Salesforce.com Secrets of Success: Best Practices for Growth and Profitability	2nd Edition, Prentice Hall	2013
4.	Keir Bowden	Visualforce Development Cookbook	PACKT enterprises, Kindle edition	2016

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21CSE04	SALESFORCE CRM AND PLATFORM LAB	L	T	P	C
		0	0	2	1

COURSE OBJECTIVES

- Understand the basic concepts of salesforce
- Develop the platform basics and console basics
- Implement the concept of Administrator
- Design SOQL database , .net, Visual force
- Analyze the Lightning Experiment basic

COURSE OUTCOMES:

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

21CSE04.CO1 Analyze salesforce platform and Developer console basics
21CSE04.CO2 Enhance the SOQL database, .net, and visual force
21CSE04.CO3 Apply Apex basic for Admin and Trigger.
21CSE04.CO4 Create conference management application.
21CSE04.CO5 Implement visualforce application with the lightning design system.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE04.CO1	x	x	x	x	x	-	-	x	-	x	x	x	x	x	x
21CSE04.CO2	x	x	x	x	x	x	-	x	x	-	x	x	x	x	-
21CSE04.CO3	x	x	x	x	-	x	-	x	x	x	x	x	x	x	x
21CSE04.CO4	x	x	x	x	x	x	-	x	x	-	-	x	x	x	X
21CSE04.CO5	x	x	x	x	x	x	-	x	x	-	x	x	x	x	x

LIST OF PROGRAMS

1. Salesforce Basics
2. Salesforce Platform Basics
3. Platform Development Basics
4. Developer Console Basics
5. Apex Basics for Admin
6. Object Oriented Programming for Admin
7. Apex Triggers
8. SOQL Database .Net Basics
9. Visual force Basics
10. Lightning Experience Basics
11. Build a Conference Management Application
12. Build a Visual force Application with the Lightning Design System

TOTAL:P:30

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21CSE05 **AWS ACADEMY CLOUD DEVELOPING** **L T P C**
3 0 0 3

COURSE OBJECTIVES

- To understand the basic concepts of Operating System.
- To understand the behavior of CPU scheduling and its application
- To choose and implement the process synchronization
- To understand and analyze various Memory management techniques
- To understand the I/O Management and disk scheduling management

COURSE OUTCOMES:

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

21CSE05.CO1 Create on AWS.
21CSE05.CO2 Develop AWS Identity and Access Management for programmatic access.
21CSE05.CO3 Implement Container with AWS Lambda.
21CSE05.CO4 Organize solutions with Amazon API Gateway.
21CSE05.CO5 Construct secure applications and deploying applications.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE05.CO1	x	-	x	x	-	-	x	-	-	x	-	x	x	x	-
21CSE05.CO2	x	x	-	-	x	-	x	x	x	x	-	-	x	-	-
231CSE05.CO3	x	x	x	x	-	x	-	-	x	x	x	x	x	-	-
21CSE05.CO4	x	x	x	-	x	x	-	x	x	x	x	-	-	-	x
21CSE05.CO5	x	x	x	x	-	x	-	-	x	x	x	x	x	x	-

UNIT I **INTRODUCTION TO DEVELOPING ON AWS** 9

Course Prerequisites, objectives and overview, AWS Training Portal, Lab Environment, AWS Free Tier, AWS Educate, Systems Development Lifecycle, Steps to Get Started Developing on AWS, Working with AWS SDKs, Errors and Exceptions, Introduction to AWS X-Ray, Introduction to Amazon CloudWatch and AWS CloudTrail, IAM - Shared Responsibility Model, Overview of IAM, Authentication with IAM, Authorization with IAM

UNIT II **DEVELOPING STORAGE SOLUTIONS WITH AMAZON S3** 9

Introduction to Amazon S3, Creating Amazon S3 Buckets, Working with Amazon S3 Objects, Protecting Data and Managing Access to Amazon S3 Resources. Developing NoSQL Solutions with Amazon DynamoDB - Introduction to Amazon DynamoDB, Amazon DynamoDB Key Concepts, Partitions and Data Distribution, Secondary Indexes, Read/Write Throughput, Streams and Global Tables, Backup and Restore, Basic Operations for Amazon DynamoDB Tables. Caching Information for Scalability - Caching Overview, Caching with Amazon CloudFront, Caching with Amazon ElastiCache, Caching Strategies.

UNIT III **INTRODUCTION TO CONTAINERS WITH AWS LAMBDA** 9

Introduction to Containers, Containers vs. Hardware Virtualization, Microservices – Use Case for Containers, Amazon Container Services. Developing Solutions with Amazon SQS and Amazon SNS - Introduction to Message Queues, Introduction to Amazon SQS, Amazon SQS Developer Concepts, Introduction to Amazon SNS, Amazon SNS Developer Concepts, Introduction to Amazon MQ. Developing Event – Driven solutions with AWS Lambda - Introduction to Serverless Computing with AWS Lambda, Overview of AWS Lambda, Execution Models for Invoking Lambda Functions, AWS Lambda Permissions, Overview of Authoring and Configuring Lambda Functions, Overview of Deploying Lambda Functions..

UNIT IV **DEVELOPING SOLUTIONS WITH AMAZON API GATEWAY** 9

Application Programming Interfaces, Amazon API Gateway, Creating a RESTful API, Controlling Access to a RESTful API, Testing a RESTful API, Deploying a RESTful API, Invoking a RESTful API, Monitoring

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a RESTful API. Developing solutions with AWS step functions - Workflow Coordination in Distributed Applications, Introduction to AWS Step Functions, State Types, AWS Step Functions Use Case, AWS Step Functions API. Developing secure application on AWS - Secure Network Connections, Manage Application Secrets, Authenticate with AWS Security Token Service, Authenticate with Amazon Cognito

UNIT V **DEVELOPING APPLICATIONS ON AWS** **9**

Introducing DevOps Using AWS code services for CI/CD, Introducing Deployment and Testing Strategies, Developing Applications with AWS Elastic Beanstalk, Deploy applications AWS CloudFormation, Deploying Serverless applications AWS SAM

TOTAL : L :45

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21CSE06	AWS ACADEMY CLOUD DEVELOPING LAB	L	T	P	C
		0	0	2	1

COURSE OBJECTIVES

- To Understand and study AWS Documentation and AWS Cloud9
- To create an IAM User and IAM Group
- To develop Amazon S3 and AWS Lambda and Amazon API Gateway
- To perform an activity RCUs and WCUs
- To demonstrate AWS Lambda with API Gateway.

COURSE OUTCOMES:

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

21CSE06.CO1	Generate AWS Cloud9
21CSE06.CO2	Create IAM user and Group
21CSE06.CO3	Developing Amazon S3 and Amazon API Gateway using AWS SDK
21CSE06.CO4	Implement Docker Container.
21CSE06.CO5	Demonstrate AWS Lambda with API Gateway.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE06.CO1	x	-	x	x	-	-	x	-	-	x	-	x	x	x	-
21CSE06.CO2	x	x	-	-	x	-	x	x	x	x	-	-	x	-	-
21CSE06.CO3	x	x	x	x	-	x	-	-	x	x	x	x	x	-	-
21CSE06.CO4	x	x	x	-	x	x	-	x	x	x	x	-	-	-	x
21CSE06.CO5	x	x	x	x	-	x	-	-	x	x	x	x	x	x	-

LIST OF PROGRAMS

1. Activity - AWS Documentation Scavenger Hunt
2. Introduction to AWS Cloud9

   Educator Demo - AWS Cloud9
3. Educator Demo - Create an IAM User and IAM Group
4. Developing with Amazon S3 using the AWS SDK

   Activity - Calculate Read Capacity Units (RCUs)

   Activity - Calculate Write Capacity Units (WCUs)
5. Working with Docker Containers
6. Developing with AWS Lambda and Amazon API Gateway using the AWS SDK
7. Sandbox

TOTAL:P:30

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21CSE07	AWS ACADEMY CLOUD ARCHITECTING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

Illustrate how cloud adoption transforms the way IT systems work.

- Identify the benefits of Infrastructure as Code.
- Summarize database services for storing and deploying web-accessible applications.
- Describe how the AWS Well-Architected Framework improves cloud-based architectures.
- Evaluate the most important performance metrics for applications

COURSE OUTCOMES:

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

21CSE07.CO1 Understand IT related work and access Amazon Web Services
21CSE07.CO2 Develop code for AWS Cloud Formatting & Amazon DynamoDB
21CSE07.CO3 Construct real time database application using current techniques
21CSE07.CO4 Demonstrate Cloud based architectures
21CSE07.CO5 Design real time application with performance metrics.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE07.CO1	x	x	-	-	x	-	-	x	-	-	x	-	x	-	-
21CSE07.CO2	x	-	x	x	x	-	x	-	-	-	x	-	-	x	-
21CSE07.CO3	x	-	x	-	x	x	x	-	-	x	x	-	-	-	x
21CSE07.CO4	x	x	x	-	x	x	-	-	x	-	x	x	x	-	-
21CSE07.CO5	x	-	-	-	x	-	-	x	-	x	x	-	-	x	-

UNIT I WELCOME TO AWS ACADEMY CLOUD ARCHITECTING 9

Course Prerequisites, Objectives, Overview, Creating AWS Training Portal Account, Accessing Course Materials. Designing Environment - Choosing a Region, Selecting Availability Zones, Virtual Private Cloud (VPC), Dividing VPCs and Subnets, Default VPCs and Default Subnets, Controlling VPC Traffic, Connecting Multiple VPCs, Integrating On-premises Components, VPC Best Practices. Designing for High Availabilty I - Load Balancing and Fault Tolerance, High Availability Across Regions, Connections Outside of Amazon VPC.

UNIT II DESIGNING FOR HIGH AVAILABILITY II AND INFRASTRUCTURE 9

Designing for High Availabilty II - Best Practice – Scalability, Determining if Scaling is Needed, Automatic Scaling, Scaling Data Stores, AWS Lambda and Event Driven Scaling. Automating Infrastructure - Manual Environment Configuration, Infrastructure as code on AWS, Grouping resources in a template, Resources not supported by AWS CloudFormation. Decoupling Infrastructure - Loose Coupling, Loose Coupling Strategies, Communicating Easily and Reliably Among Components, Communicating with Loose Coupling and Amazon DynamoDB, Amazon API Gateway, Serverless Architectures, Decoupling Examples

UNIT III DEVELOPING WEB SCALE MEDIA AND ARCHITECTED FRAMEWORK 9

Storing Web-Accessible Content with Amazon S3, Caching with Amazon CloudFront, Managing NoSQL Databases, Storing Relational Data in Amazon RDS. Architected Framework - Introduction to the Well-Architected Framework, Pillars of the Well-Architected Framework, Well-Architected Design Principles. Operational Excellence - Principles of the Operational Excellence Pillar, Drive Operational Excellence, Operational Excellence Pillar Questions

UNIT IV WELL ARCHITECTED PILLARS: 9
SECURITY,RELIABILITY,PERFORMANCE EFFICIENCY

Security - Principles of the Security Pillar, Preventing Common Security Exploits, Securing Data in CloudFront, Encrypting Data, Authentication. Reliability - Principles of the Reliability Pillar, Making

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Infrastructure More Reliable, Reliability Pillar Questions. Performance Efficiency - Principles of the Performance Efficiency Pillar, Infrastructure Efficiency Improvements, Performance Efficiency Pillar Questions and Best Practice.

UNIT V **WELL-ARCHITECTED PILLARS : COST OPTIMIZATION, TROUBLESHOOTING, DESIGN PATTERNS AND SAMPLE ARCHITECTURES** 9

Cost Optimization - Principles of the Cost Optimization Pillar, Optimizing the Cost of Infrastructure, Dedicated Instances and Dedicated Hosts, Trusted Advisor, Optimizing Costs with Caching, AWS Cost Calculation Tools, Cost Optimization Questions. Troubleshooting - Troubleshooting Steps, AWS Support Options. Design Patterns - High-Availability Design Patterns, Stream Processing Example, Sensor Network Data Ingestion and Processing Example, Application Backend Example, Transcoding and Serving Video Files ExampleLayer Security - Firewalls.

TOTAL: L: 45

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21CSE08	AWS ACADEMY CLOUD ARCHITECTING LAB	L	T	P	C
		0	0	2	1

COURSE OBJECTIVES

- Formulate Auto scaling with AWS Lambda.
- To Summarize AWS Cloud formation.
- To decouple the infrastructure.
- To implement Serverless Architecture and Amazon CloudFront
- To Develop Amazon Route 53 and sandbox

COURSE OUTCOMES:

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

21CSE08.CO1 Develop Auto scaling with AWS Lambda.
21CSE08.CO2 Deploy AWS Cloud formation.
21CSE08.CO3 Decoupling the infrastructure.
21CSE08.CO4 To implement Serverless Architecture and Amazon CloudFront
21CSE08.CO5 Construct Amazon Route 53 and sandbox.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE08.CO1	x	-	x	x	-	-	x	-	-	x	-	x	x	x	-
21CSE08.CO2	x	x	-	-	x	-	x	x	x	x	-	-	x	-	-
21CSE08.CO3	x	x	x	x	-	x	-	-	x	x	x	x	x	-	-
21CSE08.CO4	x	x	x	-	x	x	-	x	x	x	x	-	-	-	x
21CSE08.CO5	x	x	x	x	-	x	-	-	x	x	x	x	x	x	-

LIST OF PROGRAMS

1.Making Environment Highly Available

2.Using Auto Scaling with AWS Lambda

3.Automating Infrastructure Deployment with AWS Cloud Formation

4.Decoupling Infrastructure

5.Implementing a Serverless Architecture with AWS Managed Services

6.Introduction to Amazon CloudFront

7.Multi-Region Failover With Amazon Route 53

8.Sandbox

TOTAL:P:30

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21CSE09 INTERNET PROGRAMMING

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

- Understand the basic concepts of the Internetworking.
- Describe the creation of web site both client and server side.
- Implementing java-specific web services architecture.
- Explore the fundamental concepts of PHP in server side computing.
- Develop responsive web applications using AJAX.

COURSE OUTCOMES:

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

21CSE09.CO1	Illustrate the basic concepts of Networking.
21CSE09.CO2	Design a responsive web site using HTML5 and CSS3.
21CSE09.CO3	Applying different event handling mechanisms using JavaScript.
21CSE09.CO4	Build Dynamic web site using server side PHP Programming and Database connectivity.
21CSE09.CO5	Analyze different Web Extensions and Web Services.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE09.CO1	x	x	-	x	x	-	-	-	-	-	-	x	-	x	-
21CSE09.CO2	x	-	x	x	x	-	x	x	-	-	x	-	-	-	-
21CSE09.CO3	x	-	x	x	x	-	-	-	x	-	x	-	-	x	-
21CSE09.CO4	x	-	x	x	x	-	x	-	-	-	x	-	-	-	x
21CSE09.CO5	x	x	-	x	x	x	-	-	x	-	x	-	x	-	-

UNIT I INTERNETWORKING 9+6

Internetworking – Working with TCP/IP – IP address – sub netting – DNS – VPN – proxy servers – firewalls – Client/Server concepts - World Wide Web – components of web application – MIME types, browsers and web servers – types of web content – URL – HTML – HTTP protocol – Web applications – performance – Application servers – Web security. User Experience Design – Basic UX terminology – UXD in SDLC – Rapid prototyping in Requirements

UNIT II INTRODUCTION TO HTML 9+6

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.

UNIT III SERVER SIDE PROGRAMMING 9+6

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 IV INTRODUCTION TO PHP 9+6

Introduction to PHP -Declaring variables, data types, arrays, strings, operators, expressions, control structures, functions, Reading data from web form controls like text boxes, radio buttons, lists etc., Handling File Uploads, Connecting to database (MySQL as reference), executing simple queries, handling results, Handling sessions and cookies File Handling in PHP: File operations like opening, closing, reading, writing, appending, deleting

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etc. on text and binary files, listing directories.

UNIT V **WEB SERVICES AND AJAX** 9+6

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.

TOTAL: L: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Deitel and Deitel and Nieto	Internet and World Wide Web –How to Program	Prentice Hall, 5th Edition	2011
2.	Steven Holzner	The Complete Reference PHP	Tata McGraw-Hill	2012

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Jeffrey C and Jackson	Web Technologies A Computer Science Perspective	Pearson Education	2011
2.	Gopalan N.P. and Akilandeswari	Web Technology	Prentice Hall of India	2011
3.	Stephen Wynkoop and John Burke	Running a Perfect Websitel	QUE, 2nd Edition	1999
4.	UttamK.Roy	Web Technologies	Oxford University Press	2011
5.	Chris Bates	Web Programming – Building Intranet Applications	Wiley Publications 3rd Edition	2009

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21CSE10	CURRENT PRACTICES IN SOFTWARE ENGINEERING	L	T	P	C
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COURSE OBJECTIVES

- Remember the basic concepts of software Engineering and life cycle models.
- Summarize the requirements elicitation.
- Analyze the design interactive system.
- Illustrate the quality assurance using testing.
- Develop the different levels of maintaining project

COURSE OUTCOMES:

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

21CSE10.CO1 Enumerate the software modeling for various real time problems
21CSE10.CO2 Identify the elicitation techniques and integrate the requirements
21CSE10.CO3 Develop the modal and framework for real-time application
21CSE10.CO4 Analyze the quality of the software and verify the product.
21CSE10.CO5 Implement software project management for security systems

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE10.CO1	x	-	x	-	x	-	-	x	-	x	-	x	x	x	-
21CSE10.CO2	x	x	-	-	x	-	-	x	x	x	-	-	x	-	-
21CSE10.CO3	x	x	x	x	-	x	-	-	x	x	x	x	-	x	-
21CSE10.CO4	x	x	x	x	-	x	-	-	x	x	x	-	x	-	x
21CSE10.CO5	x	x	x	x	-	x	-	-	x	x	x	x	x	x	-

UNIT I SOFTWARE ENGINEERING PARADIGMS 9

Software Engineering-Challenges- Software process- Component-Based Software Engineering-Importance of Paradigms; Life Cycle Models-Waterfall Model-Incremental model-Prototyping Model-Spiral Model-RAD-Object oriented model-Win-Win Spiral model.

UNIT II SOFTWARE REQUIREMENT ANALYSIS AND SPECIFICATION 9

Requirement Analysis - Elicitation of requirements- System and software requirements- Functional and non-functional requirements- Domain requirements- User requirements- Software requirement Specification- SRS format- Software Requirement Essentials – Requirements from Customer Perspective

UNIT III SOFTWARE ENGINEERING DESIGN 9

Design Process- Logical and Physical DFDs, ERD, Data Dictionary- Functional Modeling and Data Flow, Data Modeling, Mechanics of Structured Analysis-Transform and Transaction Analysis, Structure Chart-Modularity-Other methods-User Interface Design-Component Level Design- Cohesion-Coupling-Information hiding-Functional independence

UNIT IV CODING-TESTING AND IMPLEMENTATION 9

Programming languages and development tools- Good programming practices- Coding Standards- Testing-Software testing Fundamentals- White Box and Black Box Testing, Test Case Design, Unit Testing, Integration Testing-Software Quality Assurance – Verification and Validation- Software Implementation

UNIT V MANAGING SOFTWARE PROJECTS-AGILE METHODOLOGY 9

Management activities-Software Metric- Software Size Estimation and Cost Estimation–LOC-COCOMO Model – Standards- ISO9000- CMM-Theories for Agile management – agile software development – traditional model vs. agile model- Web Engineering and Agile process-Project Scheduling-Earned value analysis-Risk Management

TOTAL: L: 45

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TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Roger S.Pressman	Software Engineering	The mcGrawHill	2010
2.	V.R.Kavitha	Software Engineering	Magnus Publications	2016

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Karl E Wiegers and Joy Beatty	Software Requirements	Microsoft Press	2013
2.	Robert Martins	Clean code-Agile Technology	Prentice hall	2008
3.	Rajib Mall	Fundamentals of Software Engineering	The mcGrawHill	2009
4.	Ian Sommerville	Software Engineering	Addison-Wesley	2008
5.	Wikibooks 2013	Introduction to Software Engineering	E-Book	2013

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21CSE11 **COMPUTER GRAPHICS** **L T P C**
3 0 0 3

COURSE OBJECTIVES

- Introduce the concept about graphics hardware devices and software used.
- Understand the two dimensional graphics and their transformations.
- Describe three dimensional graphics and their transformations.
- Demonstrate the illumination and color models.
- Enhance the concept of Animation designing..

COURSE OUTCOMES:

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

21CSE11.CO1 Apply algorithm to draw fundamental drawings (Line, Ellipse and Circle)
21CSE11.CO2 Apply algorithm for 2D images clipping and transformation.
21CSE11.CO3 Illustrate 3D images clipping and transformation operation.
21CSE11.CO4 Construct illumination models and color model applications.
21CSE11.CO5 Design animation applications.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE11.CO1	x	x	x	-	-	-	-	-	-	-	-	-	x	x	-
21CSE11.CO2	x	x	x	-	-	-	-	-	-	-	-	-	x	x	-
21CSE11.CO3	x	x	x	-	-	-	-	-	-	-	-	-	-	x	x
21CSE11.CO4	x	x	x	-	-	-	-	-	-	-	-	-	-	x	x
21CSE11.CO5	-	x	x	-	-	-	-	x	-	-	-	-	-	x	x

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

Survey of computer graphics, Overview of graphics systems – Video display devices, Raster scan systems, Random scan systems, Graphics monitors and Workstations, Input devices, Hard copy Devices, Graphics Software; Output primitives – points and lines, line drawing algorithms, loading the frame buffer, line function; circle and ellipse generating algorithms..

UNIT II **TWO DIMENSIONAL GRAPHICS** **9**

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

UNIT III **THREE DIMENSIONAL GRAPHICS** **9**

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

UNIT IV **ILLUMINATION AND COLOUR MODELS** **9**

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

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UNIT V **ANIMATIONS & REALISM** **9**

Animation Graphics: Design of Animation Sequences – Animation Function – Raster Animation – Key Frame Systems – Motion Specification –Morphing – Tweening. Computer Graphics Realism: Tiling the Plane – Recursively Defined Curves – Koch Curves – C Curves – Dragons – Space Filling Curves – Fractals – Grammar Based Models – Fractals – turtle graphics – ray tracing.

TOTAL: L: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	John F. Hughes, Andries Van Dam, Morgan Mc Guire ,David F. Sklar , James D. Foley, Steven K. Feiner and Kurt Akeley	Computer Graphics: Principles and Practice	3rd Edition, Addison-Wesley Professional	2013
2.	Donald Hearn and Pauline Baker M	Computer Graphics	Prentice Hall, New Delhi	2007

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Donald Hearn and M. Pauline Baker, Warren Carithers	Computer Graphics with Open GL, 4th Edition	Pearson Education	2010
2.	Jeffrey McConnell	Computer Graphics :Theory into Practice	Jones and Bartlett Publishers	2006
3.	Hill F S Jr	Computer Graphics	Maxwell Macmillan	1990

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21CSE12 **DISTRIBUTED PROGRAMMING** L T P C
3 0 0 3

COURSE OBJECTIVES

- Understand the basic Characterization of Distributed Systems.
- Analyze the inter process communication paradigms in distributed environment.
- Illustrate and synchronize process states for different networks
- Apply the different Distributed File Systems
- Implement the concept of distributed transaction and its concurrency control techniques

COURSE OUTCOMES:

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

21CSE12.CO1	Demonstrate knowledge of the basic elements and concepts related to distributed system
21CSE12.CO2	Apply the inter process communication paradigms in distributed environment
21CSE12.CO3	Develop various operating system support of the distributed File systems
21CSE12.CO4	Analyze the file system structure and Synchronization
21CSE12.CO5	Implement concurrency control techniques for distributed transactions

21

21Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE12.CO1	-	x	-	-	x	-	-	x	-	-	x	-	x	-	-
21CSE12.CO2	x	-	x	x	-	-	x	-	-	-	-	-	-	x	-
21CSE12.CO3	-	-	x	-	-	x	x	-	-	x	-	-	-	-	x
21CSE12.CO4	-	-	-	-	-	x	-	-	x	-	-	x	x	-	-
219CSE12.CO5	x	-	-	-	x	-	-	x	-	x	-	-	-	x	-

UNIT I **CHARACTERIZATION OF DISTRIBUTED SYSTEMS** 9

Introduction: Evolution of Distributed Computing -Issues in designing a distributed system- Challenges- Minicomputer model – Workstation model - Workstation-Server model– Processor - pool model - Trends in distributed systems-Examples of DS-Resource sharing and the Web- Challenges **System Models**: Architectural Models- Fundamental Models.

UNIT II **INTER PROCESS COMMUNICATION** 9

Message Passing: Inter process Communication-Desirable Features of Good Message-Passing Systems- Issues in IPC by Message- Synchronization- Buffering-Multi datagram Messages-Encoding and Decoding of Message Data- Process Addressing- Failure Handling- Group Communication

UNIT III **OPERATING SYSTEM SUPPORT** 9

Operating System Support: Introduction, The OS layer, Protection, Processes and Threads, Communication and Invocation , Operating system architecture **Distributed File Systems:** Introduction, File Service architecture, Sun Network File System **Synchronization:** Clock Synchronization, Event Ordering, Mutual Exclusion, Election Algorithms

UNIT IV **DISTRIBUTED FILE SYSTEMS** 9

Desirable Features of a good Distributed File Systems- File Models-File Accessing Models-File-sharing Semantics- File caching Schemes-File Replication- Fault Tolerance- Design Principles-Sun's network file system- Andrews file system- comparison of NFS and AFS.

UNIT V **DISTRIBUTED TRANSACTIONS** 9

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Distributed Transactions: Introduction, Flat and nested distributed transactions, Atomic commit protocols, Concurrency control in distributed transactions, distributed deadlocks- Transactions, Nested transactions- Locks-Optimistic concurrency control . **Case Studies**: Mach & Chorus- Group communication - Publish - subscribe systems.

TOTAL: L: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	George Coulouris, Jean Dollimore and Tim Kindberg	Distributed Systems: Concepts and Design Fifth Edition	Pearson Education	2011
2.	Pradeep K Sinha	Distributed Operating Systems : Concepts and Design	Prentice Hall of India	2009

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	A S Tanenbaum and M V Steen	Distributed Systems: Principles and paradigms	Pearson Education	2007
2.	M Solomon and J Krammer	Distributed Systems and Computer Networks	PHI	2012
3.	George Coulouris, Jean Dollimore, and Tim Kindberg.	Distributed Systems : Concepts and Design	Prentice Hall of India	2006
4	Vijay K. Garg, Wiley	Elements of Distributed Computing	Pearson Education	2002
5	Andrew Tanenbaum and Maarten van Steen,	Distributed Systems: Principles	Prentice Hall	2007

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21CSE13 ENTERPRISE PROJECT DEVELOPMENT USING FOSS

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

- Understand the concepts, strategies and methodologies related to OSS.
- Analysis the business, economy, social and intellectual properties and issues
- Apply the OSS product and development tool in the market.
- Construct the utilization of OSS for web application development.
- Implement the programming language for script development.

COURSE OUTCOMES:

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

21CSE13.CO1 State the various open source licenses.
21CSE13.CO2 Understand Linux build systems.
21CSE13.CO3 Discuss the configuration of web server.
21CSE13.CO4 Illustrate the concept of script.
21CSE13.CO5 Demonstrate programming language script to develop simple application.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE13.CO1	x	x	x			-	-	-	x	-	x	x	x	-	x
21CSE13.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21CSE13.CO3	x	x	x	x	x	x	-	x		-	x	x	x	x	-
21CSE13.CO4	x	x	x	x	-	-	-	x	-	x	x	x	x	x	x
21CSE13.CO5	x	x	x	x	-	x	-	x		-	-	x	x	x	x

UNIT I GNU/LINUX ARCHITECTURE AND DEVELOPMENT TOOLS 9

GNU/Linux Architecture, Architectural Breakdown of Major Kernel Components, Linux distributions, GNU Compiler Tool Chain, Building Software with GNU Make, Makefile Constructs. StaticShared-Dynamic Libraries, Building packages with Automake/Autoconf.

UNIT II DEPLOYMENT TOOLS 9

Components of a LAMP Server, Manage Multiple Websites with Virtual Hosts, Encrypt Sensitive Pages with SSL, Enable Server-side Includes and CGI Scripts.

UNIT III FILE HANDLING TOOLS AND GRAPHICS TOOLS 9

File Handling-API-Character access mechanisms, String access mechanisms, Sequential and Random access methods, Graphics File Formats, Diagramming with Dia, Open Office Draw, GIMP.

UNIT IV TEXT PROCESSING TOOLS 9

Bash beginnings, Pathnames and Permissions, Useful elements, cron Job, Script Versions Text Processing with awk and sed scripts

UNIT V VERSIONING CONTROL, COPYRIGHT ISSUES AND LICENSES 9

Standards for free software projects, Version Control, Bug Tracker, Wikis, Website Licenses, Patents, Copyright assignment and Ownership, Dual Licensing Schemes.

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TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	M.Tim Jones	GNU/Linux Application Programming	Dream Tech Press	2005
2.	Dream Tech Press	Producing Open Source Software	O"Reilly Media Inc	2005
3.	Janet Valade	Spring into Linux	Pearson Education	2006
4.	Tom Adelstein and Bill Lubanovic	Linux System Administration	O"Reilly	2007

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	I.Christopher Negus	Linux Bible	Wiley	2006
2.	Ellie Quigley	PERL by Example	Pearson Education	2009

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21CSE14	PARALLEL COMPUTING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To examine the scalability and clustering issues in Parallel Computing Environment
- To understand the technologies enabling parallel computing
- To study the different types of interconnection networks
- To design various parallel programming models
- To discuss the software support required for shared memory programming

COURSE OUTCOMES:

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

21CSE14.CO1	Summarize the issues in implementing parallelism and Communication
21CSE14.CO2	Apply parallel computing architectures for any given problem
21CSE14.CO3	Appraise the Network requirements for implementing Parallel Computing environment
21CSE14.CO4	Design applications by incorporating parallel computing architectures
21CSE14.CO5	Develop Programs for message passing through the Interfaces

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE14.CO1	x	-	x	x	-	-	x	-	-	x	-	x	x	x	-
21CSE14.CO2	x	x	-	-	x	-	x	x	x	x	-	-	x	-	-
21CSE14.CO3	x	x	x	x	-	x	-	-	x	x	x	x	x	-	-
21CSE14.CO4	x	x	x	-	x	x	-	x	x	x	x	-	-	-	x
21CSE14.CO5	x	x	x	x	-	x	-	-	x	x	x	x	x	x	-

UNIT I **SCALABILITY AND CLUSTERING** **9**

Evolution of Computer Architecture – Dimensions of Scalability – Parallel Computer Models – Basic Concepts Of Clustering – Scalable Design Principles – Parallel Programming Overview – Processes, Tasks and Threads – Parallelism Issues – Interaction / Communication Issues –Semantic Issues in Parallel Programs.

UNIT II **ENABLING TECHNOLOGIES** **9**

System Development Trends – Principles of Processor Design – Microprocessor Architecture Families – Hierarchical Memory Technology – Cache Coherence Protocols – Shared Memory Consistency – Distributed Cache Memory Architecture – Latency Tolerance Techniques – Multithreaded Latency Hiding..

UNIT III **SYSTEM INTERCONNECTS** **9**

Basics of Interconnection Networks – Network Topologies and Properties – Buses, Crossbar and Multistage Switches, Software Multithreading – Synchronization Mechanisms..

UNIT IV **PARALLEL PROGRAMMING** **9**

Paradigms and Programmability – Parallel Programming Models – Shared Memory Programming.

UNIT V **MESSAGE PASSING PROGRAMMING** **9**

Message Passing Paradigm – Message Passing Interface – Parallel Virtual Machine

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TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Kai Hwang and Zhi. Wei Xu,	Scalable Parallel Computing	Tata McGraw-Hill	2003
2.	David E. Culler & Jaswinder Pal Singh	Parallel Computing Architecture: A Hardware/Software Approach	Morgan Kaufinan Publishers	1999

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Michael J. Quinn	Parallel Programming in C with MPI & OpenMP	Tata McGraw-Hill	2003
2.	Kai Hwang	Advanced Computer Architecture	Tata McGraw-Hill	2003
3.	A Grama, A Gupra, G Karypis, V Kumar	Introduction to Parallel Computing	Addison Wesley	2003
4.	C Lin, L Snyder	Principles of Parallel Programming	Addison Wesley	2008
5.	T Mattson, B Sanders, B Massingill	Patterns for Parallel Programming	Addison-Wesley	2004

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21CSE15	KERNEL PROGRAMMING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- Understanding the design of Linux kernel components
- Experiencing the kernel by passive/active observation
- Extending the Linux kernel for understanding, self satisfaction/falsification ...
- Exploring current research trends in OS, Linux being the reference OS
- To learn the level of linux security

COURSE OUTCOMES:

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

21CSE15.CO1	Configure, build, and install the Linux kernel
21CSE15.CO2	Describe the Linux kernel source code
21CSE15.CO3	Explain the various functions of the Linux kernel, including file system, scheduler, and memory management.
21CSE15.CO4	Construct kernel modules for the Linux kernel
21CSE15.CO5	Implement customized extensions to the Linux kernel

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE15.CO1	x	-	x	x	-	-	x	-	-	x	-	x	x	x	-
21CSE15.CO2	x	x	-	-	x	-	x	x	x	x	-	-	x	-	-
21CSE15.CO3	x	x	x	x	-	x	-	-	x	x	x	x	x	-	-
21CSE15.CO4	x	x	x	-	x	x	-	x	x	x	x	-	-	-	x
21CSE15.CO5	x	x	x	x	-	x	-	-	x	x	x	x	x	x	-

UNIT I **INTRODUCTIONS TO KERNEL PROGRAMMING** 9

Contemporary operating systems, Linux and its evolution, Systems programming, Basic Linux installation and administration, Linux kernel architecture, Lab: installing and compiling Linux kernel General kernel ,responsibilities, Kernel organization, Kernel modules Lab: implementing a new kernel module.

UNIT II **KERNEL SERVICES** 9

System calls, Signals and interrupts, proc file system, Lab: adding a new system call Managing Memory: Address architecture, address space, Virtual memory, memory mapping, Paging, switching, caching, Lab: doing a project on virtual memory

UNIT III **MANAGING PROCESSES** 9

Process, kernel thread, tasklet, Context switch and scheduling, Interrupts, signals, and exceptions
Lab: doing a project on light weight process, Managing Times and Synchronization Kernel timer, hardware clocks, IPC, The Linux/SMP kernel, Lab: doing a project on time synchronization or SMP

UNIT IV **LINUX DEVICES AND NETWORKING** 9

Linux device driver architecture, Device filesystem (devfs), Hardware I/O, Lab: writing a new device driver, Linux File systems, Virtual filesystem (VFS),LVM and RAID, Journaling file system (JFS), Lab: writing a new file system, Multiplexing and demultiplexing, Linux TCP/IP Stack, Netfilter and advanced networking.

UNIT V **LINUX SECURITY** 9

Protection, Secure file system, Packet filters, Lab: NSA security-enhanced linux, Contemporary Topics, Embedded Linux, Low-power/power-efficient Linux, Lab: doing a project in embedded Linux kernel, Linux, Lab: writing a new protocol module.

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TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Daniel P. Bovet & Marco Cesati,O'Reilly & Associates	Understanding the Linux Kernel	ISBN 0-596-00002-2	October 2000,
2.	Addison Wesley	Kernel Projects for Linux By Gary Nutt	ISBN: 0-201-61243-7	July 2000

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Daniel P. Bovet, Marco Cesat	Understanding the Linux Kernel,	Springer	2017
2.	Robert Love	Linux Kernel Development	Springer	3rd Edition, 2015
3.	Jonathan Corbet, Greg Kroah-Hartman, Alessandro Rubini	Linux Device Drivers	Springer	, 3rd Edition, 2014
4	Marcel Gagné, Addison Wesley	inux System Administration: A User's Guide	ISBN: 0-201-71934-7	September 2001
5	Alessandro Rubini & Jonathan Corbet	Linux Device Drivers	ISBN 0-596-00008-1	2nd Edition 2001

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21CSE16 **SOFT COMPUTING TECHNIQUES** **L T P C**
3 0 0 3

COURSE OBJECTIVES

- Classify the various soft computing frame works
- Design the supervised learning network & unsupervised learning network
- Illustrate mathematical background for optimized genetic programming
- Restate to neuro-fuzzy hybrid systems and its applications.
- Apply the hybrid soft computing techniques

COURSE OUTCOMES:

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

21CSE16.CO1	Apply various soft computing concepts for practical applications
21CSE16.CO2	Design suitable neural network for real time problems
21CSE16.CO3	Construct fuzzy rules and reasoning to develop decision making and expert system
21CSE16.CO4	Summarize the importance of optimization techniques and genetic programming
21CSE16.CO5	Develop the various hybrid soft computing techniques and apply in real time problems

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE16.CO1	x	x	x	-	-	-	-	-	-	-	-	-	x	x	-
21CSE16.CO2	x	x	x	-	-	-	-	-	-	-	-	-	x	x	-
21CSE16.CO3	x	x	x	-	-	-	-	-	-	-	-	-	-	x	x
21CSE16.CO4	x	x	x	-	-	-	-	-	-	-	-	-	-	x	x
21CSE16.CO5	-	x	x	-	-	-	-	x	-	-	-	-	-	x	x

UNIT I **INTRODUCTION TO SOFT COMPUTING** **9**

Soft Computing Constituents-From Conventional AI to Computational Intelligence- Artificial neural network: Introduction, characteristics- learning methods – taxonomy – Evolution of neural networks - basic models - important technologies - applications. Fuzzy logic: Introduction - crisp sets- fuzzy sets - crisp relations and fuzzy relations: cartesian product of relation - classical relation, fuzzy relations, tolerance and equivalence relations, non-iterative fuzzy sets. Genetic algorithm Introduction - biological background - traditional optimization and search techniques - Genetic basic concepts

UNIT II **NEURAL NETWORKS** **9**

McCulloch-Pitts neuron - linear separability - hebb network - supervised learning network: perceptron networks - adaptive linear neuron, multiple adaptive linear neuron, BPN, RBF, TDNNassociative memory network: auto-associative memory network, hetero-associative memory network, BAM, hopfield networks, iterative auto associative memory network & iterative associative memory network –unsupervised learning networks: Kohonen self-organizing feature maps, LVQ – CP networks, ART network.

UNIT III **FUZZY LOGIC** **9**

Membership functions: features, fuzzification, methods of membership value assignmentsDefuzzification: lambda cuts - methods - fuzzy arithmetic and fuzzy measures: fuzzy arithmetic - extension principle - fuzzy measures - measures of fuzziness -fuzzy integrals - fuzzy rule base and approximate reasoning : truth values and tables, fuzzy propositions, formation of rulesdecomposition of rules, aggregation of fuzzy rules, fuzzy reasoning-fuzzy inference systemsoverview of fuzzy expert system-fuzzy decision making.

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UNIT IV **GENETIC ALGORITHM** 9

Genetic algorithm- Introduction - biological background - traditional optimization and search techniques - Genetic basic concepts - operators – Encoding scheme – Fitness evaluation – crossover - mutation - genetic programming – multilevel optimization – real life problem- advances in GA .

UNIT V **HYBRID SOFT COMPUTING TECHNIQUES & APPLICATIONS** 9

Neuro-fuzzy hybrid systems - genetic neuro hybrid systems - genetic fuzzy hybrid and fuzzy genetic hybrid systems - simplified fuzzy ARTMAP - Applications: A fusion approach of multispectral images with SAR, optimization of traveling salesman problem using genetic algorithm approach, soft computing based hybrid fuzzy controllers.

TOTAL: L: 4

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	J.S.R.Jang, C.T. Sun and E.Mizutani	Neuro-Fuzzy and Soft Computing	PHI / Pearson Education	2004
2.	S.N.Sivanandam and S.N.Deepa	Principles of Soft Computing	Wiley India Pvt Ltd	2011

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	S.Rajasekaran and G.A.Vijayalakshmi Pai	Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis & Applications	Prentice-Hall of India Pvt. Ltd.,	2006
2.	George J. Klir, Ute St. Clair, Bo Yuan	Fuzzy Set Theory: Foundations and Applications	Prentice Hall	1997
3.	David E. Goldberg	Genetic Algorithm in Search Optimization and Machine Learning	Pearson Education India	2013
4	James A. Freeman, David M. Skapura	Neural Networks Algorithms, Applications, and Programming Techniques	Pearson Education India	1991
5	Simon Haykin	Neural Networks Comprehensive Foundation	Second Edition, Pearson Education	2005

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21CSE17	VIRTUAL REALITY	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- Understand the concepts on Virtual Environment and 3D Modeling
- Analyzing modeling strategies
- Summaries concept on Animating the Virtual Environment
- Illustrate the Integrated VR systems
- Apply VR Application in real time.

COURSE OUTCOMES:

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

21CSE17.CO1	Understanding the concepts of Virtual Modeling and Environment
21CSE17.CO2	Analysis facts about the Geometric modeling and its Virtual Environment
21CSE17.CO3	Summaries basic techniques in designing transmission systems and Apply the software and hardware
21CSE17.CO4	Predict the technologies related to virtual reality and application of virtual reality system.
21CSE17.CO5	Apply virtual reality in real-world applications and do VRML programming

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE17.CO1	x	x	x	x		-	-	-	-	-	-	x	x	x	-
21CSE17.CO2	x	x	x	x	x	-	x	-	x	x	x	x	x	x	x
21CSE17.CO3	x	x	x	x	-	-	-	x	-	-	x	x	x	x	x
21CSE17.CO4	x	x	x	x	-	x	-	x	-	x	x	x	x	x	x
21CSE17.CO5	x	x	x	x	x	x	x	-		-	x	x	x	x	x

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

Virtual Reality & Virtual Environment : Introduction – Computer graphics – Real time computer-graphics – Flight Simulation – Virtual environments –Requirement for virtuality – benefits of virtual reality- Historical development of VR : Introduction – Scientific Landmark -3D Computer Graphics : Introduction – The Virtual world space – positioning the virtual of server – the perspective projection – human vision – stereo perspective projection – 3D clipping – Colour theory – Simple 3D modeling – Illumination models – Reflection models – Shading algorithms – Radiosity – Hidden-Surface removal– Realism – Stereographic usages.

UNIT II **GEOMETRIC MODELING** **9**

Geometric Modeling : Introduction – From 2D to 3D – 3D space curves – 3D boundary representation – Other modeling strategies-Geometrical Transformations: Introduction – Frames of reference – Modeling transformations – Instances – Picking – Flying – Scaling the VE – Collision detection - A Generic VR system : Introduction – The virtual environment – the Computer environment – VR Technology – Model of interaction – VR System

UNIT III **VIRTUAL ENVIRONMENT** **9**

Animating the Virtual Environment: Introduction – The dynamics of numbers – the animation of objects –shape & object in between – free-form deformation – particle system Physical Simulation : Introduction – Objects falling in a graphical field – Rotating wheels – Elastic collisions – projectiles – simple pendulum – springs – Flight dynamics of an aircraft.

UNIT IV **VR HARDWARES & SOFTWARES** **9**

Human Factors : Introduction – the age- the ear- the semantic senses – equilibrium – conclusions - VR Hardware : Introduction – sensor hardware – Head-coupled displays – Aquatic hardware – Integrated VR systems-VR Software: Introduction – Modeling virtual world –Physical simulation- VR tool kits

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UNIT V **VR APPLICATION** **9**

Introduction – Engineering – Entertainment – Science – Training – The Future : Introduction – Virtual Equipments – modes of interaction – conclusion

TOTAL: L: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	John Vince	Virtual Reality Systems	Pearson Education Asia	2001

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Adams	Visualizations of Virtual Reality	Tata McGraw Hill	2000
2.	William R. Sherman, Alan B. Craig	Understanding Virtual Reality: Interface, Application, and Design"	Morgan Kaufmann, 1st Edition	2002
3.	Fei GAO	Design and Development of Virtual Reality Application System	Tsinghua Press	2012

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21CSE18 **STORAGE INFRASTRUCTURE MANAGEMENT** **L T P C**
3 0 0 3

COURSE OBJECTIVES

- Evaluate Storage System Environment and storage architecture
- Describing storage networking technologies such as FC – SAN, NAS, IP – SAN and data archival solution CAS
- Create logical and physical components of a storage infrastructure including storage subsystems
- Identifying difference storage replication technologies and their benefits
- Illustrate business continuity solutions including, backup and recovery technologies, and Local and remote

COURSE OUTCOMES:

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

21CSE18.CO1	Identify the performance of Key challenges in managing information
21CSE18.CO2	Analyze the technologies in storage networks
21CSE18.CO3	Implementing the advance storage networks and Virtualization
21CSE18.CO4	Apply of replications and network infrastructure and replication
21CSE18.CO5	Summarize the business techniques and analyze the risk in business continuity

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE18.CO1	x	-	x	-	-	-	x	-	x	-	-	-	-	x	
21CSE18.CO2	-	x	-	-	x	x	-	-	-	x	-	-	-	-	x
21CSE18.CO3	x	-	-	x	-	-	x	-	-	-	-	x	x	-	-
21CSE18.CO4	-	x	-	-	x	-	-	x	-	-	x	-	-	-	x
21CSE18.CO5	-	-	x	x	-	-	-	-	-	x	-	x	-	x	-

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

Introduction to Information Storage and Management: Information storage – Evolution of storage technology and architecture – Data center Infrastructure - Key challenges in managing information – Information life cycle-Storage System Environment: Components of Host. RAID – implementation of RAID – RAID array components – RAID levels – RAID Comparison - Host spares. Intelligent storage System – Components –Intelligent storage array

UNIT II **STORAGE NETWORKING TECHNOLOGIES** **9**

Direct – Attached storage and introduction to SCSI: Types of DAS – DAS benefits and limitations Disk Drive Interfaces – Introduction to Parallel SCSI – SCSI command model-Storage Area Networks – Fiber channel – SAN evolution - SAN components – FC Connectivity – Fiber channel ports – Fiber Channel Architecture - Zoning – Fiber Channel login types – FC Topologies. Benefits of NAS –NAS file I/O – Components of NAS – NAS implementation – NAS file sharing protocols – NAS I/O operations

UNIT III **ADVANCED STORAGE NETWORKING AND VIRTUALIZATION** **9**

iSCSI – FCIP – Fixed content and archives – Types of archives – features and benefits of CAS – CAS architecture –Objects storage and retrieval in CAS – CAS Examples Storage Virtualization: Forms of Virtualization - SNIA Storage virtualization taxonomy – storage virtualization configurations – storage virtualization challenges – Types of storage virtualization.

UNIT IV **REPLICATION** **9**

Local replication: Source and target – uses of local replicas – data consistency – local replication technologies – restore and restart considerations – creating multiple replicas – management interfaces – concepts in practice - Remote replications – modes of remote replication technologies – network

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infrastructure – concepts in practice

UNIT V **BUSINESS CONTINUITY** 9

Introduction to Business continuity: Information availability – BC terminology – BC planning life cycle – Failure analysis – Business impact analysis – BC technology solutions – concept in practice Backup and Recovery: Backup purpose – considerations – granularity – recovery considerations – backup technologies – concepts in practice

TOTAL: L: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	EMC Corporation	Information Storage and Management	Wiley India	2010
2.	Jeffrey A. Hoffer, Heikki Topi, V Ramesh	Modern database management	10 Edition, PEARSON	2012

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Robert Spalding	Storage Networks: The Complete Reference	Tata McGraw Hill	2003
2.	Marc Farley	Building Storage Networks	Tata McGraw Hill	2001
3.	Meeta Gupta	Storage Area Networks Fundamentals	Pearson Education Limited	2002
4	Dr. Arun Kumar R	Easy Oracle Automation– Oracle 10g, Automatic Storage	Memory and Diagnostic Features	2004
5	Alex Berson, Larry Dubov	Master Data Management And Data Governance	2/E, Tata McGraw Hill	2011

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21CSE19 **TOTAL QUALITY MANAGEMENT** **L T P C**
3 0 0 3

COURSE OBJECTIVES

- To understand the importance of total quality management
- To develop students in the role of leadership & employee engagements
- To explore the TQM Tools for defect prevention and data gathering
- To apply the total quality management tools and techniques
- To develop competency in quality system and quality auditing systems

COURSE OUTCOMES:

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

21CSE19.CO1 Describe the Dimensions and Barriers regarding with Quality
21CSE19.CO2 Illustrate the TQM Principles
21CSE19.CO3 Demonstrate Tools utilization for Quality improvement.
21CSE19.CO4 Summarize the various types of Techniques are used to measure Quality
21CSE19.CO5 Apply various Quality Systems and Auditing on implementation of TQM

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE19.CO1	x	-	x	x	-	-	x	-	-	x	-	x	x	x	-
21CSE19.CO2	x	x	-	-	x	-	x	x	x	x	-	-	x	-	-
21CSE19.CO3	x	x	x	x	-	x	-	-	x	x	x	x	x	-	-
21CSE19.CO4	x	x	x	-	x	x	-	x	x	x	x	-	-	-	x
21CSE19.CO5	x	x	x	x	-	x	-	-	x	x	x	x	x	x	-

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

Introduction - Need for quality - Evolution of quality - Definitions of quality - Dimensions of product and service quality - Basic concepts of TQM - TQM Framework - Contributions of Deming, Juran and Crosby - Barriers to TQM – Customer: Focus, Satisfaction, Complaints, Retention - Costs of quality

UNIT II **TQM PRINCIPLES** **9**

Leadership, Employee Involvement - Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous Process Improvement - PDCA cycle - Supplier Partnership - Partnering, Selection, Rating.

UNIT III **TQM TOOLS AND TECHNIQUES I** **9**

The Seven Traditional Tools of Quality - New management tools - Six sigma - Bench marking - FMEA - 5S.

UNIT IV **TQM TOOLS AND TECHNIQUES II** **9**

Quality Function Development (QFD) - Taguchi quality loss function - TPM - Concepts, improvement needs - Performance measures.

UNIT V **QUALITY SYSTEMS** **9**

ISO 9000 Quality Management Systems: Introduction to ISO, Need for ISO 9000, elements of ISO 9000, quality auditing, types of auditing, ISO 14000: Environmental Management systems: Introduction to ISO 14000, Series of ISO14000, ISO 9000 Vs ISO 14000, Elements of EMS. TQM Implementation in manufacturing and service sectors.

TOTAL: L: 45

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TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Dale H. Besterfiled	Total Quality Management	Pearson Education Asia, Third Edition	2006
2.	James R. Evans and William M. Lindsay	Total Quality Management	8th Edition, First Indian Edition, Cengage Learning	2012

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Feigenbaum.A.V	Total Quality Management	McGraw Hill	1991
2.	Oakland.J.S	Total Quality Management Butterworth	Heinemann Ltd., Oxford	1989
3.	Suganthi.L and Anand Samuel	Total Quality Management	Prentice Hall (India) Pvt. Ltd	2006
4	Janakiraman. B and Gopal .R.K	Total Quality Management – Text and Cases	Prentice Hall (India) Pvt. Ltd.,	2006
5	R.S Naagarazan	Total Quality Management	New Age international,3e	2015

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21CSE20 **CLOUD INFRASTRUCTURE SERVICES**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

- To introduce the broad perceptive of cloud architecture and models
- To be familiar with AWS Storage services and Programming
- To understand the importance of AWS Security Services
- To appreciate the emergence of AWS Networking services, Database services
- To use the various types of AWS Services in cloud environment

COURSE OUTCOMES:

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

21CSE20.CO1	Compare the strengths and limitations of cloud computing models
21CSE20.CO2	Illustrate the fundamental concepts of cloud storage
21CSE20.CO3	Address the core issues of cloud computing such as security, privacy and interoperability
21CSE20.CO4	Deploy applications over commercial cloud computing infrastructures
21CSE20.CO5	Analyze the billing of resources and disaster management

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE20.CO1	x	-	x	-	-	x	x	x	-	x	-	-	x	-	x
21CSE20.CO2	x	x	-	-	-	x	x	x	-	x	-	-	x	x	x
21CSE20.CO3	-	-	x	x	-	x	-	x	-	x	-	x	x	x	-
21CSE20.CO4	x	-	x	-	x	-	-	-	-	x	x	x	x	x	-
21CSE20.CO5	x	-	x	-	x	-	x	x	-	x	-	x	-	x	-

21NIT I **CLOUD TECHNOLOGIES AND CLOUD PLATFORMS** **9**

Introduction to Cloud Computing, History of Cloud computing, Cloud Service options, Cloud Deployment models, Business concerns in the cloud, Exploring virtualization, Load balancing, Hypervisors, Machine imaging, Cloud marketplace overview, Comparison of Cloud providers.

UNIT II **PROGRAMMING AND STORAGE WITH AWS** **9**

Introduction to AWS - AWS history, AWS Infrastructure, AWS services, AWS ecosystem, Programming- Basic Understanding APIs - AWS programming interfaces, Web services, AWS URL naming, Matching interfaces and services, Storage- Elastic block store, Glacier.

UNIT III **AWS SECURITY SERVICES AND COMPUTING** **9**

Users, groups, and roles - Understanding credentials, Security policies, IAM abilities and limitations, AWS physical security - AWS compliance initiatives, Understanding public/private keys, Other AWS security capabilities. AWS computing and marketplace-Elastic cloud compute - Introduction to servers, Imaging computers, Auto scaling, Elastic load balancing, Cataloging the marketplace, AMIs, Selling on the marketplace.

UNIT IV **AWS NETWORKING, DATABASES** **9**

Virtual private clouds, Cloud models, Private DNS servers, Relational database service – DynamoDB, ElastiCache, Redshift.

UNIT V **OTHER AWS SERVICES** **9**

Services-Analytics services, Application services, Management Services- Cloud security, CloudWatch, CloudFormation, CloudTrail, OpsWorks. AWS billing and Dealing with Disaster- Managing costs, Utilization and tracking, Bottom line impact, Geographic and other concerns, Failure plans, Examining logs.

TOTAL: L: 45

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TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Barrie Sosinsky	Cloud Computing Bible.	John Wiley & Sons.	2011
2.	Patterns by Thomas Erl	Cloud Computing Design Patterns	Prentice Hall	2015

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Bernard Golden	Amazon Web Services For Dummies.	Wiley	2013
2.	Rajkumar Buyya	Cloud Computing: Principles and Paradigms	John Wiley & Sons	2013
3.	Christopher M. Moyer	Building Applications in the Cloud: Concepts, Patterns and Projects	Pearson Addison-Wesley Professional	2011
4	Michael Wittig and Andreas Wittig	Amazon Web Services in Action	Dreamtech Press	2015
5	Francis Shanahan, Wrox	Amazon.com Mashups	Wiley Publishing Inc.,	2007

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21CSE21 **GRAPHICS AND MULDIMEDIA**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

- Demonstrate algorithms in generating graphical outputs.
- Describe 3-dimensional objects using suitable transformations.
- Discuss the architecture for design of multimedia system.
- Familiarize the issues related to multimedia file handling.
- Understand hypermedia standards in developing multimedia applications.

COURSE OUTCOMES:

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

21CSE21.CO1 Develop algorithms to draw fundamental drawings
21CSE21.CO2 Construct real-time rendering 3D graphics
21CSE21.CO3 Design multimedia Application.
21CSE21.CO4 Compress the Multimedia file system
21CSE21.CO5 Integrate Hypermedia components using multimedia message standards

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE21.CO1	x	x	x	-	-	-	-	-	-	-	-	-	x	x	-
21CSE21.CO2	-	x	x	-	-	-	-	x	-	-	-	-	-	x	x
21CSE21.CO3	-	x	x	-	-	-	-	x	-	-	-	-	-	x	x
21CSE21.CO4	x	x	x	-	-	-	-	-	-	-	-	-	-	x	x
21CSE21.CO5	-	x	x	x	-	-	-	-	-	-	-	-	-	x	x

21NIT I **OUTPUT PRIMITIVES** **9**

Introduction - Line - Curve and Ellipse Drawing Algorithms – Attributes – Two-Dimensional - Geometric Transformations – Two-Dimensional Clipping and Viewing

UNIT II **THREE-DIMENSIONAL CONCEPTS** **9**

Three-Dimensional Object Representations – Three Dimensional Geometric and Modeling Transformations – Three-Dimensional Viewing – Color models – Animation

UNIT III **MULTIMEDIA SYSTEMS DESIGN** **9**

An Introduction – Multimedia applications – Multimedia System Architecture – Evolving technologies for Multimedia – Defining objects for Multimedia systems – Multimedia Data-interface standards – Multimedia Databases.

UNIT IV **MULTIMEDIA FILE HANDLING** **9**

Compression & Decompression – Data & File Format standards – Multimedia I/O technologies -Digital voice and audio – Video image and animation – Full motion video – Storage and retrieval-Technologies- Multimedia Authoring & User Interface.

UNIT V **HYPERMEDIA** **9**

Hypermedia messaging - Mobile Messaging –Hypermedia message component – Creating Hypermedia message – Integrated multimedia message standards – Integrated Document management – Distributed Multimedia Systems

TOTAL: L: 45

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TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Donald Hearn and M.Pauline Baker	Computer Graphics C	Pearson Education	2007
2.	Prabat K Andleigh and Kiran Thakrar	Multimedia Systems and Designl	Prentice- Hall of India	2009

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	James D Foley, Andries van Dam Feiner K , John F Hughes	Computer Graphics: Principles and Practice	Pearson Education	2013
2.	Foley, Vandam, Feiner, Huges	Computer Graphics: Principles & Practice	Pearson Education, second edition	2003
3.	Judith Jeffcoate	Multimedia in practice technology and Applicationsl	Prentice- Hall of India	1998

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21CSE22	GRAPHICS AND MULTIMEDIA LABORATORY	L	T	P	C
		0	0	2	1

COURSE OBJECTIVES

- Implement Bresenham's algorithms for line, circle and ellipse drawing.
- Perform 2D trsnsformations on translation, rotation, scaling, refelction, sharing and 2D clipping
- Illustate 3D transformations on translation, rotation, scaling
- Implement text compression, image compression and animation.
- Apply Animation and editing operation on image.

COURSE OUTCOMES:

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

21CSE22.CO1	Illustrate Bresenham's algorithms for line, circle and ellipse drawing.
21CSE22.CO2	Design an algorithm for 2D trsnsformations on translation, rotation, scaling, refelction, sharing and 2D clipping
21CSE22.CO3	Formulate an algorithm for 3D transformations on translation, rotation, scaling
21CSE22.CO4	Implement text compression, image compression and animation
21CSE22.CO5	Apply various color model and editing operation on image

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE22.CO1	x	x	x	-	-	-	-	-	-	-	-	-	x	x	-
21CSE22.CO2	-	x	x	-	-	-	-	x	-	-	-	-	-	x	x
21CSE22.CO3	-	x	x	-	-	-	-	x	-	-	-	-	-	x	x
21CSE22.CO4	x	x	x	-	-	-	-	-	-	-	-	-	x	x	-
21CSE22.CO5	-	x	x	x	-	-	-	-	-	-	-	-	-	x	x

LIST OF PROGRAMS

1. Implement Bresenham's algorithms for line.
2. Implement Bresenham's algorithms for circle and ellipse drawing.
3. Perform 2D Transformations such as translation, rotation, scaling, reflection and sharing.
4. Implement Cohen-Sutherland 2D clipping and window-view port mapping.
5. Perform 3D Transformations such as translation, rotation and scaling.
6. Color model conversion.
7. Implement text compression algorithm.
8. Implement image compression algorithm.
9. Perform animation using animation software.
10. Perform basic operations on image using any image editing software.

TOTAL:P:30

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21CSE23	DATA WAREHOUSING AND DATA MINING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To explore the basics of data warehousing
- To know the basics of Data Mining
- To understand frequent pattern and association rule mining techniques for data analysis
- To understand appropriate classification techniques for data analysis
- To understand the concepts of Data mining, Classification and Clustering for applications using weka tool

COURSE OUTCOMES:

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

21CSE23.CO1 Analyze the concepts of data warehousing.
21CSE23.CO2 Acquire the preprocessing of data and apply mining techniques on it.
21CSE23.CO3 Analysis frequent pattern on data mining.
21CSE23.CO4 Develop various classification algorithms.
21CSE23.CO5 Organize different types of clustering algorithm using weka tool.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE23.CO1	x	-	X	x	-	-	x	-	-	x	-	x	x	x	-
21CSE23.CO2	x	x	-	-	x	-	x	x	x	x	-	-	x	-	-
21CSE23.CO3	x	x	X	x	-	x	-	-	x	x	x	x	x	-	-
21CSE23.CO4	x	x	X	-	x	x	-	x	x	x	x	-	-	-	x
21CSE23.CO5	x	x	X	x	-	x	-	-	x	x	x	x	x	x	-

UNIT I **DATA WAREHOUSING, BUSINESS ANALYSIS AND ONLINE ANALYTICAL PROCESSING (OLAP)** 9

Basic Concepts-Warehouse Modelling–Schemas - Data cube – Multidimensional Data Model– Concept hierarchy - Dimension-Measures-OLAP operations-Starnet query model-Data warehouse design process-Data cube computation-OLAP Indexing-OLAP server architecture.

UNIT II **DATAMINING – INTRODUCTION** 9

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

UNIT III **DATAMINING – FREQUENT PATTERN ANALYSIS** 9

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

UNIT IV **CLASSIFICATION** 9

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

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UNIT V CLUSTERING AND WEKATOOL 9

Clustering Techniques – Cluster analysis – Partitioning Methods – Hierarchical Methods– Grid Based Methods– Evaluation of clustering – Clustering high dimensional data – Clustering with constraints, Outlier analysis – outlier detection methods - Case studies. WekaTool – Datasets – Introduction, Iris plants database, Breast cancer database – Introduction to WEKA, The Explorer-Getting started, Exploring the explorer, Learning algorithms, Clustering algorithms, Association–Rule learners.

TOTAL: L: 45

TEXT BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Pang-Ning Tan, Michael Steinbach, Vipin Kumar	Introduction to Data Mining	Pearson Education	2019
2.	Jiawei Hanand Micheline Kamber	Data Mining Concepts and Techniques	Elsevier	2012

REFERENCE BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Alex Berson and Stephen J.Smith	Data Warehousing, Data Mining & OLAP	Tata McGra Hill	2016
2.	K.P.Soman, Shyam Diwakar and V.Ajay	Insight into Data Mining Theory and Practice	Eastern Economy	2006

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21CSE24	SOFTWARE QUALITY ASSURANCE	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To understand the basic tenets of software quality, quality factors and Architecture
- To describe how the SQA components can be integrated into the project life cycle.
- To analyze the software quality infrastructure.
- To appraise the management components of software quality.
- Be familiar with IEEE standards, Certifications and Assessments

COURSE OUTCOMES:

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

21CSE24.CO1 Analyze Software quality factors and components
21CSE24.CO2 Utilize the concepts in SQA Components and software development life cycle.
21CSE24.CO3 Apply the training and certification to check the audit.
21CSE24.CO4 Evaluate the quality of software product.
21CSE24.CO5 Demonstrate their capability to adopt quality standards.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE24.CO1	-	x	-	-	x	-	-	x	-	-	x	-	x	-	-
21CSE24.CO2	x	-	x	x	-	-	x	-	-	-	-	-	-	x	-
21CSE24.CO3	-	-	x	-	-	x	x	-	-	x	-	-	-	-	x
21CSE24.CO4	-	-	-	-	-	x	-	-	x	-	-	x	x	-	-
21CSE24.CO5	x	-	-	-	x	-	-	x	-	x	-	-	-	x	-

UNIT I INTRODUCTION TO SOFTWARE QUALITY & ARCHITECTURE 9

Need for Software quality – Quality challenges – Software quality assurance (SQA) – Definition and objectives – Software quality factors- McCall"s quality model – SQA system and architecture – Software Project life cycle Components -- Pre project quality components – Development and quality plans.

UNIT II SQA COMPONENTS AND PROJECT LIFE CYCLE 9

Software Development methodologies – Quality assurance activities in the development process- Verification & Validation – Reviews – Software Testing – Software Testing implementations – Quality of software maintenance – Pre-Maintenance of software quality components – Quality assurance tools – CASE tools for software quality – Software maintenance quality – Project Management.

UNIT III SOFTWARE QUALITY INFRASTRUCTURE 9

Procedures and work instructions - Templates - Checklists – 3S development - Staff training and certification Corrective and preventive actions – Configuration management – Software change control – Configuration management audit -Documentation control – Storage and retrieval.

UNIT IV SOFTWARE QUALITY MANAGEMENT & METRICS 9

Project process control – Computerized tools - Software quality metrics – Objectives of quality measurement – Process metrics – Product metrics – Implementation – Limitations of software metrics – Cost of software quality – Classical quality cost model – Extended model – Application of Cost model.

UNIT V STANDARDS, CERTIFICATIONS & ASSESSMENTS 9

Quality management standards – ISO 9001 and ISO 9000-3 – capability Maturity Models – CMM and CMMI assessment methodologies - Bootstrap methodology – SPICE Project – SQA project process standards – IEEE Std 1012 & 1028 – Organization of Quality Assurance – Department management responsibilities – Project management responsibilities – SQA units and other actors in SQA systems.

TOTAL : L : 30

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TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Daniel Galin	Software Quality Assurance	Pearson Publication	2019

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Alan C.Gillies	Software Quality: Theory and Management	International Thomson Computer Press	1997
2.	Mordechai Ben-enachem	Software Quality: Producing Practical Consistent Software	International Thomson Computer Press	1997

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21CSE25 **NETWORKING AND ROUTING PROTOCOLS**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

- Understand the transmission media and tools
- Restate about the functions of different network layers
- Create in-depth awareness of packet routing in computer communication networks
- Summarize routing algorithms, Framework and Principles
- Illustrate familiarized with different protocols and Ad hoc Network components

COURSE OUTCOMES:

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

21CSE25.CO1	Identify the role of each layer in computer networks and its protocols
21CSE25.CO2	Develop the characteristics of distance vector routing protocols
21CSE25.CO3	Describe the critical role routers play in enabling communications across multiple networks
21CSE25.CO4	Evaluate the performance of various routing Framework and Principles
21CSE25.CO5	Apply the characteristics of Routing in Ad hoc Network

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE25.CO1	x	-	x	-	x	-	-	x	-	x	-	x	x	x	-
21CSE25 CO2	x	x	-	-	x	-	-	x	x	x	-	-	x	-	-
21CSE25.CO3	x	x	x	x	-	x	-	-	x	x	x	x	-	x	-
21CSE25.CO4	x	x	x	x	-	x	-	-	x	x	x	-	x	-	x
21CSE25.CO5	x	x	x	x	-	x	-	-	x	x	x	x	x	x	-

21NIT I **INTRODUCTION** **9**

Overview: Data Communication - Network Types - Internet History –Topology- Network model: OSI Model - TCP/IP Protocol Suite- Digital Signals - Data rate limits - Performance - Transmission Media: Guided Media- Unguided Media - Repeater and Hub & its type, Bridges and its Types, Switch- Configuration of Switches and Router

UNIT II **NETWORK MODEL** **9**

Description of Seven Layers of OSI Model-TCP/IP Model- Comparison of OSI & TCP/IP Model- Physical and Data link Layer- Network and Transport Layer- Presentation and Session Layer- Application Layer

UNIT III **NETWORKING AND NETWORK ROUTING** **9**

Router Architectures : Functions of a Router- Types of Routers- Elements of a Router- Packet Flow- Packet Processing- Fast Path versus Slow Path, Router Architectures **Addressing and Internet Service:** An Overview-Network Routing-IP Addressing- On Architectures- Service Architecture- Protocol Stack Architecture-Router Architecture-Network Topology Architecture

UNIT IV **ROUTING PROTOCOLS FRAMEWORK AND PRINCIPLES** **9**

Routing Protocol- Routing Algorithm and Routing Information- Representation and Protocol Messages- Distance Vector Routing Protocol- Link State Routing Protocol- Path Vector Routing Protocol-Link Cost- RIP – OSPF – BGP- Multicast Routing-Transport Layer- UDP - Overview of TCP - TCP flow control- TCP Error control - Congestion Control-Quality of Service

UNIT V **ROUTING IN AD HOC NETWORK** **9**

Introduction to Ad hoc Networks – Features/ Characteristics, Types and Applications, Limitations, Advantages and Disadvantages, Classification of Routing Protocols in Ad hoc Networks – Proactive Routing Protocols (DSDV, OLSR), Reactive Routing Protocols (DSR, AODV), Hybrid Routing Protocols (ZRP)

TOTAL: L: 45

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TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Behrouz A. Foruzan	Data communication and Networking	Tata McGraw-Hill	2013
2.	Larry L. Peterson and Bruce S. Davie	Computer Networks: A systems approach	Morgan Kaufmann Publishers	2010

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Deepankar Medhi, Kartikeyan Ramasamy	Network Routing – Algorithms, Protocols, Architecture	Morgan Kauffman Series Publication	2010
2.	Andrew S Tanenbaum, David J. Wetherall	Computer Networks	Prentice Hall of India/ Pearson Education	2010
3.	William Stallings	Data and Computer Communications	Pearson Education	2013
4	James F. Kurose, Keith W. Ross	Computer Networking, A Top–Down Approach Featuring the Internet	Pearson Education	2012
5	Dharma Prakash Agrawal and Carlos De Morais Cordeiro	Adhoc and Sensor Networks – Theory and Applications	World Scientific publication	2008

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21CSE26 **SCALING AND CONNECTING NETWORKS**

L	T	P	C
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COURSE OBJECTIVES

- State basic concepts as VLAN Technologies
- Describe the concept of Spanning Tree Routing Protocol
- Develop a different types of Routing Protocol
- Evaluate the EIGRP for IPv4, IPv6
- Illustarte the features of OSPF protocols

COURSE OUTCOMES:

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

21CSE26.CO1 Identify and design the new models for VLAN.
21CSE26.CO2 Develop various Routing Algorithm
21CSE26.CO3 Compare the operations of dynamic Routing Protocol
21CSE26.CO4 Analyze the different models for Network dynamics.
21CSE26.CO5 Configure Shortest Route using OSPF

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE26.CO1	x	x	x	x	-	x	-	-	x	x	x	x	x	x	-
21CSE26.CO2	x	x	-	-	x	-	-	x	x	x	-	-	x	-	-
21CSE26.CO3	x	x	x	x	-	x	-	-	x	x	x	x	x	x	-
21CSE26.CO4	x	x	x	x	-	x	-	-	x	x	x	-	x	-	x
21CSE26.CO5	x	-	x	-	x	-	-	x	x	x	-	-	x	-	-

UNIT I **INTRODUCTION-VLAN** 9

Introduction to LAN Design - Campus Wired LAN Designs -Hierarchical Design Model -Selecting Network Devices-Switch Hardware-Router Hardware-Scaling VLANs-VTP, Extended VLANs, and DTP - VTP Concepts and Operation -VTP Modes-Extended ,VLANs Troubleshoot Multi-VLAN Issues

UNIT II **SPANNING TREE** 9

STP-Spanning Tree Concepts-Purpose of Spanning Tree--STP Operation-Varieties of Spanning Tree Protocols-Spanning Tree Configuration, Ether Channel and HSRP--First Hop Redundancy Protocols-Link Aggregation Concepts-HSRP Operations-HSRP Failure.

UNIT III **ROUTING PROTOCOLS** 9

Dynamic Routing-Dynamic Routing Protocols-Types of Routing Protocols-Distance Vector Routing Protocols -- Distance Vector Dynamic Routing-Distance Vector Routing Protocol Operation and its types, Link-State Routing Protocols -Link-State Routing Protocol Operation and Benefits

UNIT IV **EIGRP TUNING AND TROUBLESHOOTING** 9

EIGRP- EIGRP Characteristics- EIGRP Packet Types- EIGRP Messages- EIGRP Operation- Implement EIGRP for IPv4,IPv6- EIGRP Tuning and Troubleshooting

UNIT V **OSPF** 9

OSPF- OSPF Characteristics- Evolution of OSPF, Features of OSPF -Components of OSPF, OSPF Messages, OSPF Network Types, OSPF Operation, Single-Area OSPF- Differences Between OSPFv2 and OSPFv3- Multiarea OSPF-Multiarea OSPF Operations

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TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Bob Vachon, Allan Johnson	Scaling Networks v6 Companion Guide	Cisco Press	2018
2.	Larry L. Peterson and Bruce S. Davie	Computer Networks: A systems approach	Morgan Kaufmann Publishers	2010

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Deepankar Medhi, Kartikeyan Ramasamy	Network Routing – Algorithms, Protocols, Architecture	Morgan Kauffman Series Publication	2010
2.	Andrew S Tanenbaum, David J. Wetherall	Computer Networks	Prentice Hall of India/ Pearson Education	2010
3.	William Stallings	Data and Computer Communications	Pearson Education	2013
4	James F. Kurose, Keith W. Ross	Computer Networking, A Top–Down Approach Featuring the Internet	Pearson Education	2012
5	Dharma Prakash Agrawal and Carlos De Morais Cordeiro	Adhoc and Sensor Networks – Theory and Applications	World Scientific publication	2008

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21CSE27 **OPEN STACK ESSENTIALS**

L	T	P	C
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COURSE OBJECTIVES

- Understand Open Stack Architecture
- Analyze the Principles of Identity and Image Management
- Define Network and Instance Management
- Develop A Block and Object Storage
- Design and Build Simple Nodes

COURSE OUTCOMES:

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

21CSE27.CO1 Installing Pack stack and generating an answer file
21CSE27.CO2 Develop Glance as a Registry of images
21CSE27.CO3 Construct Web Interface External Network Setup
21CSE27.CO4 Determine Object file management in the web interface
21CSE27.CO5 Implement interactive Scaling control and Networking Services

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE27.CO1	x	x	-	-	x	-	x	-	-	-	-	-	x	-	-
21CSE27.CO2	-	-	x	-	-	-	x	x	-	-	x	-	-	x	-
21CSE27.CO3	-	-	x	-	x	-	-	-	x	x	-	-	-	-	x
21CSE27.CO4	-	x	-	x	-	x	-	-	x	-	-	x	-	x	-
21CSE27.CO5	x	-	-	x	-	-	-	-	-	x	-	-	-	-	x

UNIT I **ARCHITECTURE AND COMPONENT OVERVIEW** 9

Open Stack Architecture- Dashboard- Keystone- Glance- Neutron- Nova- Cinder-Shift- Ceilometer- Heat. RDO Installation: Installing RDO using Packstack -Installing Packstack and generating an answer file.

UNIT II **IDENTITY AND IMAGE MANAGEMENT** 9

Services and Endpoints: Hierarchy of users-roles-Creating an User-Creating an role-Interacting with Keystone in the dashboard-Endpoints in the Dashboard.Glance as a Registry of images -Using the Web Interface-Building an Image.

UNIT III **NETWORK AND INSTANCE MANAGEMENT** 9

Networking And Neutron-Network Fabric-Open VSwitch Configuration-VLAN –GRE tunnels-VXLAN tunnels-Creating a Network- Web interface Management-External Network access – Preparing a network – Creating an External network-Web Interface External Network Setup. Managing flavors –Managing key pairs – Launching an Instance-Managing floating IP addresses-Managing Security Groups

UNIT IV **BLOCK AND OBJECT STORAGE** 9

Use case – Creating and using Block Storage – Attaching the block storage to an Instance - Backing Storage – Cinder types.

Object Storage- Use case Architecture of Swift Cluster – Creating and using object storage – Object file management in the web interface – Ring Files.

UNIT V **SCALING AND MONITORING** 9

Scaling Compute nodes – Control and Networking – Scaling control and Networking Services – Load – Balancing Key stone – Additional Key stone tuning – Glance Load Balancing.Monitoring – Methods – Commands – Non open stack Service checks – Monitoring control services – Network Services – Compute services – Trouble Shooting.

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TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Dan Radez	OpenStack Essentials, Second Edition	Packt Publishing	2015
2.	James Denton	Learning Open Stack Networking, 3 rd Edition	Packt Publishing	2013

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Omar Khedher	Learning Openstack Networking - Third Edition	Packt Publishing	2014
2.	Cody Bumgardner	Open Stack in Action	Packt Publishing	2011
3.	Tom Fifield	Open stack Operations Guide	Packt Publishing	2000

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21CSE28	SOFTWARE DEFINED NETWORKS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- Define the fundamentals of software defined networks.
- Understand the separation of the data plane and the control plane.
- Describe about the SDN Programming.
- Analyze the various applications of SDN
- Interpret the Framework and their roles in SDN

COURSE OUTCOMES:

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

21CSE28.CO1	Interpret basic principles of python programming
21CSE28.CO2	Write clear and effective python code
21CSE28.CO3	Create applications using python programming
21CSE28.CO4	Access database using python programming
21CSE28.CO5	Develop web applications using python programming

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19CSE28.CO1	x	-	x	x	-	-	x	-	-	x	-	x	x	x	-
19CSE28.CO2	x	x	-	-	x	-	x	x	x	x	-	-	x	-	-
19CSE28.CO3	x	x	x	x	-	x	-	-	x	x	x	x	x	-	-
19CSE28.CO4	x	x	x	-	x	x	-	x	x	x	x	-	-	-	x
19CSE28.CO5	x	x	x	x	-	x	-	-	x	x	x	x	x	x	-

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

Basic Packet Switching Terminology - Historical Background - The Modern Data Center - Why SDN? - Genesis of SDN - How SDN Works?

UNIT II **OPEN FLOW AND SDN CONTROLLERS** **9**

Open Flow Specification – Drawbacks of Open SDN, SDN via APIs, SDN via Hypervisor Based Overlays – SDN via Opening up the Device – SDN Controllers – General Concepts.

UNIT III **DATA CENTERS** **9**

Multitenant and Virtualized Multitenant Data Center – SDN Solutions for the Data Center Network – VLANs – EVPN – VxLAN – NVGRE.

UNIT IV **SDN APPLICATIONS** **9**

Application Types - A Brief History of SDN Controllers - Controller Considerations - Network Device Considerations - Offloading Flows in the Data Center - Access Control for the Campus

UNIT V **SDN** **9**

Juniper SDN Framework – IETF SDN Framework – Open Daylight Controller – Floodlight Controller – Bandwidth Calendaring – Data Center Orchestration

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TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Paul Goransson and Chuck Black	Software Defined Networks: A Comprehensive Approach	First Edition, Morgan Kaufmann	2014
2.	Thomas D. Nadeau, Ken Gray	SDN: Software Defined Networks	OReilly Media	2013

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Siamak Azodolmolky	Software Defined Networking with Open Flow	Packet Publishing	2013
2.	Vivek Tiwari	SDN and Open Flow for Beginnersll	Amazon Digital Services	2013
3.	Fei Hu, Editor	Network Innovation through Open Flow and SDN: Principles and Design	CRC Press	2014

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21CSE29	DOCKER AND KUBERNETES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- Understand the basic concepts of Kubernetes
- Illustrate Network And data Management using containers
- Develop a Docker Essential
- Evaluate kubernetes on AWS and Google cloud platforms
- Deploy stateful and stateless apps on the cluster

COURSE OUTCOMES:

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

21CSE29.CO1	Installing & creating an account with docker Hub
21CSE29.CO2	Summarize the interactive Scaling control and Networking Services using docker
21CSE29.CO3	Expose the Build Comprehensive Hands-on with Kubernetes Components
21CSE29.CO4	Organize Kubernetes Cluster installation on Virtualbox, AWS & Google Cloud Platforms
21CSE29.CO5	Develop interactive app outside the cluster and to autoscale apps

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE29.CO1	x	-	x	x	-	-	x	-	-	x	-	x	x	x	-
21CSE29.CO2	x	x	-	-	x	-	x	x	x	x	-	-	x	-	-
21CSE29.CO3	x	x	x	x	-	x	-	-	x	x	x	x	x	-	-
21CSE29.CO4	x	x	x	-	x	x	-	x	x	x	x	-	-	-	x
21CSE29.CO5	x	x	x	x	-	x	-	-	x	x	x	x	x	x	-

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

Introduction to Docker-requirements –Docker containers-listing-searching-pulling for an image-Starting containers-listing containers-stopping containers, deleting containers-setting and getting privileged access inside a container- run container images in Kubernetes-injecting new process to a running container-labelling filtering containers.

UNIT II **NETWORK AND DATA MANAGEMENT FOR CONTAINERS** **9**

Introduction-Accessing containers from outside-Managing data in containers-linking two or more containers-LAMP-application by linking containers-networking of multihost containers with Flannel-Assigning IPv6 addresses to containers.

UNIT III **DOCKER PERFORMANCE AND ORCHESTRATION** **9**

Introduction-Benchmarking CPU performance, Benchmarking disk performance, Benchmarking network performance-Performance monitoring. Orchestration-Introduction-Applications with docker compose-cluster with docker Swarm-CoreOS for docker Orchestration-docker in project atomic.

UNIT IV **INTRODUCTION TO KUBERNETES** **9**

Introduction- Kubernetes Architecture- Components of kubernetes cluster - cluster management - Deploy Kubernetes-deploy Kubernetes on AWS and Google cloud platforms- Pods and Deployments -Kubernetes Master- master nodes.

UNIT V **KUBERNETES USING DOCKER** **9**

Kubernetes Management Design Patterns with Docker, CoreOS Linux- Kubernetes docker containers-Nodes-Cluster-Service-pod-Replication controller-label-selector-name-namespace-volume-Service proxy-listing service-listing nodes- Kubernetes Cluster-Scaling-Testing-wordpress with kubernetes cluster.

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TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Deepak Vohra	Kubernetes Microservices with Docker	Apress	2016
2.	Neependra Khare	Docker Cookbook	Packt Publishing	2015

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Deepak Vohra	Kubernetes Management Design Patterns	Apress	2017
2.	Ed Robinson	Kubernetes on AWS	Packt Publishing	2018
3.	Karl Matthias, Sean P. Kane	Docker: Up and Running	O'Reilly Media	2015

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21CSE30	BLOCK CHAIN	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To Understand the emerging abstract models for Blockchain Technology.
- Analyze the mechanism of digital money and Cryptography
- Summaries the necessary bitcoin and cryptocurrency background.
- Apply the function of initial coin offerings
- Implement the Applications of Block chain

COURSE OUTCOMES:

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

21CSE30.CO1 Understand the use cases in Block Chain
21CSE30.CO2 Demonstrate the digital transaction in same and different bank.
21CSE30.CO3 Implement the Bitcoin transactions.
21CSE30.CO4 Summarizes the functions of bitcoin and make use of it to solve problems
21CSE30.CO5 Demonstrates the foundations with Decentralized Applications

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE30.CO1	x	x	x	-	x	-	-	-	-	x	-	-	x	-	x
21CSE30.CO2	-	-	-	x	x	x	x	-	-	-	-	x	-	x	x
21CSE30.CO3	x	-	x	x	-	-	x	x	-	-	-	-	x	x	-
21CSE30.CO4	-	x	-	-	-	x	x	-	-	-	x	x	-	x	x
21CSE30.CO5	-	-	x	-	-	-	-	-	x	x	x	x	-	x	x

UNIT I INTRODUCTION TO BLOCKCHAIN 9

Centralized vs. Decentralized Systems- Layers of Blockchain- Importance of Blockchain- Limitations of Centralized Systems- Blockchain Adoption- Blockchain Uses and Use Cases- Laying the Blockchain Foundation- Cryptography- Game Theory- Properties of Blockchain Solutions- Blockchain Applications

UNIT II DIGITAL MONEY AND CRYPTOGRAPHY 9

Interbank Payments-Same bank- diffferent banks- Correspondent Bank Accounts- Central Bank Accounts- International Payments- E-Money Wallets-Cryptography- Encryption and Decryption- Hashes-Digital Signatures- Alice and Bob

UNIT III BITCOIN AND CRYPTOCURRENCY 9

A basic crypto currency-Creation of coins- Bitcoin -Working with Bitcoins- The Bitcoin Blockchain- Block Structure, The Genesis Block- The Bitcoin Network- Network Discovery for a New Node, Bitcoin Transactions, Consensus and Block Mining, Block Propagation- Bitcoin Scripts

UNIT IV INITIAL COIN OFFERINGS AND INVESTING 9

ICOs- Whitepapers- The Token Sale- ICO Funding Stages- Whitelisting- Funding Caps- Treasury-Exchange Listing- Pricing-Price utility tokens- Risks and Mitigations- Market Risk-Liquidity Risk-Exchange Risks-Wallet Risks- Regulatory Risks-Scams

UNIT V BLOCKCHAIN APPLICATIONS 9

Foundations of Blockchain- Transaction Workflow, Simple Payment Verification, Blockchain Forks- Unpacking Ethereum- Overview- Ethereum Virtual Machine- Decentralized Applications- Decentralized Organizations- Blockchain in Science, Reproducibility Crisis, Clinical Trials, Reputation System, Pharmaceutical Drug Tracking

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TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Bikramaditya Singhal Priyansu Sekhar Panda Gautam Dhameja	Beginning Blockchain-A Beginner's Guide to Building Blockchain Solutions	Apress	2018
2.	Antony lewis	The Basics of Bitcoins and Blockchains	Mango Publishing Group	2018
3.	Vikram Dhillon , David Metcalf, Max Hooper	Blockchain Enabled Applications-Understand the Blockchain Ecosystem and How to Make it Work for You	Apress	2017

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Bashir, Imran	Mastering Blockchain: Deeper insights into decentralization, cryptography, Bitcoin, and popular Blockchain frameworks	Springer	2017
2.	Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder	Bitcoin and cryptocurrency technologies: a comprehensive introduction	Princeton University Press	2016
3.	Joseph Bonneau	SoK: Research perspectives and challenges for Bitcoin and cryptocurrency	IEEE Symposium on security and Privacy	2015

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21CSE31 **USER CENTRIC DESIGN**

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COURSE OBJECTIVES

- Provide a problem setting, critically discuss the appropriateness of potential design methods such as contextual design, prototyping, ideation, etc.
- Describe the challenges to achieving a human-centered design process.
- Restate useful information about users and activities through observation or systematic in-quiry.
- Analyze the design of standards, guidelines, and patterns of UCD
- Create a prototype for a small system and plan and perform a usability evaluation.

COURSE OUTCOMES:

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

21CSE31.CO1	Evaluate an appreciation for the theory and sensibilities of user-centered design
21CSE31.CO2	Illustrate skills in the use and application of a variety of design methods, specifically applicable to user-centered design
21CSE31.CO3	Utilize individual and collaborative skills in design-based problem solving
21CSE31.CO4	Develop UCD is an Iterative process
21CSE31.CO5	Analyze Multidisciplinary Design Teams for User Centered Design

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE31.CO1	-	x	-	-	x	-	-	x	-	-	x	-	x	-	-
21CSE31.CO2	x	-	x	x	-	-	x	-	-	-	-	-	-	x	-
21CSE31.CO3	-	-	x	-	-	x	x	-	-	x	-	-	-	-	x
21CSE31.CO4	-	-	-	-	-	x	-	--	x	-	-	x	x	-	-
21CSE31.CO5	x	-	-	-	x	-	-	x	-	x	-	-	-	x	-

UNIT I **USER CENTERED DESIGN OVERVIEW** **9**

User centered Design- UCD Principle - Iterative Process-Phases of the design process—Investigative Methods and Tools- Example: Brainstorming- Apply User Centered Design – Understand context of use – Specify user Requirements – Design Solutions – Evaluate against requirements – Hardware UCD - Working with Users.

UNIT II **MULTIDISCIPLINARY DESIGN TEAMS** **9**

Multidisciplinary Design Teams for User Centered Design: Engineer-Designer-Researcher- Marketer – Stakeholder – Investment in UCD Pays off – Benefits of User centered Design – Approach of User centered Design – UX and Interactive Design. Design Principle : Hick's Law – Fitt's Law – Visibility – Visual Feedback – Gestalt Principle – Mobile UCD – UCD Terms.

UNIT III **ESTABLISHING A BASELINE ABOUT UCD** **9**

Introduction to UCD – UCD and User Experience – User Experience versus User Interface – UX is more than a Buzz word – User Research – Interviews – Surveys – Focus Groups – Observational Usability Research – Scenarios - UCD Process –Storyboards - Creating a personal Manifesto – Balance and Filter Design Features – MVP

UNIT IV **USER CENTRIC TOOLS AND TECHNIQUES** **9**

Introduction to UCD Tools and Techniques – Activity: Personas and Target Audience – UX One sheet – Journey Mapping – Wire framing – Ideation –Prototyping – Evaluation – Design specification - Sketching: Open ended vs Highly Constrained Sketching – Scribble Sketching – Stretch your imagination – Combining Sketching with images – Final Reflection – Pendo – Survey Monkey- Axure – POP – Silverback

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UNIT V **ITRENDS IN UCD** **9**

Personalization - Material design - Designing for content - Designing for content - Animation and micro-interactions - Accessible design - AI for testing design options and making decisions - Data and design collaboration - Minimalistic Simple Designs - Stellar 3D Animation & Graphic – RIDE (Report – Iterate – Deploy – Evaluate.

TOTAL: L: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Travis Lowdermilk	User-Centered Design: A Developer's Guide to Building User-Friendly Applications, First Edition	O'Reilly Media	2013
2.	Brian Still and Kate Crane	Fundamentals of User-Centered Design: A Practical Approach	CRC Press	2016

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Elizabeth F. Churchill, Frank Ritter, and Gordon D. Baxter	Foundations for Designing User-Centered Systems: What System Designers Need to Know about People	Springer	2014
2.	Amir Shevat	Designing Bots: Creating Conversational Experiences	O'Reilly Media	2017
3.	Westley Knight	UX for Developers: How to Integrate User-Centered Design Principles Into Your Day-to-Day Development Work	Apress	2018

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21CSE32	NODE.JS AND REACT.JS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To learn the runtime web development for easily building fast and scalable network applications.
- To enhance the knowledge in event-driven and real-time applications that run across distributed devices.
- To learn the streams and file systems in Node Js
- To acquire the knowledge on web development and database connectivity
- To Acquire the knowledge of MVC template on user interfaces using React JS

COURSE OUTCOMES:

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

21CSE32.CO1 Examine the fundamental structure of Node.js platform
21CSE32.CO2 Affirm the concepts of NPM
21CSE32.CO3 Interpret the concepts of streams and file systems
21CSE32.CO4 Develop the web content using node.js
21CSE32.CO5 Annotate the various features of React js

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE32.CO1	x	-	x	x	-	-	x	-	-	x	-	x	x	x	-
21CSE32.CO2	x	x	-	-	x	-	x	x	x	x	-	-	x	-	-
21CSE32.CO3	x	x	x	x	-	x	-	-	x	x	x	x	x	-	-
21CSE32.CO4	x	x	x	-	x	x	-	x	x	x	x	-	-	-	x
21CSE32.CO5	x	x	x	x	-	x	-	-	x	x	x	x	x	x	-

UNIT I **INTRODUCTION TO NODE.JS** 9

The environment of Node.js - Benefits and Features - Install Node.js on Windows - Console and Web programs - Node.js REPL Commands

UNIT II **NPM** 9

Node.js Package Manager - Installing modules using NPM - Node.js Command Line Options - Node.js Errors - Node.js DNS - Node.js Net

UNIT III **STREAMS AND FILE SYSTEMS** 9

Node.js Creating Buffers - Node.js Streams - Node.js Piping Streams - Node.js Chaining Streams - Node.js File systems

UNIT IV **WEB DEVELOPMENT** 9

Node.js Web Module - Node.js html form handling - Node.js Database Connectivity

UNIT V **INTRODUCTION TO REACT.JS** 9

The environment of React.js - Benefits and Features – components – state – lifecycle – events – forms – CSS

TOTAL: L: 45

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TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	AzatMardan	Practical Node. jsBuilding Real-World Scalable Web Apps,	APRESS Publication	2018

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Alex Young, Bradley Meck, Mike Cantelon	Node.js in Action	Manning Publications	2017
2.	Alex banks & Eve Porcello	Learning React	O'Reilly Publications	2017

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21CSE33	C# AND . NET CORE	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To gain the fundamental skills in C# programming Language
- To gain knowledge in object-oriented concepts in C#
- To understand the concepts of the .NET Core and its platform
- To implement data manipulation using Razor pages
- To enhance the knowledge in Model-View-Controller architecture

COURSE OUTCOMES:

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

21CSE33.CO1 Understand the basic concepts of C#
21CSE33.CO2 Summarize Object-Oriented concepts in C#
21CSE33.CO3 Ability to develop web pages using ASP.NET Core platform
21CSE33.CO4 Implement the data manipulation concept using Razor Pages
21CSE33.CO5 Integrate the concept of MVC in ASP.NET Core platform

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE33.CO1	x	x	x	-	-	-	-	-	-	-	-	-	x	x	-
21CSE33.CO2	x	x	x	-	-	-	-	-	-	-	-	-	x	x	-
21CSE33.CO3	x	x	x	-	-	-	-	-	-	-	-	-	-	x	x
21CSE33.CO4	x	x	x	-	-	-	-	-	-	-	-	-	-	x	x
21CSE33.CO5	-	x	x	-	-	-	-	x	-	-	-	-	-	x	x

UNIT I **INTRODUCTION TO C#** **9**

Introducing C# – Understanding .NET – Overview of C# – Literals – Variables – Data Types – Operators – Expressions – Branching – Looping – Methods – Arrays – Strings – Structures – Enumerations.

UNIT II **OBJECT-ORIENTED PROGRAMMING IN C#** **9**

Classes – Objects – Inheritance – Methods – Polymorphism – Interfaces – Operator Overloading – Delegates – Events – Errors – Exceptions – Collections – Managing File system.

UNIT III **ASP.NET CORE WEB APPLICATION USING RAZOR PAGES** **9**

Introduction to ASP.NET Core Web Application – Environment Setup – Project Layout – Static and Default Files - Enabling and Defining Razor Pages – Shared Layouts – Using code-behind files.

UNIT IV **DATA MANIPULATION USING RAZOR PAGES** **9**

Introduction to ADO.NET – Connection Class with Authentication – Command Class – DataReader Class – DataAdapter Class – DataSet – OnGet –OnPost – OnPostDelete – OnPostEdit – OnPostView – REST API – Model and Controller for REST API.

UNIT V **MODEL-VIEW-CONTROLLER (MVC) IN ASP.NET CORE** **9**

Introduction to MVC – Setting up an ASP.NET Core MVC Website – MVC Routing – Controllers and Actions – Model – Views – Parameters Passing – View Helpers – Model Validation.

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TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Mark J. Price	C# 8.0 and .NET Core 3.0 – Modern Cross-Platform Development, 4th Edition	Packt Publishing Limited	2019
2.	Dino Esposito	Programming ASP.NET Core, 1st Edition	Pearson Education Inc	2018

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Christian Nagel	Professional C# 7 and .NET Core 2.0, 1st Edition	Wiley Publication	2018
2.	Andrew Troelsen Phil Japikse	Pro C# 8 with .NET Core 3: Foundational Principles and Practices in Programming	Apress Publication	2020
3.	Jon Skeet	C# in Depth, Fourth Edition		2019

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21CSE34 **AGILE METHODOLOGY** **L T P C**
3 0 0 3

COURSE OBJECTIVES

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

COURSE OUTCOMES:

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

21CSE34.CO1	Realize the importance of interacting with business stakeholders in determining the requirements for a software system
21CSE34.CO2	Perform iterative software development processes: how to plan them, how to execute them.
21CSE34.CO3	Develop techniques and tools for improving team collaboration and software quality.
21CSE34.CO4	Analyse Software process improvement as an ongoing task for development teams.
21CSE34.CO5	Show how agile approaches can be scaled up to the enterprise level.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE34.CO1	x	-	x	-	x	-	-	x	-	x	-	x	x	x	-
21CSE34.CO2	x	x	-	-	x	-	-	x	x	x	-	-	x	-	-
21CSE34.CO3	x	x	x	x	-	x	-	-	x	x	x	x	-	x	-
21CSE34.CO4	x	x	x	x	-	x	-	-	x	x	x	-	x	-	x
21CSE34.CO5	x	x	x	x	-	x	-	-	x	x	x	x	x	x	-

UNIT I **AGILE METHODOLOGY** 9

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

UNIT II **AGILE PROCESSES** 9

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

UNIT III **AGILITY AND KNOWLEDGE MANAGEMENT** 9

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

UNIT IV **AGILITY AND REQUIREMENTS ENGINEERING** 9

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

UNIT V **AGILITY AND QUALITY ASSURANCE** 9

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

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TOTAL: L: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	David J. Anderson and Eli Schragenheim	Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results	Prentice Hall	2003
2.	Hazza and Dubinsky	Agile Software Engineering, Series: Undergraduate Topics in Computer Science	Springer	2009

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Craig Larman	Agile and Iterative Development: A Manager's Guide	Addison-Wesley	2004
2.	Kevin C. Desouza	Agile Information Systems: Conceptualization, Construction, and Management	Butterworth-Heinemann	2007

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21CSE35 **TEXT MINING**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

- Describe text extraction techniques.
- Differentiate clustering and classification techniques on text.
- Analyze visualization methodologies.
- Illustrate about event detection methods and embedding semantics in models.
- Compare feature extraction methods

COURSE OUTCOMES:

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

21CSE35.CO1 Design text extraction techniques.
21CSE35.CO2 Design clustering techniques for text.
21CSE35.CO3 Design classification techniques for text
21CSE35.CO4 Practice visualization methodologies using tools.
21CSE35.CO5 Practice feature extraction using tools

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE35.CO1	x	-	x	x	-	-	x	-	-	x	-	x	x	x	-
21CSE35.CO2	x	x	-	-	x	-	x	x	x	x	-	-	x	-	-
21CSE35.CO3	x	x	x	x	-	x	-	-	x	x	x	x	x	-	-
21CSE35.CO4	x	x	x	-	x	x	-	x	x	x	x	-	-	-	x
21CSE35.CO5	x	x	x	x	-	x	-	-	x	x	x	x	x	x	-

UNIT I **TEXT EXTRACTION** **9**

Text Extraction: Introduction, Rapid automatic keyword extraction: candidate keywords, keyword scores, adjoining keywords, extracted keywords, Benchmark evaluation: precision and recall, efficiency, stop list generation, Evaluation on new articles.

UNIT II **CLUSTERING** **9**

Clustering: Multilingual document clustering: Multilingual LSA, Tucker1 method, PARAFAC2 method, LSA with term alignments, LMSA, LMSA with term alignments.

UNIT III **CLASSIFICATION** **9**

Classification: Content-based spam email classification using machine-learning algorithms, Utilizing nonnegative matrix factorization for email classification problems, Constrained clustering with k-means type algorithms.

UNIT IV **ANOMALY AND TREND DETECTION** **9**

Anomaly and trend detection: Text Visualization techniques such as tag clouds, authorship and change tracking, Data Exploration and the search for noval patterns, sentiment tracking, visual analytics and Future Lens, scenario discovery, adaptive threshold setting for novelty mining.

UNIT V **TEXT STREAMS** **9**

Text streams: Introduction, Text streams, Feature extraction and data reduction, Event detection, Trend detection, Event and trend descriptions, Embedding semantics in LDA topic models: Introduction, vector space modeling, latent semantic analysis, probabilistic latent semantic analysis, Latent Dirichlet allocation, embedding external semantics from Wikipedia, data-driven semantic embedding.

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TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Michael W. Berry & Jacob Kogan	Text Mining Applications and Theory	Wiley publications	2010
2.	Aggarwal, Charu C., and ChengXiang Zhai, eds	Mining text data	Springer Science & Business Media	2012

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21CSE36	ANGULAR JS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To understand the design of single-page applications and how Angular JS facilitates their development
- To properly separate the model, view, and controller layers of your application and implement them using Angular JS
- To master Angular JS expressions, filters, and scopes
- To build Angular forms
- To elegantly implement Ajax in your Angular JS applications

COURSE OUTCOMES:

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

21CSE36.CO1	Recall the concepts of HTML and JavaScript and express the features of AngularJS
21CSE36.CO2	Rephrase the purpose of binding and template and the various effects of elements and events
21CSE36.CO3	Construct various scopes, controllers and features of directives
21CSE36.CO4	Identify the several services and its works and Design the applications using AJAX
21CSE36.CO5	Comprehend the concepts of animation services and the various actions of provision

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE36.CO1	x	x	-	-	x	-	-	-	-	x	-	x	-	-	-
21CSE36.CO2	x	-	x	-	x -	-	-	x	-	-	x	-	-	-	-
21CSE36.CO3	x	-	x	x	-	-	x	-	-	-	-	-	-	x	-
21CSE36.CO4	x	-	x	-	x	-	-	-	-	x	x	-	-	-	x
21CSE36.CO5	x	x	-		-	-	-	x	x	-	-	-	x	-	-

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

Introduction to AngularJS: HTML and Bootstrap CSS Primer - JavaScript Primer - Single Page Application –MVC Architecture – first Application of AngularJS.

UNIT II **WORKING WITH ANGULARJS** **9**

Binding – Template Directives – Elements – Events

UNIT III **WORKING WITH FORMS** **9**

Forms – Controllers – Scopes – Filters - Custom & Complex Directives

UNIT IV **WORKING WITH SERVICES** **9**

Modules – Services – Global objects – Errors and Expressions – AJAX and Promises

UNIT V **ADVANCED SERVICES** **9**

REST – Views – Animation – Touch – Provision – Injection

TOTAL: L: 45

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TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Adam Freeman	Pro AngularJS	Apress Publications	2014
2.	Ken Williamson	Learning AngularJS: A Guide to AngularJS Development	O' Reilly	2015

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Brad Green, ShyamSeshadri	AngularJS	O'REILLY publications	2014
2.	AgusKurniawan	AngularJS Programming	kindle Edition	2014
3.	ValeriKarpov, Diego Netto	Professional AngularJS	kindle Edition	2015
4	Doguhan Uluca	Angular 6 for Enterprise-Ready Web Applications: Deliver production-ready and cloud-scale Angular web apps	kindle Edition	2018

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21CSE37	DEEP LEARNING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES :

- To understand the basic ideas and principles of Neural Networks
- To understand the basic concepts of Big Data and Statistical Data Analysis
- To familiarize the student with The Image Processing facilities like Tensorflow and Keras
- To appreciate the use of Deep Learning Applications
- To understand and implement Deep Learning Architectures

COURSE OUTCOMES:

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

21CSE37.CO1 Understand the role of Deep learning in Machine Learning Applications.
21CSE37.CO2 To get familiar with the use of TensorFlow/Keras in Deep Learning Applications.
21CSE37.CO3 To design and implement Deep Learning Applications.
21CSE37.CO4 Critically Analyse Different Deep Learning Models in Image Related Projects.
21CSE37.CO5 To design and implement Convolutional Neural Networks

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE37.CO1	x	-	-	x	x	-	x	x	-	-	x	-	x	-	-
21CSE37.CO2	x	-	x	x	-	-	x	-	-	-	x	-	-	x	-
21CSE37.CO3	x	-	x	-	-	x	x	-	-	x	x	-	-	-	x
21CSE37.CO4	x	x	-	-	-	x	-	--	x	-	x	x	x	-	-
21CSE37.CO5	x	-	-	-	x	-	-	x	-	x	x	-	-	x	-

UNIT I BASICS OF NEURAL NETWORKS 9

Basic concept of Neurons – Perceptron Algorithm – Feed Forward and Back Propagation Networks

UNIT II INTRODUCTION TO DEEP LEARNING 9

Feed Forward Neural Networks – Gradient Descent – Back Propagation Algorithm – Vanishing Gradient problem – Mitigation – RelU Heuristics for Avoiding Bad Local Minima – Heuristics for Faster Training – Nestors Accelerated Gradient Descent – Regularization – Dropout

UNIT III CONVOLUTIONAL NEURAL NETWORKS 9

CNN Architectures – Convolution – Pooling Layers – Transfer Learning – Image Classification using Transfer Learning

UNIT IV MORE DEEP LEARNING ARCHITECTURES 9

LSTM, GRU, Encoder/Decoder Architectures – Autoencoders – Standard- Sparse – Denoising – Contractive- Variational Autoencoders – Adversarial Generative Networks – Autoencoder and DBM

UNIT V APPLICATIONS OF DEEP LEARNING 9

Image Segmentation – Object Detection – Automatic Image Captioning – Image generation with Generative Adversarial Networks – Video to Text with LSTM Models – Attention Models for Computer Vision – Case Study: Named Entity Recognition – Opinion Mining using Recurrent Neural Networks – Parsing and Sentiment Analysis using Recursive Neural Networks – Sentence Classification using Convolutional Neural Networks – Dialogue Generation with LSTMs.

TOTAL: L: 45

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TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Ian Good Fellow, Yoshua Bengio, Aaron Courville	Deep Learning	MIT Press,	2017
2.	Francois Chollet	Deep Learning with Python	Manning Publications	2018

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Phil Kim	Matlab Deep Learning: With Machine Learning, Neural Networks and Artificial Intelligence	Apress	2017
2.	Ragav Venkatesan, Baoxin Li	Convolutional Neural Networks in Visual Computing	CRC Press	2018
3.	Navin Kumar Manaswi	Deep Learning with Applications Using Python	Apress	2018
4	Joshua F. Wiley	R Deep Learning Essentials	Packt Publications	2016

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21CSE38 **UBIQUITOUS COMPUTING** **L T P C**
3 0 0 3

COURSE OBJECTIVES :

- To describe ubiquitous computing, its properties applications and architectural design.
- To explain various smart devices and services used in ubiquitous computing.
- To teach the role of sensors and actuators in designing real time applications using Ubicomp.
- To explore the concept of human computer interaction in the context of Ubicomp and Ubicomp privacy.
- To describe Ubicomp network with design issues and Ubicomp management.

COURSE OUTCOMES:

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

21CSE38.CO1	Demonstrate the knowledge of design of Ubicomp and its applications.
21CSE38.CO2	Explain smart devices and services used Ubicomp.
21CSE38.CO3	Describe the significance of actuators and controllers in real time application design.
21CSE38.CO4	Use the concept of HCI to understand the design of automation applications and Ubicomp privacy.
21CSE38.CO5	Get the knowledge of ubiquitous and service oriented networks along with Ubicomp management.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE38.CO1	x	-	-	X	x	-	x	x	-	-	x	-	x	-	-
21CSE38.CO2	x	-	x	X	-	-	x	-	-	-	x	-	-	x	-
21CSE38.CO3	x	-	x	-	-	x	x	-	-	x	x	-	-	-	x
21CSE38.CO4	x	x	-	-	-	x	-	--	x	-	x	x	x	-	-
21CSE38.CO5	x	-	-	-	x	-	-	x	-	x	x	-	-	x	-

UNIT I **INTRODUCTION TO UBIQUITOUS COMPUTING** **9**

Concept of Ubiquitous Computing and Advantages, Ubiquitous Computing Applications and Scope, Properties of Ubiquitous Computing, Modelling the Key Ubiquitous Computing Properties. Ubiquitous System Environment Interaction. Architectural Design for UbiCom Systems: Smart DEI Model.

UNIT II **UBIQUITOUS COMPUTING SMART DEVICES AND SERVICES** **9**

Smart Devices and Service properties, Smart mobile devices and Users, Mobile code, Smart Card Devices and Networks, Service Architecture Models. Service Provision Life-Cycle. Virtual Machines and Operating Systems, OS for Mobile Computers and Communicator Devices.

UNIT III **ACTUATION AND CONTROL** **9**

Tagging the Physical World, Sensors and Networks, Micro- Electro-Mechanical Systems (MEMS), Embedded Systems and Real-Time Systems. Programmable and PID type control system, Robots.

UNIT IV **HUMAN COMPUTER INTERACTION AND UBICOMP PRIVACY** **9**

User Interfaces and Interaction for devices, Abstract user interface through Basic Smart Wearable and Implanted Devices. Human- Centered Design (HCD). User Models: Direct and indirect user input and modelling, modelling users' planned tasks and multiple tasks-based computing. Ubiquitous computing privacy definition, Solove's taxonomy of privacy, legal background, Interpersonal privacy, Ubicomp challenges to privacy: Collection scale, manner and motivation, data types, data accessibility.

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UNIT V **UBIQUITOUS COMMUNICATION AND MANAGEMENT** **9**

Data Networks, Audio Networks, Wireless Data Networks, Ubiquitous Networks, Service oriented networks, network design issues; Configuration and Security management, Service oriented computer and information management, Context awareness.

TOTAL: L: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Stefan Poslad	Ubiquitous Computing	Wiley, Student Edition,	2017

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Yin-Leng Theng and Henry B. L. Duh	Ubiquitous Computing	IGI, 2nd Edition	-
2.	Adam Greenfield	Everyware the Drawing age of Ubiquitous Computing	AIGA, 1st Edition	-
3.	Laurence T. Yeng, Evi Syukur and Seng W. Loke	Handbook on Mobile and Ubiquitous Computing	CRC, 2nd Edition	-

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21CSE39 **FOG COMPUTING** **L T P C**
3 0 0 3

COURSE OBJECTIVES:

- To understand the need and basics of fog computing
- To explore the fog computing architecture
- To learn the services of fog computing
- To study the data analytics techniques and security aspects
- To learn the application use case

COURSE OUTCOMES:

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

21CSE39.CO1 Explore the fundamentals and management in fog computing
21CSE39.CO2 Use the design of fog architecture
21CSE39.CO3 Design new services with fog computing
21CSE39.CO4 Explore Fog on security, multimedia and smart data
21CSE39.CO5 Model the fog computing scenario

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE39.CO1	x	-	-	x	x	-	x	x	-	-	x	-	x	-	-
21CSE39.CO2	x	-	x	x	-	-	x	-	-	-	x	-	-	x	-
21CSE39.CO3	x	-	x	-	-	x	x	-	-	x	x	-	-	-	x
21CSE39.CO4	x	x	-	-	-	x	-	--	x	-	x	x	x	-	-
21CSE39.CO5	x	-	-	-	x	-	-	x	-	x	x	-	-	x	-

UNIT I **FOG COMPUTING INTRODUCTION** 9

Fog Computing Fundamentals in the Internet-of-Things - IoT Resource Estimation Challenges and Modeling in Fog - Tackling IoT Ultra Large Scale Systems: Fog Computing in Support of Hierarchical Emergent Behaviors. About Fog Computing and the Consortium - Pillars of OpenFog RA.

UNIT II **FOG COMPUTING ARCHITECTURE** 9

Fog Computing: A Platform for Internet of Things and Analytics - Reference Architecture Overview: Functional Viewpoint - Deployment Viewpoint - OpenFog Architecture Description – Perspectives - Node View – System Architecture View - Software Architecture View - Adherence to OpenFog Reference Architecture.

UNIT III **SERVICES OF THE FOG LAYER** 9

The Present and Future of Privacy-Preserving Computation in Fog Computing - Self-Aware Fog Computing in Private and Secure Spheres - Urban IoT Edge Analytics.

UNIT IV **DATA ANALYTICS** 9

IoT Edge to Cloud Protocols - Cloud and Fog Topologies - Data Analytics and Machine Learning in the Cloud and in the Fog.

UNIT V **DEPLOYMENT USE CASE** 9

Control-as-a-Service in Cyber-Physical Energy Systems over Fog Computing - Leveraging Fog Computing for Healthcare IoT. Airport Visual Security - Cloud and Edge Approaches - Fog Computing Approaches - Application to Airport Visual Security

TOTAL: L: 45

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TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Amir M. Rahmani, PasiLiljeberg Axel Jantsch	Fog Computing in the Internet of Things: Intelligence at the Edge	Springer	2018
2.	Perry Lea	Internet of Things for Architects: Architecting IoT solutions by implementing sensors, communication infrastructure, edge computing, analytics, and security	Packit	-

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Ivan Stojmenovic, Sheng Wen	The Fog Computing Paradigm: Scenarios and Security Issues	-	2014
2.	Amir Vahid Dastjerdi Rajkumar Buyya	Fog Computing: Helping the Internet of Things Realize its Potential	University of Melbourne	-
3.	Farhoud Hosseinpour, Juha Plosila, Hannu Tenhunen	An Approach for Smart management of Big Data in the Fog Computing Context	IEEE 8th International Conference on Cloud Computing Technology and Science	2016
4	Hua-Jun Hong, Jo-Chi Chuang, Cheng-HsinHsu	Animation Rendering on Multimedia Fog computing Platforms	IEEE 8th International Conference on Cloud Computing Technology and Science	2016
5	Dongyoung Koo, Youngjoo Shin, Joobeom Yun, junbeomHur	A Hybrid deduplicaton for secure and Efficient data Outsourcing n Fog Computing	IEEE 8th International Conference on Cloud Computing Technology and Science	2016

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21CSE40 **MACHINE LEARNING USING R**

L	T	P	C
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COURSE OBJECTIVES

1. To learn basic concepts of machine learning and R
2. To understand descriptive statistics
3. To explore regression and classification models
4. To learn unsupervised learning techniques
5. To study concepts of artificial neural networks

COURSE OUTCOMES

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

21CSE40.CO1 Exploit the basics of machine learning and R
21CSE40.CO2 Work with descriptive statistics
21CSE40.CO3 Apply regression and classification for real world problems
21CSE40.CO4 Work with unsupervised learning methods
21CSE40.CO5 Construct neural network architecture for real world proble

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE40.CO1	X	X	X	-	-	-	-	-	X	-	X	X	X	X	-
21CSE40.CO2	X	X	X	X	X	X	-	-	-	-	X	X	X	X	X
21CSE40.CO3	X	X	X	X	X	-	-	X		X	X	X	X	-	X
21CSE40.CO4	X	X	X	X	-	-	-	X	-	X	X	X	X	X	X
21CSE40.CO5	X	X	X	X	-	X	-	X	-	-	X	X	X	X	X

UNIT I **INTRODUCTION TO MACHINE LEARNING AND R** 9

Concept of learning-Types of machine learning-Industrial applications-Introduction to R-Object, Vector, List, Factor, Matrix, Array, Data Frame, Manipulating objects, Input/output, R constructs

UNIT II **DESCRIPTIVE STATISTICS** 9

Central tendency- Dispersion of data-Variance and standard deviation-Shape-skewness, kurtosis, percentiles, five number summary, boxplots, histograms, barplot, pie chart, scatter plot , covariance, correlation, Chi-square test fortwo way tables

UNIT III **REGRESSION AND CLASSIFICATION** 9

Regression- Simple linear regression-Multiple linear regression-Logistic regression-Classification-Decision tree-knearestneighbours-Support vector machine

UNIT IV **UNSUPERVISED LEARNING** 9

Clustering-Applications-Similarity measures-Partition based clustering techniques- K means clustering, k-mediod clustering- Hierarchical clustering-Density based clustering-Cluster validation

UNIT V **NEURAL NETWORKS AND DEEP LEARNING** 9

Neural networks basics-Activation functions, learning rate, stochastic gradient descent- Deep Feed forwardnetworks- Convolutional Networks-Autoencoders- Undercomplete, Regularized and Denoising Autoencoders.

TOTAL:L : 45

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TEXT BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Nina Zumel, John Mount	Practical Data Science with R	Manning Publications	2014
2.	Jiawei Han, Micheline Kamber, Jian Pei	Data Mining : Concepts and Techniques	morgan Kaufmann Publishers, Third Edition	2014
3.	Ian Goodfellow, YoshuaBengio, Aaran Courville	Deep learning	MIT Press	2016

REFERENCE BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Gareth James, Daniela Witten, Trever Hastie and Robert Tibshirani	An Introduction to Statistical Learning: with Applications in R	Springer	2015
2.	Y. S. Abu-Mostafa, M. Magdon-Ismail, and H.T. Lin	Learning from Data	AML Book Publishers	2012
1.	. K. P. Murphy	Machine Learning: A probabilistic perspective	MIT Press	20122
2.	C. M. Bishop	Pattern Recognition and Machine Learning	Springer	2007
3.	D. Barber	Bayesian Reasoning and Machine Learning	Cambridge University Press	2016

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21CSE41	HUMAN COMPUTER INTERACTION	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES :

- To study the effectiveness of interacting with computers
- To learn the various models that can be used for designing systems
- To understand the importance of interaction styles
- To learn to design web interface
- To understand the applications of HCI

COURSE OUTCOMES:

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

21CSE41.CO1 Understand the Human Computer Interaction (HCI) principles while developing software
21CSE41.CO2 Identify the appropriate design model for HCI
21CSE41.CO3 Postulate appropriate interaction styles
21CSE41.CO4 Design a web interface for HCI
21CSE41.CO5 Apply HCI in real time systems

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE41.CO1	X	X	X	-	-	-	-	-	X	-	X	X	X	X	-
21CSE41.CO2	X	X	X	X	X	X	-	-	-	-	X	X	X	X	X
21CSE41.CO3	X	X	X	X	X	-	-	X		X	X	X	X	-	X
21CSE41.CO4	X	X	X	X	-	-	-	X	-	X	X	X	X	X	X
21CSE41.CO5	X	X	X	X	-	X	-	X	-	-	X	X	X	X	X

UNIT I **INTRODUCTION AND DESIGN PROCESS** 9

Interaction design basics – process of design – user focus – navigation – screen design and layout – Iteration and prototyping – HCI in the Software process – Software life cycle –Usability engineering – Iterative design and prototyping – Design Focus – Design rationale – Design Rules.

UNIT II **MODELS** 9

Cognitive models – Goal and task hierarchies – Linguistic models – Challenge of display-based systems – Physical and device models – Cognitive architectures – Socio-organizational issues and stakeholder requirements – Socioorganizational issues and stakeholder requirements – Organizational issues – Capturing requirements – Communication and Collaboration models – Face-to-face communication – Conversation – Text-based communication – Group working

UNIT III **INTERACTION STYLES** 9

Dialog notations and design –Dialog design notations – Diagrammatic notations – Textual dialog notations – Dialog semantics – Dialog analysis and design – Models of the system – Standard formalisms – Interaction models –Continuous behaviour – Modelling rich interaction – Status-event analysis – Rich contexts.

UNIT IV **WEB INTERFACE DESIGN - I** 9

Designing Web Interfaces – Drag & Drop – Purpose – Module, List, Object, Action, Collection - Challenge – Direct Selection – Toggle, Collected, Object, Hybrid – Contextual Tools.

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UNIT V **WEB INTERFACE DESIGN - II** 9

Overlays – Dialog, Detail, Input – Inlays – Dialog, List, Detail – Virtual Pages – Virtual Scrolling – Inline Paging – Scrolling Paging – Virtual Panning – Zoomable User Interface – Process Flow – Transitional Patterns – Purpose of Transitions.

TOTAL: L: 45

TEXT BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale,	Human Computer Interaction	Pearson Education	2009
2.	Bill Scott and Theresa Neil	Designing Web Interfaces	O'Reilly	2009

REFERENCE BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Julie A. Jacko (Ed)	The Human-Computer Interaction Handbook	CRC Press	2012
2.	M.G. Helander	Handbook of Human-Computer Interaction	Elsevier	2014
3	Andrew Sears, Julie A. Jacko	Human-Computer Interaction: Design Issues, Solutions, and Applications	CRC Press	2009

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21CSE42 **J2EE TECHNOLOGIES**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES :

- To learn the server-side technologies such as Java servlets and JSP
- To examine the notion of Enterprise Java Beans (EJB) and its types
- To familiarize the messaging services using JavaMail and Java Message Service
- To understand the JSF GUI application and usage of Java web services
- To learn the various frameworks of MVC architecture

COURSE OUTCOMES:

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

21CSE42.CO1 Develop web-based applications using Java servlet / JSP
21CSE42.CO2 Work with different enterprise java beans
21CSE42.CO3 Select suitable technique for message transmission / reception
21CSE42.CO4 Develop GUI-based applications using JSF
21CSE42.CO5 Deploy SOAP-based / REST-based web services

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE42.CO1	X	-	-	-	X	-	-	X	-	-	-	-	-	-	X
21CSE42.CO2	x	-	-	x	x	x	-	-	-	-	x	-	-	x	-
21CSE42.CO3	-	x	x	-	x	-	x	-	-	-	-	-	-	x	-
21CSE42.CO4	-	-	x	x	x	-	x	-	-	-	-	-	x	-	-
21CSE42.CO5	-	-	x	-	x	-	x	-	-	-	x	-	-	x	-

UNIT I **SERVLET AND JSP** 9

J2EE architecture – Servlet – Life cycle – Parameter data – Sessions – Cookies – URL rewriting – Other servlet capabilities – Servlets and concurrency – Database connectivity.
Java Server Pages: Directive, scripting, action elements - expression language –JavaBeans classes and JSP - JSP Standard Tag Library..

UNIT II **ENTERPRISE JAVA BEANS** 9

Understanding EJBs: Types of EJBs - Anatomy of an EJB - EJB container – Embedded container - Dependency injection and JNDI. Session Beans: Stateless, stateful, singletons beans – Session beans life cycle - Session bean model – asynchronous calls. Message. Driven Beans (MDB): MDB model - MDB as a consumer, producer – Example.Entity Java Bean – Types, life cycle.

UNIT III **JAVA MAIL AND JMS** 9

Java Mail: API – Protocols – Send email message – Retrieving email messages – Deleting email messages – Forwarding email message – Sending and receiving attachments.
Java Message service: JMS fundamentals – JMS API – Components of JMS –sending message – receiving message creating a publisher – Creating a subscriber.

UNIT IV **JSF AND WEB SERVICES** 9

Java Server Faces (JSF): overview – architecture – Life cycle – various tags – data tables – JSF JDBC integration – Event handling – Application using JSF.
SOAP Web Services: Understanding SOAP web services - Invoke a SOAP web service. RESTful Web Services: Understanding RESTful web services - Java API for RESTful web services.

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UNIT V **MVC ARCHITECTURE** **9**

MVC Architecture – Struts framework: overview – architecture – Struts Action class– Using Struts HTML tags – Struts validation framework – Developing application with Struts. Introduction to Spring – Introduction to Hibernate.

TOTAL : L : 45

TEXT BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Antonio Goncalves	Beginning Java™ EE 6 Platform with GlassFish™ 3	Apress	2010
2.	Jeffrey C. Jackson	Web Technologies – A Computer Science Perspective	Pearson Education	2011

REFERENCE BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Jim Keogh	J2EE The Complete Reference	McGraw Hill	2009
2.	P.J. Deitel, H.M. Deitel	Internet and World Wide Web - How to program	Pearson Education	2009
3	B.M. Harwani	Java Server Faces: A Practical Approach for Beginners	PHI Learning Pvt	2009

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21CSE43	WEB USER INTERFACE DESIGN	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

1. To design web pages with good look and feel using CSS3 and Bootstrap
2. To validate and manipulate the contents of the webpage using JavaScript and DOM
3. To learn and realize features of NoSQL and Type Script fundamentals
4. To understand the concept of server side Java Script Framework Node JS
5. To Gain knowledge on Angular JS

COURSE OUTCOMES

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

21CSE43.CO1 Design increasingly appealing web pages using CSS3 and Bootstrap
21CSE43.CO2 Create valid and interactive web pages using JavaScript and DOM
21CSE43.CO3 Work with MongoDB and write program in type script
21CSE43.CO4 Write programs of Node JS in server side
21CSE43.CO5 Develop application using Angular JS framework

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE43.CO1	x	x	-	x	x	-	-	-	-	-	-	x	-	x	-
21CSE43.CO2	x	-	x	x	x	-	x	x	-	-	x	-	-	-	-
21CSE43.CO3	x	-	x	x	x	-	-	-	x	-	x	-	-	x	-
21CSE43.CO4	x	-	x	x	x	-	x	-	-	-	x	-	-	-	x
21CSE43.CO5	x	x	-	x	x	x	-	-	x	-	x	-	x	-	-

UNIT I **HTML AND CSS3** 9

Review of HTML - Lists - Tables - Forms - Internal linking - Meta elements - New HTML5 Form input types – Input and datalist elements and auto complete attribute Types of CSS - Conflicting style sheets - Positioning Elements - Element Dimension - Box model and Text Flow - Color- Box Shadows.

UNIT II **JAVASCRIPT AND DOM** 9

Introduction to JavaScript - Syntax - Variables and data types - JavaScript Control Statements - Operators - Literals -Functions - Objects - Arrays - Built in objects - JavaScript Event Handling - Form processing with focus, blur, submit,reset - Event Bubbling - Introduction to the Document Object Model - The Document Tree - DOM Collections –Dynamic Style - Using Timer and Dynamic Styles to Create Animated Effects.

UNIT III **SERVER-SIDE JS FRAMEWORK - NODE.JS** 9

Introduction to Node JS – Architecture – Feature of Node JS - Installation and setup - Creating web servers with HTTP (Request & Response) – Event Handling - GET & POST

UNIT IV **INTRODUCTION TO MONGODB AND TYPESCRIPT** 9

Introduction to NoSQL Database – Uses of MongoDB - Difference between MongoDB & RDBMS - MongoDB :Data Types – Database – Collection – Documents - Basic CRUD Operations using MongoDB – Limiting Records – Sorting Records – Aggregation - Connect to NoSQL Database using Node JS – Implementation of CRUD operations.TypeScript : Introduction – Features – Installation setup – Variables – Datatypes – Enum – Array – Tuples– Functions - OOP concepts: Interfaces – Modules – Namespaces – Decorators.

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UNIT V **ANGULAR JS** **9**

Introduction to Angular 4.0 - Needs & Evolution – Features – Architecture overview - Components and Modules – Templates – Change Detection – Directives – Data Binding - Event Binding - Pipes – Nested Components. Template Driven Forms - Model Driven Forms or Reactive Forms - Custom Validators - Dependency Injection - Services - RxJS Observables - HTTP - Routing.

TOTAL:L : 45

TEXT BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	P.J. Deitel, H.M. Deitel	Internet and World Wide Web – How to program	Pearson Education	2009
2.	Amol Nayak	MongoDB Cookbook Paperback	-	2014
3.	Krasimir Tsonev	Node.js by Example Paperback	-	2015
4.	Nate Murray, Felipe Coury, Ari Lerner and Carlos Taborda	The Complete Book on Angular 4	-	2016

REFERENCE BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Jeffrey C. Jackson	Web Technologies - A Computer Science Perspective	Pearson Education	2011
2.	David Herron	Node.js Web Development: Create real-time server-side applications with this practical, step-bystep guide	-	2016
3	Agus Kurniawan	AngularJS Programming by Example	Kindle	2014

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21CSE44	SPEECH AND LANGUAGE PROCESSING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

1. To explore the fundamental concepts of Natural Language Processing
2. To know the different grammars of language modelling and learn the techniques for word level analysis
3. To understand the working of syntactic and semantic analysis
4. To familiar with pragmatic analysis and natural language generation systems
5. To study about machine translation, information retrieval and lexical resources

COURSE OUTCOMES

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

21CSE44.CO1 Familiarize with concept of Natural Language Processing.
21CSE44.CO2 Construct the various language models and analyze the natural language using word level
21CSE44.CO3 Examine the syntactic and semantic analysis for the natural language text
21CSE44.CO4 Analysis the resolution technique for pragmatic and develop NLG systems
21CSE44.CO5 Apply Natural Language Processing technique and evaluate the lexical resources

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE44.CO1	x	x	-	x	x	-	-	-	-	-	-	x	-	x	-
21CSE44.CO2	x	-	x	x	x	-	x	x	-	-	x	-	-	-	-
21CSE44.CO3	x	-	x	x	x	-	-	-	x	-	x	-	-	x	-
21CSE44.CO4	x	-	x	x	x	-	x	-	-	-	x	-	-	-	x
21CSE44.CO5	x	x	-	x	x	x	-	-	x	-	x	-	x	-	-

UNIT I **INTRODUCTION TO NLP** 9

Natural language processing –History of NLP –Early NLP systems –Phases of natural language processing – Evaluation of NLP systems -Origins and challenges of NLP – Basic English concepts — Language and Grammar - Processing Indian Languages - NLP tools –NLP Applications.

UNIT II **LANGUAGE MODELING AND WORD LEVEL ANALYSIS** 9

Language Modeling: Various Grammar-based Language Models – Government and Binding Grammar – Lexical Functional Grammar– Paninian Framework - Statistical Language Model - Word Level Analysis: Regular Expressions -Finite-State Automata - Morphological Parsing - Spelling Error Detection and correction - Words and Word classes -Part-of Speech Tagging.

UNIT III **SYNTACTIC AND SEMANTIC ANALYSIS** 9

Syntactic Analysis: Context-free Grammar – Constituency – Parsing - Probabilistic Parsing - Semantic Analysis: Meaning Representation - Lexical Semantics – Ambiguity - Word Sense Disambiguation.

UNIT IV **PRAGMATIC ANALYSIS AND NATURAL LANGUAGE GENERATION** 9

Discourse Processing: Cohesion - Reference Resolution - Reference Phenomena - Pronoun Interpretation – Pronoun Resolution Algorithm – Discourse or Text Coherence – Discourse Structure – Dialogue Acts – Types of Interpretation of Dialogue Acts – Natural Language Generation: Architecture of NLG systems – Generation Tasks and Representations -Application of NLG.

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UNIT V **NLP APPLICATIONS AND LEXICAL RESOURCES** 9

Machine Translation: Problems and Approaches of Machine Translation – Information Retrieval: Design Features of Information Retrieval Systems - Models and Evaluation of IR Systems - Lexical Resources: WordNet – FrameNet -Stemmers - POS Tagger - Research Corpora.

TOTAL:L : 45

TEXT BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Ela Kumar	Natural Language Processing	I.K International	2011
2.	Tanveer Siddiqui, U.S. Tiwary,	Natural Language Processing and Information Retrieval	Oxford University	2008
3.	Daniel Jurafsky and James H Martin	Speech and Language Processing: An introduction to Natural Language Processing, Computational Linguistics and Speech Recognition	Prentice Hall	2008

REFERENCE BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	James Allen	Natural Language Understanding	Benjamin Cummings	1995
2.	Christopher D.Manning and Hinrich Schutze	Foundations of Statistical Natural Language Processing	MIT	2003

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21CSE45	ADVANCED JAVA PROGRAMMING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

1. To explore Java Language and Fundamentals
2. To know the object oriented concepts and functional style data processing
3. To understand the java libraries and know effective programming with streams
4. To familiar the enhanced java features
5. To study system based application using AWT and Swing

COURSE OUTCOMES

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

21CSE45.CO1 Understand Java Language and Fundamentals.
21CSE45.CO2 Examine object oriented concepts and functional style data processing
21CSE45.CO3 Develop java libraries and know effective programming with streams
21CSE45.CO4 Apply the enhanced java features.
21CSE45.CO5 Create a system based application using AWT and Swing.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE45.CO1	x	x	-	x	x	-	-	-	-	-	-	x	-	x	-
21CSE45.CO2	x	-	x	x	x	-	x	x	-	-	x	-	-	-	-
21CSE45.CO3	x	-	x	x	x	-	-	-	x	-	x	-	-	x	-
21CSE45.CO4	x	-	x	x	x	-	x	-	-	-	x	-	-	-	x
21CSE45.CO5	x	x	-	x	x	x	-	-	x	-	x	-	x	-	-

UNIT I JAVA VERSION AND CONTEXT 9

An Overview of Java - Data Types, Variables, and Arrays – Operators - Control Statements - Java 8, 9, 10, and 11: what's happening? - Passing code with behaviour parameterization.

UNIT II OOPS AND FUNCTIONAL-STYLE DATA PROCESSING 9

Inheritance - Packages and Interfaces - Exception Handling - Enumerations, Auto boxing, and Annotations - I/O, Try-with-Resources- Lambda Expressions – Modules- Introducing streams - Working with streams – Collecting data with streams - Parallel data processing and performance.

UNIT III THE JAVA LIBRARY AND EFFECTIVE PROGRAMMING WITH STREAMS AND LAMBDAS 9

String Handling - Exploring java.lang - java.util Part 1: The Collections Framework - java.util Part 2: More Utility Classes - Collection API enhancements - Input/Output: Exploring java.io - Exploring NIO – Regular Expressions and Other Packages - Event Handling - Refactoring, testing, and debugging - Domain-specific languages using lambdas .

UNIT IV ENHANCED JAVA CONCURRENCY 9

The Concurrency Utilities - Concepts behind Completable Future and reactive programming- Completable Future: composable asynchronous Programming - Reactive programming - Thinking functionally - Functional programming techniques - Blending OOP and FP.

UNIT V AWT AND GUI PROGRAMMING WITH SWING 9

Introducing the AWT: Working with Windows, Graphics, and Text - Using AWT Controls, Layout Managers, and Menus – Images - Introducing Swing - Exploring Swing - Introducing Swing Menus .

TOTAL:L : 45

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TEXT BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Uttam Roy	Natural Language Processing	Oxford University	2015
2.	Raoul-Gabriel Urma, Mario Fusco, Alan Mycroft,	Modern Java in Action: Lambdas, streams, functional and reactive programming	Manning	2018

REFERENCE BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Raoul-Gabriel Urma , Mario Fusco and Alan Mycroft	Java 8 in Action	Dreamtech	2014

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21CSE46	PARALLEL AND DISTRIBUTED COMPUTING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

1. To explore the features and fundamentals of parallel computing paradigms
2. To know the Parallel Algorithmic Models
3. To understand the performance of parallel systems and parallel programming
4. To familiar the design principles in distributed systems and the architectures for distributed systems
5. To techniques fault tolerance and recovery in distributed systems and algorithms

COURSE OUTCOMES

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

21CSE46.CO1	Understand the features and fundamentals of parallel computing paradigms.
21CSE46.CO2	Understand the Parallel Algorithmic Models.
21CSE46.CO3	Learn the performance of parallel systems and parallel programming.
21CSE46.CO4	Demonstrate the design principles in distributed systems and the architectures for distributed systems.
21CSE46.CO5	Analyze fault tolerance and recovery in distributed systems and algorithms

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE46.CO1	x	x	-	x	x	-	-	-	-	-	-	x	-	x	-
21CSE46.CO2	x	-	x	x	x	-	x	x	-	-	x	-	-	-	-
21CSE46.CO3	x	-	x	x	x	-	-	-	x	-	x	-	-	x	-
21CSE46.CO4	x	-	x	x	x	-	x	-	-	-	x	-	-	-	x
21CSE46.CO5	x	x	-	x	x	x	-	-	x	-	x	-	x	-	-

UNIT I INTRODUCTION TO PARALLELPROCESSING 9

Key Concepts and Challenges of Parallel and Distributed Computing **Parallel Programming Platforms:** Implicit Parallelism: Trends in Microprocessor Architectures, Dichotomy of Parallel Computing Platforms, Physical Organization, and Communication Costs in Parallel Machines, Routing Mechanisms for Interconnection Networks, GPU, co processing.

UNIT II PRINCIPLES OF PARALLELALGORITHM DESIGN 9

Decomposition, Tasks, and Dependency Graphs-Decomposition Techniques – Characteristics of Tasks and Interactions – Mapping Techniques for Load Balancing – Methods for Containing Interaction Overheads – Parallel Algorithm Models.

UNIT III ANALYTICAL MODELLING OF PARALLEL PROGRAMS 9

Sources of Overhead in Parallel Programs, Performance Metrics for Parallel Systems, The Effect of Granularity on Performance, Scalability ofParallel Systems, Minimum Execution Time and Minimum Cost-Optimal Execution Time.

UNIT IV DISTRIBUTED COMPUTING PARADIGM 9

Paradigms for Distributed applications – Basic algorithms in Message passing Systems – Leader Election in Rings – Mutual Exclusion in Shared Memory.

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UNIT V DISTRIBUTED COMPUTING DESIGN 9

Synchronous Systems with Crash Failures – Byzantine Failures – Impossibility in Asynchronous Systems - Formal Model for Simulation – Broadcast and Multicast – Specification of a Broadcast Service – Implementing a Broadcast Service – Multicast in Groups – Distributed Shared Memory.

TOTAL: L: 45

TEXT BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Ananth Grama, Anshul Gupta, George Karypis and Vipin Kumar	Introduction to Parallel Computing	Pearson	2009
2.	Haggit Attiya and Jennifer Welch	Distributed Computing – Fundamentals, Simulations and Advanced Topics	Wiley	2012

REFERENCE BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Norman Matloff	Parallel Computing for Data Science – With Examples in R, C++ andCUDA	Chapman and Hall/CRC	2014
2.	M.R. Bhujade	Parallel Computing	New Age International	2009
3.	Wan Fokkink	Distributed Algorithms: An Intuitive Approach	MIT	2013
4.	M.L. Liu	Distributed Computing – Principles and Applications	PearsonEducation	2011

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		L	T	P	C
21CSE47	COMPUTER VISION	3	0	0	3

COURSE OBJECTIVES

1. To review image processing techniques for computer vision.
2. To understand shape and region analysis.
3. To understand Hough Transform and its applications to detect lines
4. To understand motion analysis.
5. To study some applications of computer vision algorithms

COURSE OUTCOMES

21CSE47.CO1 Implement fundamental image processing techniques required for computer vision.
21CSE47.CO2 Perform shape analysis
21CSE47.CO3 Apply Hough Transform for line, circle, and ellipse detections
21CSE47.CO4 Implement motion related techniques.
21CSE47.CO5 Develop applications using computer vision techniques

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE47.CO1	x	x	x	-	x	-	-	-	-	-	-	x	-	x	-
21CSE47.CO2	x	-	x	x	-	x	-	x	-	-	x	-	-	x	-
21CSE47.CO3	x	x	x	-	-	-	x	-	-	-	x	-	x	-	x
21CSE47.CO4	x	x	x	x	-	-	-	-	-	-	-	-	x	-	-
21CSE47.CO5	x	x	x	-	-	-	-	-	x	x	-	-	x	-	-

UNIT I IMAGE PROCESSING FOUNDATIONS 9

Review of image processing techniques – classical filtering operations – thresholding techniques – edgedetection techniques – corner and interest point detection – mathematical morphology – texture.

UNIT II SHAPES AND REGIONS 9

Binary shape analysis – connectedness – object labeling and counting – size filtering – distance functions – skeletons and thinning – deformable shape analysis – boundary tracking procedures – active contours – shape models and shape recognition – centroidal profiles – handling occlusion – boundary length measures – boundary descriptors – chain codes – Fourier descriptors – region descriptors – moments.

UNIT III HOUGH TRANSFORM 9

Line detection – Hough Transform (HT) for line detection – foot-of-normal method – line localization – line fitting – RANSAC for straight line detection – HT based circular object detection – accurate center location – speed problem – ellipse detection – Case study: Human Iris location – hole detection – generalized Hough Transform (GHT).

UNIT IV 3D VISION AND MOTION 9

from texture – shape from focus – active range finding – surface representations – point-based representation – volumetric representations – 3D object recognition – 3D reconstruction – introduction to motion- – layeredmotion.

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UNIT V APPLICATIONS 9

Application: Photo album – Face detection – Face recognition – Eigen faces – Active appearance and 3D shape models faces - Application: In-vehicle vision system: locating roadway – road markings – identifying road signs – locating pedestrians- Application: Surveillance – foreground-background separation – particle filters – Chamfer matching, tracking, and occlusion.

TOTAL : L : 45

REFERENCE BOOKS:

Sl.No	AUTHOR(s)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	D. L. Baggio et al	Mastering OpenCV with Practical Computer Vision Projects	Packt Publishing,	2012
2.	Mark Nixon and Alberto S. Aquado	Feature Extraction & Image Processing for Computer Vision	Third Edition, Academic Press	2012
3.	R. Szeliski	Computer Vision: Algorithms and Applications	Springer	2011

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21CSE48 ADVANCED DATA STRUCTURES AND ALGORITHMS

L	T	P	C
3	0	0	3

COURSE OBJECTIVES :

- To explore the algorithm analysing techniques and asymptotic notation.
- To know the sorting Technique.
- To understand the elementary data structures.
- To familiar the advance data structures.
- To advanced algorithm design technique

COURSE OUTCOMES:

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

21CSE48.CO1 Understand algorithm analysing techniques and asymptotic notation.
21CSE48.CO2 Understand various sorting Technique.
21CSE48.CO3 Understand elementary data structures.
21CSE48.CO4 Understand various advance data structures.
21CSE48.CO5 Understand advanced algorithm design technique.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE48.CO1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
21CSE48.CO2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
21CSE48.CO3	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X
21CSE48.CO4	X	X	X	X	X	X	X	-	-	X	X	X	X	X	X
21CSE48.CO5	X	X	X	X	X	X	X	-	-	X	X	X	X	X	X

UNIT I FOUNDATIONS 9

Introduction: The Role of Algorithms in Computing-Analyzing algorithms-Designing algorithms. Growth of Functions: Asymptotic notation-Standard notations and common functions. Divide-and-Conquer: The maximum-subarray problem-Strassen's algorithm for matrix multiplication-The substitution method for solving recurrences-The recursion-tree method for solving recurrences-The master method for solving recurrences-Proof of the master theorem-Probabilistic Analysis and Randomized Algorithms

UNIT II SORTING AND ORDER STATISTICS 9

Heapsort:Heaps-Maintaining the heap property-Building a heap-The heapsort algorithm. Quicksort: Description of quicksort - Performance of quicksort - Analysis of quicksort. Sorting in Linear Time: Lower bounds for sorting - Counting sort - Radix sort - Bucket sort. Medians and Order Statistics: Minimum and maximum - Selection in expected linear time - Selection in worst-case linear time

UNIT III DATA STRUCTURES 9

Linked lists with Bitwise Operators - Stacks and queues- Representing rooted trees-Multilinked List- Hash Tables :Direct-address tables - Hash tables - Hash functions - Open addressing - Perfect hashing Complete Binary Tree-Symmetric Binary Tree- Binary Search Trees: Insertion and deletion-Randomly built binary search trees-Red-Black Trees - Properties of red-black trees –Rotations-Insertion – Deletion.

UNIT IV ADVANCED DATA STRUCTURES 9

B-Trees: Basic operations on B-trees - Deleting a key from a B-tree - Fibonacci Heaps: Structure of Fibonacci heaps - Mergeable-heap operations - Decreasing a key and deleting a node - Bounding the maximum degree - Graph Algorithms-Flood fill Algorithm-ford fulkerson Algorithm - Minimum Spanning Trees - Single-Source Shortest Paths - All-Pairs Shortest Paths - Maximum Flow

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UNIT V ADVANCED DESIGN AND ANALYSIS TECHNIQUES 9

Recursion and Backtracking :Format of a Recursive Function - Recursion and Memory - Recursion versus Iteration-Dynamic Programming : levenshtien Algorithm –Sliding Window Algorithms-Pattern Matching Algorithm-Matrix-chain multiplication - Elements of dynamic programming - Longest common subsequence - Optimal binary search trees. Greedy Algorithms :An activity-selection problem - Elements of the greedy strategy - Huffman codes - Matroids and greedy methods-Fractional Knapsack Algorithm. String Algorithm-Mackers Algorithm

TOTAL: L: 45

TEXT BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Karumanchi Narasimha	Data Structures and Algorithms Made Easy	CareerMonk	2019
2.	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest,Clifford Stein	Introduction to Algorithms	MIT Press Cambridge, Massachusetts London	2009

REFERENCE BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Jeff Edmonds	How to think about Algorithms	Cambridge University	2008
2.	Adam Drozdek	Data Structures and Algorithms in Java	Cengage Learning	2013
3.	R.C.T.Lee, S.S.Tseng, R.C.Chang and Y.T.Tsai	Introduction to the Design and Analysis of Algorithms A Strategic Approach	Tata McGraw Hill	2012
4.	Peter Brass	Advanced Data Structures	Cambridge University	2008

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21CSE49	SOFTWARE TESTING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

1. To explore the activities, process and techniques carried out in testing process
2. To explore the different types of testing strategies
3. To learn the testing levels carried out during the testing phase of an software
4. To study the prepare test plan based on the requirements and specifications
5. To learn the Automation testing tools in the production environment.

COURSE OUTCOMES

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

21CSE49.CO1 Understand all the activities, process and techniques carried out in testing process
21CSE49.CO2 Understand the different types of testing strategies
21CSE49.CO3 Identify all the testing levels carried out during the testing phase of an software
21CSE49.CO4 Understand how to prepare test plan based on the requirements and specifications
21CSE49.CO5 Apply the Automation testing tools in the production environment.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE49.CO1	X	X	X	-	-	-	-	-	X	-	X	X	X	X	-
21CSE49.CO2	X	X	X	X	X	X	-	-	-	-	X	X	X	X	X
21CSE49.CO3	X	X	X	X	X	-	-	X		X	X	X	X	-	X
21CSE49.CO4	X	X	X	X	-	-	-	X	-	X	X	X	X	X	X
21CSE49.CO5	X	X	X	X	-	X	-	X	-	-	X	X	X	X	X

UNIT I INTRODUCTION TO SOFTWARE TESTING 9

Introduction-Evolution of Software Testing-Software Testing –Myths and Facts – Goals of Software testing – Software Testing Definitions-Models of Software Testing- Effective Software Testing Vs Exhaustive Software Testing –Software Testing Terminology and Methodology - Verification and Validation.

UNIT II TESTING STRATEGIES 9

Dynamic Testing: Black-Box Testing Techniques- Boundary Value Analysis- Equivalence Class Testing- State Table-Based Testing- Decision Table-Based Testing- Cause-Effect Graphing Based Testing. White-Box Testing Techniques- Need of White-Box Testing- Static Testing –Structural Testing-Unit Code functionality Testing-Code coverage Testing-Code Complexity Testing-Challenges in White box Testing

UNIT III LEVELS OF TESTING 9

Different levels of testing - Unit Validation Testing - Integration Testing-Scenario Testing- Defect Bash - Function Testing- System Testing- Acceptance Testing - Regression Testing.

UNIT IV TEST MANAGEMENT 9

Test Management- Test Organization- Structure of Testing Group- Test Planning- Detailed Test Design and Test Specifications - Software Metrics- Testing Metrics for Monitoring and Controlling the Testing Process- Efficient Test Suit Management - Testing Process Maturity Models.

UNIT V AUTOMATION TESTING TOOL 9

Automation and Testing Tools- Need for Automation- Categorization of Testing Tools– Selection of Testing Tools. Introduction to JUnit – Overview – Test Framework –Application. Introduction to Selenium- Getting Started – Finding and Working with Element- Working with Selenium API.

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TOTAL:L : 45

TEXT BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Naresh Chauhan	Software Testing principles and practice	Oxford University	2016
2.	Srinivasan Desikan and Gopalaswamy Ramesh	Software Testing – Principles and Practices	Pearson Education	2016

REFERENCE BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Paul Ammann and Jeff Offutt	Introduction to Software Testing	Cambridge University	2017
2.	Unmesh Gundecha	Selenium Testing Tools Cookbook	Packt	2015

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21CSE50 **INFORMATION SECURITY**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

1. To explore the basics of information security
2. To explore the legal, ethical and professional issues in information security
3. To learn the various aspects in data security
4. To study various standards in the Information Security System
5. To learn implementation of security techniques

COURSE OUTCOMES

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

21CSE50.CO1 Discuss the basics of information security
21CSE50.CO2 Illustrate the legal, ethical and professional issues in information security
21CSE50.CO3 Demonstrate the various aspects in data security
21CSE50.CO4 Explain various standards in the Information Security System
21CSE50.CO5 Design and implementation of security techniques

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE50.CO1	X	X	X	-	-	-	-	-	X	-	X	X	-	X	-
21CSE50.CO2	X	X	X	X	X	X	-	-	-	-	X	X	-	X	-
21CSE50.CO3	X	X	X	X	X	-	-	X		X	X	X	-	X	-
21CSE50.CO4	X	X	X	X	-	-	-	X	-	X	X	X	-	X	-
21CSE50.CO5	X	X	X	X	-	X	-	X	-	-	X	X	-	X	-

UNIT I INTRODUCTION 9

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

UNIT II SECURITY INVESTIGATION 9

Need for Security - Business Needs - Threats - Attacks - Legal - Ethical and Professional Issues in Information Security.

UNIT III DATA SECURITY 9

Representing Identity- Access Control Mechanisms- Information Flow and Confinement problem-Malicious logic-Intrusion Detection-User Security and Program Security.

UNIT IV LOGICAL DESIGN 9

Blueprint for Security - Information Security Policy - Standards and Practices - ISO17799/BS 7799 - NIST Models - VISA International Security Model - Design of Security Architecture - Planning for Continuity.

UNIT V PHYSICAL DESIGN 9

Security Technology - IDS - Scanning and Analysis Tools - Cryptographic Algorithms and Tools - Access Control Devices - Physical Security - Security and Personnel - Security Management Maintenance Models- Digital Forensics.

TOTAL:L : 45

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TEXT BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Michael E Whitman and Herbert J Mattord	Principles of Information Security	Vikas Publishing House	2014
2.	Atul Kahate	Cryptography and Network Security	Tata McGraw Hill Ltd	2013

REFERENCE BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Charles B.fleeger and Shari Lawrence Pfleeger	Security in Computing	Pearson	2014
2.	Matt Bishop	Computer Security Art and Science	Pearson/PHI	2014
3	Bernard Menezes	Cryptography and Network Security	Cengage Learning India	2010

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21CSE51 **DATA VISUALIZATION**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

1. To explore the key techniques and theory behind data visualization
2. To explore the various methodologies present in data visualization
3. To learn the various processes and tools used for data visualization
4. To study the data visualization to make inferences
5. To learn the data visualization systems and security issues present in data visualization

COURSE OUTCOMES

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

21CSE51.CO1 Understand the key techniques and theory behind data visualization
21CSE51.CO2 Implement the various methodologies present in data visualization.
21CSE51.CO3 Understand the various processes and tools used for data visualization.
21CSE51.CO4 Apply interactive data visualization to make inferences.
21CSE51.CO5 Design and build data visualization systems and security issues present in data visualization

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE51.CO1	X	X	X	-	-	-	-	-	X	-	X	X	X	X	-
21CSE51.CO2	X	X	X	X	X	X	-	-	-	-	X	X	X	X	X
21CSE51.CO3	X	X	X	X	X	-	-	X		X	X	X	X	-	X
21CSE51.CO4	X	X	X	X	-	-	-	X	-	X	X	X	X	X	X
21CSE51.CO5	X	X	X	X	-	X	-	X	-	-	X	X	X	X	X

UNIT I INTRODUCTION TO DATA VISUALIZATION 9

Context of Data Visualization – Definition, Methodology, Visualization design objectives. Key Factors – Purpose, visualization function and tone, visualization design options. Data Abstraction –Analysis. Task Abstraction – Analysis. Four Levels for Validation. Seven stages of data visualization.

UNIT II VISUALIZING DATA METHODS 9

Mapping - Time series - Connections and correlations – Indicator-Area chart-Pivot table- Scatter charts, Scatter maps - Tree maps, Space filling and non - space filling methods-Hierarchies and Recursion - Networks and Graphs - Displaying Arbitrary Graphs-node link graph-Matrix representation for graphs - Info graphics

UNIT III VISUALIZING DATA PROCESS 9

Acquiring data - Where to Find Data, Tools for Acquiring Data from the Internet, Locating Files for Use with Processing, Loading Text Data, Dealing with Files and Folders, Listing Files in a Folder, Asynchronous Image Downloads, Advanced Web Techniques, Using a Database, Dealing with a Large Number of Files. Parsing data - Levels of Effort, Tools for Gathering Clues, Text Is Best, Text Markup Languages, Regular Expressions (regexps), Grammars and BNF Notation, Compressed Data, Vectors and Geometry, Binary Data Formats.

UNIT IV INTERACTIVE DATA VISUALIZATION 9

Drawing with data – Scales – Axes – Updates, Transition and Motion – Interactivity - Layouts – Geomapping – Exporting.

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UNIT V **DASHBOARD CREATION VISUALIZATION AND SECURITY DATA VISUALIZATION** 9

Dashboard creation using visualization tools for the use cases: Finance – marketing - Security: Port scan visualization - Vulnerability assessment and exploitation - Creating security visualization system.

TOTAL: L: 45

TEXT BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Scott Murray	Interactive data visualization for the web	O"Reilly Media	2017
2.	Tamara Munzner	Visualization Analysis and Design	A K Peters Visualization Series, CRC Press	2014

REFERENCE BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Paul J. Deitel, Harvey Deitel	Java SE8 for Programmers (Deitel Developer Series)		2014
2.	Alberto Cairo	The Functional Art: An Introduction to Information Graphics and Visualization	New Riders	2012
3	Nathan Yau	Visualize This: The Flowing Data Guide to Design. Visualization and Statistics	John Wiley & Sons	2011
4	Ben Fry	Visualizing Data	O"Reilly Media	2007

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21CSE52	SOFT COMPUTING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

1. To explore the basics of soft computing techniques
2. To explore the neural network concepts
3. To learn the fuzzy logic concepts
4. To study the basic concepts of genetic algorithm
5. To learn the hybrid soft computing techniques and its applications

COURSE OUTCOMES

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

21CSE52.CO1	Understand about the basics of soft computing techniques
21CSE52.CO2	Explain about the neural network concepts
21CSE53.CO3	Explain about the fuzzy logic concepts
21CSE53.CO4	Understand the basic concepts of genetic algorithm
21CSE53.CO5	Explore hybrid soft computing techniques and its applications

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE52.CO1	x	-	-	x	x	-	x	x	-	-	x	-	x	-	-
21CSE52.CO2	x	-	x	x	-	-	x	-	-	-	x	-	-	x	-
21CSE52.CO3	x	-	x	-	-	x	x	-	-	x	x	-	-	-	x
21CSE52.CO4	x	x	-	-	-	x	-	--	x	-	x	x	x	-	-
21CSE52.CO5	x	-	-	-	x	-	-	x	-	x	x	-	-	x	-

UNIT I INTRODUCTON TO SOFT COMPUTING 9

Artificial neural network: Introduction, characteristics- learning methods – taxonomy – Evolution of neural networks- basic models – important technologies – applications. Fuzzy logic: Introduction – crisp sets- fuzzy sets – crisp relations and fuzzy relations: Cartesian product of relation – classical relation, fuzzy relations, tolerance and equivalence relations, non-iterative fuzzy sets. Genetic algorithm- Introduction – biological background – traditional optimization and search techniques – Genetic basic concepts.

UNIT II NEURAL NETWORKS 9

McCulloch-Pitts neuron – linear separability – hebb network – supervised learning network: perceptron networks – adaptive linear neuron, multiple adaptive linear neuron, BPN, RBF, TDNN- associative memory network: auto-associative memory network, hetero-associative memory network, BAM, hopfield networks, iterative auto associative memory network & iterative associative memory network – unsupervised learning networks: Kohonen self-organizing feature maps, LVQ – CP networks, ART network.

UNIT III FUZZY LOGIC 9

Membership functions: features, fuzzification, methods of membership value assignments- Defuzzification: lambda cuts – methods – fuzzy arithmetic and fuzzy measures: fuzzy arithmetic – extension principle – fuzzy measures – measures of fuzziness -fuzzy integrals – fuzzy rule base and approximate reasoning : truth values and tables, fuzzy propositions, formation of rules-decomposition of rules, aggregation of fuzzy rules, fuzzy reasoning-fuzzy inference systems-overview of fuzzy expert system-fuzzy decision making.

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UNIT IV GENETIC ALGORITHM 9

Genetic algorithm and search space – general genetic algorithm – operators – Generational cycle – stopping condition – constraints – classification genetic programming – multilevel optimization – real life problem-advances in genetic algorithm.

UNIT V HYBRID SOFT COMPUTING TECHNIQUES & APPLICATIONS 9

Neuro-fuzzy hybrid systems – genetic neuro hybrid systems – genetic fuzzy hybrid and fuzzy genetic hybrid systems – simplified fuzzy ARTMAP – **Applications:** A fusion approach of multispectral images with SAR, optimization of traveling salesman problem using genetic algorithm approach, soft computing based hybrid fuzzy controllers.

TOTAL:L : 45

TEXT BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	S.Rajasekaran, G.A.Vijayalakshmi Pai,	Neural Networks, Fuzzy Logic and Genetic Algorithm, Synthesis and Applications	PHI Learning Pvt. Ltd.	2017
2.	J.S.R.Jang, C.T. Sun and E.MizutaniPearson;	Neuro-Fuzzy and Soft Computing	Education India	2015

REFERENCE BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	David E. Goldberg,	Genetic Algorithm in Search Optimization and Machine Learning Pearson Education India	-	2013
2.	N.P.Padhy, S.P.Simon,	"Soft Computing with MATLAB Programming	Oxford University Press,	2015
3	Rich E, Knight K,	Artificial Intelligence	3rd Edition	2012

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21CSE53 **SPEECH RECOGNITION**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

1. To explore the understand speech production and related parameters of speech.
2. To explore use of techniques such as short time Fourier transform, linear predictive coefficients and other coefficients in the analysis of speech.
3. To learn the understand different speech modelling procedures such as Markov and their implementation issues.
4. To study the understand various speech signal representation, coding and recognition techniques.
5. To learn the Implement speech recognition techniques.

COURSE OUTCOMES

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

21CSE53.CO1	Understand speech production and related parameters of speech.
21CSE53.CO2	Implement computation and use of techniques such as short time Fourier transform, linear predictive coefficients and other coefficients in the analysis of speech
21CSE53.CO3	Understand different speech modelling procedures such as Markov and their implementation issues.
21CSE53.CO4	Understand various speech signal representation, coding and recognition techniques
21CSE53.CO5	Implement speech recognition techniques

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE53.CO1	X	X	X	-	-	-	-	-	X	-	X	X	X	X	-
21CSE53.CO2	X	X	X	X	X	X	-	-	-	-	X	X	X	X	X
21CSE53.CO3	X	X	X	X	X	-	-	X		X	X	X	X	-	X
21CSE53.CO4	X	X	X	X	-	-	-	X	-	X	X	X	X	X	X
21CSE53.CO5	X	X	X	X	-	X	-	X	-	-	X	X	X	X	X

UNIT I FUNDAMENTALS OF SPEECH PROCESSING 9

Speech Fundamentals: Articulatory Phonetics – Production and Classification of Speech Sounds; Acoustic Phonetics – Acoustics of speech production; Review of Digital Signal Processing concepts; Short-Time Fourier Transform, Filter-Bank and LPC Methods

UNIT II SPEECH ANALYSIS 9

Features, Feature Extraction and Pattern Comparison Techniques: Speech distortion measures – mathematical and perceptual – Log–Spectral Distance, Cepstral Distances, Weighted Cepstral Distances and Filtering, Likelihood Distortions, Spectral Distortion using a Warped Frequency Scale, LPC, PLP and MFCC Coefficients, Time Alignment and Normalization –Dynamic Time Warping, Multiple Time – Alignment Paths

UNIT III SPEECH MODELLING 9

Hidden Markov Models: Markov Processes, HMMs – Evaluation, Optimal State Sequence – Viterbi Search, Baum-Welch Parameter Re-estimation, and Implementation issues.

UNIT IV SPEECH PERCEPTION 9

Large Vocabulary Continuous Speech Recognition: Architecture of large vocabulary continuous speech recognition system – acoustics and language models – n-grams, context dependent sub word units; Applications and present status.

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UNIT V SPEECH SYNTHESIS 9

Text-to-Speech Synthesis: Concatenate and waveform synthesis methods, sub-word units for TTS, intelligibility and naturalness – role of prosody, Applications and present status.

TEXT BOOKS: **TOTAL: L : 45**

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Daniel Jurafsky and James H Martin	Speech and Language Processing – An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition	Pearson Education, 3rd Edition	2018
2.	Joseph Mariani, Wiley,	Language and Speech Processing	-	2009

REFERENCE BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Lawrence Rabinerand Biing-Hwang Juang	Fundamentals of Speech Recognition	Pearson Education	2009
2.	Ben Gold and Nelson Morgan, Wiley	Speech and Audio Signal Processing and Perception of Speech and Music	India Edition	2006
3	Thomas F Quatieri,	Discrete-Time Speech Signal Processing Principles and Practice	Pearson Education	2004
4	Frederick Jelinek Reprint	Statistical Methods of Speech Recognition	MIT Press	2001

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21CSE54 **PYTHON FOR DATA SCIENCE**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

1. To explore and master the fundamentals of Data Science.
2. To explore the basics of Numpy for computations.
3. To learn use of pandas for various data manipulations.
4. To study the experiment visualizations with Matplotlib Library.
5. To apply the machine Learning Algorithms to various datasets.

COURSE OUTCOMES

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

21CSE54.CO1	Understand and master the fundamentals of Data Science
21CSE54.CO2	Understand the basics of Numpy for computations
21CSE54.CO3	Make use of pandas for various data manipulations
21CSE54.CO4	Experiment visualizations with Matplotlib Library
21CSE54.CO5	Apply the machine Learning Algorithms to various datasets.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE54.CO1	x	x	-	-	x	x	-	x	x	-	x	-	x	x	-
21CSE54.CO2	x	x	x	x	x	x	-	x	-	x	x	x	x	x	x
21CSE54.CO3	x	x	-	x	-	x	-	x	x	x	x	-	x	-	x
21CSE54.CO4	x	x	x	x	x	-	x	x	-	x	x	x	-	x	x
21CSE54.CO5	x	x	x	x	-	-	x	x	x	x	x	x	x	x	x

UNIT I INTRODUCTION 9

Introduction to data science - The need for Business Analytics -Data Science Life Cycle -Different tools available for Data Science -Data Exploration, Feature Engineering.

UNIT II INTRODUCTION TO NUMPY 9

The Basics of NumPy Arrays - Computation on NumPy Arrays: Universal Functions - Aggregations: Min, Max, and Everything In Between - Computation on Arrays: Broadcasting - Comparisons, Masks, and Boolean Logic - Fancy Indexing-Sorting Arrays-Structured Data: NumPy's Structured Arrays.

UNIT III DATA MANIPULATION WITH PANDAS 9

Introducing Pandas Objects - Data Indexing and Selection - Operating on Data in Pandas - Handling Missing Data - Hierarchical Indexing - Combining Datasets: Concat and Append - Combining Datasets: Merge and Join-Aggregation and Grouping - Pivot Tables - Vectorized String Operations Working with Time Series- High-Performance Pandas: eval() and query()-Regression models : Linear Regression, Logistic Regression, Support Vector Machines.

UNIT IV VISUALIZATION WITH MATPLOTLIB 9

Simple Line Plots – Boxplots- Simple Scatter Plots - Visualizing Errors- Density and Contour Plots - Histograms, Binnings, and Density Customizing Plot Legends- Customizing Colorbars -Multiple Subplots-Text and Annotation -Customizing Ticks

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UNIT V **INTRODUCTION TO STATISTICS** **9**

Descriptive Statistics - Measures of Central Tendency: Mean, Median, Mode, Measures of Variability: Variance, Standard deviation, Skewness, Percentiles, Ranges, Measures of Normality: Skewness, Kurtosis, Measures of Correlation : Positive, Negative, Weak Correlations.

TOTAL: L: 45

TEXT BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	John Mueller and Luca Massaron	Python for Data Science For Dummies	-	2015
2.	Kevin P. Murphy	Machine Learning: A Probabilistic Perspective	MIT Press	2012
3.	Avrim Blum, John Hopcroft, and Ravindran Kannan	Foundations of Data Science	Cambridge University Press,	2018

REFERENCE BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	https://jakevdp.github.io/PythonDataScienceHandbook/ *Jake VanderPlas*	Python Data Science Handbook	O'Reilly Media, Inc.	2016

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21CSE55 **BIO-INSPIRED COMPUTING** **L T P C**
3 0 0 3

COURSE OBJECTIVES

1. To explore the bio inspired computing fundamentals.
2. To explore the apply the behavior of ant in solving large sized computational problems.
3. To learn the Compare different Ant Colony Optimization algorithmic models.
4. To study the Compare different Artificial Bee Colony Optimization algorithmic models.
5. To learn the application use case.

COURSE OUTCOMES

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

21CSE55.CO1 Explain about bio inspired computing fundamentals
21CSE55.CO2 Apply the behaviour of ant in solving large sized computational problems
21CSE55.CO3 Compare different Ant Colony Optimization algorithmic models
21CSE55.CO4 Compare different Artificial Bee Colony Optimization algorithmic models
21CSE55.CO5 Explain different bio inspired computing algorithms

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE55.CO1	X	X	X	-	-	-	-	-	X	-	X	X	X	X	-
21CSE55.CO2	X	X	X	X	X	X	-	-	-	-	X	X	X	X	X
21CSE55.CO3	X	X	X	X	X	-	-	X		X	X	X	X	-	X
21CSE55.CO4	X	X	X	X	-	-	-	X	-	X	X	X	X	X	X
21CSE55.CO5	X	X	X	X	-	X	-	X	-	-	X	X	X	X	X

UNIT I FUNDAMENTALS OF BIO-INSPIRED COMPUTING 9

Models of Life and Intelligence - Fundamentals of bio-inspired models and bio-inspired computing. Evolutionary models and techniques, Swarm models and its self-organisation, swarm and evolutionary algorithms. Optimisation problems –single and multi-objective optimisation, heuristic, meta-heuristic and hyper heuristic functions.

UNIT II ANT COLONY OPTIMIZATION 9

Advanced Population based search algorithms – Introduction to Ant Colony Optimization – Ant System – Pheromone trail – Desirability factor – Variants in ant colony optimization – Simple applications.

UNIT III SWARM OPTIMISATION 9

Particle Swam algorithms - particles moves, particle swarm optimisation, variable length PSO, applications of PSO, case studies. Artificial Bee Colony algorithms - ABC basics, ABC in optimisation, multi-dimensional bee colony algorithms, applications of bee algorithms, case studies.

UNIT IV BIO INSPIRED TECHNIQUES 9

Hill climbing, simulated annealing, Gaussian adaptation, Cuckoo search, Firey algorithm, SDA algorithm, bat algorithm, case studies. Other nature inspired techniques - Social spider algorithm, Cultural algorithms, Harmony search algorithm, Intelligent water drops algorithm, Artificial immune system, Flower pollination algorithm, case studies.

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UNIT V BIO INSPIRED OPTIMIZATION TECHNIQUES 9

Bacterial colony optimization, Glow-worm Swarm optimization, Plant growth adaptation in optimization, Termite colony optimization, African Buffalo optimization, case studies.

TEXT BOOKS: **TOTAL:L : 45**

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Xin-She Yang	Nature Inspired Optimization Algorithm	Elsevier First Edition	2014
2.	F. Neumann and C. Witt.	Bio inspired Computation in combinatorial optimization: Algorithms and their computational complexity	Springer	2010

REFERENCE BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	A. E. Elben and J. E. Smith	Introduction to Evolutionary Computing	Springer	2010
2.	D. E. Goldberg, Addison-Wesley	Genetic algorithms in search, optimization, and machine learning	-	2015
3	Simon O. HaykinThird	Neural Networks and Learning Machines	Prentice Hall	2017.

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21CSE56 **VIRTUAL AND AUGMENTED REALITY** **L T P C**
3 0 0 3

COURSE OBJECTIVES

1. To explore the working principles of AR/VR input and output devices.
2. To explore the software used for interacting with the devices.
3. To learn the animation algorithms used for virtual reality.
4. To study the applications of AR/VR and factors involved in the usage.
5. To learn the interface and sounds to create VR environment.

COURSE OUTCOMES

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

21CSE56.CO1 Understand the working principles of AR/VR input and output devices.
21CSE56.CO2 Understand the software used for interacting with the devices.
21CSE56.CO3 Implement the animation algorithms used for virtual reality.
21CSE56.CO4 Implement the applications of AR/VR and factors involved in the usage.
21CSE56.CO5 Develop interface and sounds to create VR environment.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE56.CO1	x	x	-	-	x	x	-	x	x	-	x	-	x	x	-
21CSE56.CO2	x	x	x	x	x	x	-	x	-	x	x	x	x	x	x
21CSE56.CO3	x	x	-	x	-	x	-	x	x	x	x	-	x	-	x
21CSE56.CO4	x	x	x	x	x	-	x	x	-	x	x	x	-	x	x
21CSE56.CO5	x	x	x	x	-	-	x	x	x	x	x	x	x	x	x

UNIT I INTRODUCTION 9

Introduction to VR, Historical perspective, Birds-eye view: general, Hardware, software, Sensation and perception. Geometry of Virtual Worlds: Geometric modeling, transforming models, Matrix algebra, 2D and 3D rotations, Homogeneous transforms, the chain of viewing transforms, Eye transforms, Canonical view transform, Viewport transform. Light and Optics, Visual Physiology, Visual Perception, Tracking Systems, Visual Rendering.

UNIT II VISUAL PHYSIOLOGY AND PERCEPTION 9

Parts of the human eye, photoreceptors and densities, scotopic and photopic vision, display resolution requirements, eye movements, neural vision structures, sufficient display resolution, other implications of physiology on VR. Photoreceptors, Sufficient resolution for VR, Light intensity, Eye movements, Neuroscience of vision. Depth perception, Motion perception, Frame rates and displays, Automated Learning of Muscle Control, Natural and Expressive Motion, Flexible Bodies, Cloth, Interactive Synthetic Characters.

UNIT III TRACKING 9

Overview, Orientation tracking, Tilt drift correction, Yaw drift correction, Tracking with a camera, Perspective n-point problem, Filtering, Lighthouse approach, Velocities, acceleration, vestibular system, virtual world physics, simulation, collision detection, avatar motion.

UNIT IV RENDERING 9

Visual Rendering: Visual Rendering-Overview, Shading models Rasterization, Pixel shading, VR specific problems, Distortion shading, Post-rendering image warp

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UNIT V AUDIO AND INTERFACES 9

Audio: Physics and physiology, Auditory perception, Auditory localization, Rendering, Spatialization and display, Combining other senses. Interfaces: Locomotion, Manipulation, System control, Social interaction, Evaluation of VR Systems.

TOTAL:L : 45

TEXT BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Aukstakalnis S.	Practical Augmented Reality: A guide to the technologies, applications, and human factors for AR and VR	Addison-Wesley Professional	2016
2.	Jason Jerald	The VR Book: Human-Centred Design for Virtual Reality. Association for Computing Machinery and Morgan and Claypool	New York, NY, USA	2015

REFERENCE BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Peter Shirley, Michael Ashikhmin, and Steve Marschner	Fundamentals of Computer Graphics	A K Peters/CRC Press; 3 editions	2009
2.	Blake J. Harris	The history of the future: Oculus," Facebook and the Revolution that swept Virtual Reality	-	2019
3	Steven M	Virtual Reality	LaValle. Cambridge University Press	2019
4	Future Cyborgs Robert R Powell	Human-Machine Interface for Virtual Reality Applications	IEEE 8th International Conference on Cloud Computing Technology and Science	2012

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21CSE57 **NATURAL LANGUAGE PROCESSING**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

1. To explore the models, methods, and algorithms of statistical Natural Language Processing (NLP) for common NLP tasks
2. To explore the mathematical and statistical models for NLP.
3. To learn the linguistic phenomena and linguistic features relevant to each NLP task
4. To study the probabilistic models in code
5. To learn the learning models to NLP tasks such as speech recognition, machine translation, spam filtering, text classification, and spell checking.

COURSE OUTCOMES

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

21CSE57.CO1	Understand the models, methods, and algorithms of statistical Natural Language Processing (NLP) for common NLP tasks.
21CSE57.CO2	Apply mathematical and statistical models for NLP.
21CSE57.CO3	Understand linguistic phenomena and linguistic features relevant to each NLP task
21CSE57.CO4	Apply probabilistic models in code.
21CSE57.CO5	Apply learning models to NLP tasks such as speech recognition, machine translation, spam filtering, text classification, and spell checking.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE57.CO1	X	X	X	-	-	-	-	-	X	-	X	X	X	X	-
21CSE57.CO2	X	X	X	X	X	X	-	-	-	-	X	X	X	X	X
21CSE57.CO3	X	X	X	X	X	-	-	X		X	X	X	X	-	X
21CSE57.CO4	X	X	X	X	-	-	-	X	-	X	X	X	X	X	X
21CSE57.CO5	X	X	X	X	-	X	-	X	-	-	X	X	X	X	X

UNIT I INTRODUCTION 9

Overview: Origins and challenges of NLP-Language and Grammar-Processing Indian Languages NLP Applications-Information Retrieval. Language Modeling: Various Grammar- based Language Models-Statistical Language Model, Finite-State Automata – English Morphology, Transducers for lexicon and rules, Tokenization.

UNIT II WORD LEVEL ANALYSIS 9

Unsmoothed N-grams, Evaluating N-grams, Smoothing, Interpolation and Backoff – Word Classes, Part-of-Speech Tagging, Rule-based, Stochastic and Transformation-based tagging, Part of Speech tagging. Word Level Analysis: Regular Expressions-Finite-State Automata-Morphological Parsing-Spelling Error Detection and correction-Words and Word Classes-Part-of Speech Tagging.

UNIT III SYNTACTIC ANALYSIS 9

Context-Free Grammars, Grammar rules for English, Treebanks, Normal Forms for grammar – Dependency Grammar – Syntactic Parsing, Ambiguity, Dynamic Programming parsing – Shallow parsing – Probabilistic CFG, Probabilistic CYK, Probabilistic Lexicalized CFGs, Deep representation learning - Generative learning, Constituency- Parsing-Probabilistic Parsing

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UNIT IV SEMANTIC ANALYSIS AND DISCOURSE PROCESSING 9

Semantic Analysis: Meaning Representation-Lexical Semantics- Ambiguity-Word Sense Disambiguation. Discourse segmentation, Coherence – Reference Phenomena, Anaphora Resolution using Hobbs and Centering Algorithm.

UNIT V INFORMATION RETRIEVAL AND LEXICAL RESOURCES 9

Information Retrieval: Design features of Information Retrieval Systems-Classical, Non-classical, Alternative Models of Information Retrieval – Co-reference Resolution – Resources: Porter Stemmer, Lemmatizer, Penn Treebank, Brill's Tagger, WordNet, Prop Bank, FrameNet, Brown Corpus, British National Corpus (BNC).

TOTAL:L : 45

TEXT BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Daniel Jurafsky, James H	Speech and Language Processing: An Introduction to Natural Language Processing	MartinComputational Linguistics and Speech, Pearson Publication,	2014.
2.	Tanveer Siddiqui	Natural Language Processing and Information Retrieval	U.S. Tiwary, Oxford University Press,	2008

REFERENCE BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Breck Baldwin	Language Processing with Java and LingPipe Cookbook	Atlantic Publisher	2015
2.	Richard M Reese	Natural Language Processing with Java	O'Reilly Media	2015
3	Nitin Indurkhya and Fred J. Damerau	Handbook of Natural Language Processing	Second Edition, Chapman and Hall/CRC Press	2010
4	Tiwary U S, Siddiqui T	Natural language processing and information retrieval	Oxford University Press, Inc	2008.

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21CSE58 **VIDEO ANALYTICS** **L T P C**
3 0 0 3

COURSE OBJECTIVES

1. To explore the concepts and techniques used in multimedia basics and standard coding techniques.
2. To explore the numeric problems related to motion estimation.
3. To learn the work with surveillance videos for analytics.
4. To study the design of optimization algorithms for better analytics and recognition of objects in a scene.
5. To learn the various video analytics for different case studies

COURSE OUTCOMES

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

21CSE58.CO1 Articulate the concepts and techniques used in multimedia basics and standard coding techniques.
21CSE58.CO2 Derive numeric problems related to motion estimation.
21CSE58.CO3 Work with surveillance videos for analytics.
21CSE58.CO4 Design of optimization algorithms for better analytics and recognition of objects in a scene.
21CSE58.CO5 Apply the various video analytics for different case studies

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE58.CO1	X	X	X	-	-	-	-	-	X	-	X	X	X	X	-
21CSE58.CO2	X	X	X	X	X	X	-	-	-	-	X	X	X	X	X
21CSE58.CO3	X	X	X	X	X	-	-	X		X	X	X	X	-	X
21CSE58.CO4	X	X	X	X	-	-	-	X	-	X	X	X	X	X	X
21CSE58.CO5	X	X	X	X	-	X	-	X	-	-	X	X	X	X	X

UNIT I VIDEO FUNDAMENTALS 9

Basic Concepts and Terminology – Analog Video Standards – Digital Video Basics – Analog to Digital Conversion – Color Representation and Chroma Sub Sampling – Video Sampling Rate and Standards Conversion – Digital Video Formats – Video Features – Colour, Shape and Textural features.

UNIT II MOTION ESTIMATION 9

Fundamentals of Motion Estimation – Optical Flow – 2D and 3D Motion Estimation – Block Based Point Correspondences – Gradient Based Intensity Matching – Feature Matching – Frequency Domain Motion Estimation.

UNIT III VIDEO ANALYTICS 9

Introduction-Fundamentals for Video Surveillance- Scene Artifacts- Object Detection and Tracking: Adaptive Background Modelling and Subtraction- Pedestrian Detection and Tracking Vehicle Detection and Tracking-Articulated Human Motion Tracking in Low-Dimensional Latent Spaces.

UNIT IV BEHAVIOURAL ANALYTICS & ACTIVITY RECOGNITION 9

Event Modelling-Behavioural Analytics- Human Activity Recognition-Complex Activity Recognition Activity modelling using 3D shape, Video summarization, shape based activity models- Suspicious Activity Detection.

UNIT V CASE STUDY 9

Face Detection and Recognition, Video Surveillance, Traffic Monitoring, Intelligent Transport System.

TOTAL: L 45

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TEXT BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	A. Murat Tekalp	Digital Video Processing	Second Edition, Prentice Hall	2015
2.	Rama Chellappa, Amit K.Roy-Chowdhury, Kevin Zhou.S	Recognition of Humans and their Activities using Video	Morgan & Claypool Publishers	2005

REFERENCE BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Oges Marques	Practical Image and Video Processing Using MATLAB	Wiley and Sons (IEEE Press)	2011
2.	Tay Vaughan	Multimedia: Making it Work	McGraw – Hill Education, Ninth Edition	2014
3	Yunqian Ma	Intelligent Video Surveillance: Systems and Technology	Gang Qian, CRC Press (Taylor and Francis Group)	2009
4	Ralf Steinmetz, Klara Nahrstedt	Multimedia computing, communications, and applications	Pearson India	2009

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21CSE59 **WEB FRAMEWORKS** **L T P C**
3 0 0 3

COURSE OBJECTIVES

1. To explore the fundamentals of website development, such as HTML5, XHTML, CSS.
2. To explore the interactive web page styles using JavaScript and CSS and handling web page events.
3. To learn the work with Server Side Frameworks
4. To study the design of make use of ORM Frameworks, Hibernate.
5. To learn the various expertise with Angular JS and its application

COURSE OUTCOMES

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

21CSE59.CO1	Understand and master the fundamentals of website development, such as HTML5, XHTML, CSS.
21CSE59.CO2	Create and design interactive web page styles using JavaScript and CSS and handling web page events.
21CSE59.CO3	Experiment with Server Side Frameworks.
21CSE59.CO4	Make use of ORM Frameworks, Hibernate.
21CSE59.CO5	Expertise with Angular JS and its application.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE59.CO1	x	x	-	x	x	-	-	-	-	-	-	x	-	x	-
21CSE59.CO2	x	-	x	x	x	-	x	x	-	-	x	-	-	-	-
21CSE59.CO3	x	-	x	x	x	-	-	-	x	-	x	-	-	x	-
21CSE59.CO4	x	-	x	x	x	-	x	-	-	-	x	-	-	-	x
21CSE59.CO5	x	x	-	x	x	x	-	-	x	-	x	-	x	-	-

UNIT I CLIENT SIDE FRAMEWORKS 9

Introduction to Web framework -A Quick Dive into HTML/CSS/JavaScript-Overview of ES6 JavaScript Enhancements-Introduction to Bootstrap & Responsive Page Designing – ReactJS-Components, Component Life Cycle.

UNIT II TYPE SCRIPT 9

An introduction to Type Script-How Type Script Works-Type Script vs JavaScript, Setting Up Type Script, Type declarations-Arrays and tuples ,type erasure and error behavior, implicit functions, Classes and interfaces

UNIT III WEB FRAMEWORKS – SERVER SIDE 9

Spring – Spring MVC: Dependency Injection, IOC container– Spring Boot : Introduction, Annotations, Dependency Management.

UNIT IV ORM FRAMEWORKS 9

Hibernate: Introduction -Architecture ,Hibernate with Eclipse : HB using XML open linkHB using Annotation-Hibernate Example-HB Web application-HB Generator classes-HB Dialects-Hibernate Log4jHB with Log4j 1HB with Log4j2.

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UNIT V ANGULAR JS 9

Introduction to AngularJS -MVC Architecture - Conceptual Overview - Setting up the Environment - First Application - Understanding ng attributes

TOTAL:L : 45

TEXT BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Fain, Y., & Moiseev, A.	Angular 2 Development with TypeScript (1 edition). Shelter Island	NY: Manning Publications	2016
2.	Deitel, Deitel,	Internet & World Wide Web How To Program	Goldberg, Third Edition, Pearson Education,	2006

REFERENCE BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Robert. W. Sebesta,	Programming the World Wide Web	Fourth Edition, Pearson Education,	2007
2.	Jeffrey C.Jackson,	Web Technologies–A Computer Science Perspective	Pearson Education	2006
3	Carlos De La Guardia	Python Web Frameworks	OReilly	2004

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21CSE60	QUANTUM COMPUTING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

1. To explore the basics of Quantum Computing.
2. To explore the fundamental concepts of Quantum mechanics
3. To learn the circuits, applications and algorithms of Quantum Computing.
4. To study the physical realization of Quantum computers.
5. To learn the fundamentals of quantum information

COURSE OUTCOMES

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

21CSE60.CO1	Understand the basics of Quantum Computing
21CSE60.CO2	Describe the fundamental concepts of Quantum mechanics.
21CSE60.CO3	Explore the circuits, applications and algorithms of Quantum Computing.
21CSE60.CO4	Conceptualize the physical realization of Quantum computers.
21CSE60.CO5	Explore the fundamentals of quantum information

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE60.CO1	X	X	X	-	-	-	-	-	X	-	X	X	X	X	-
21CSE60.CO2	X	X	X	X	X	X	-	-	-	-	X	X	X	X	X
21CSE60.CO3	X	X	X	X	X	-	-	X		X	X	X	X	-	X
21CSE60.CO4	X	X	X	X	-	-	-	X	-	X	X	X	X	X	X
21CSE60.CO5	X	X	X	X	-	X	-	X	-	-	X	X	X	X	X

UNIT I FOUNDATION OF QUANTUM COMPUTING 9

History of quantum computation – Quantum bits – Quantum computation – Quantum Algorithms: Quantum parallelism, Deutsch's algorithm, Deutsch-Jozsa algorithm - Experimental quantum information processing - Quantum information.

UNIT II QUANTUM MECHANICS 9

Quantum Mechanics: Linear algebra – Postulates of quantum mechanics – Super dense coding – Density Operator – Schmidt decomposition and purifications - EPR and the Bell inequality. Computer Science Perspective: Models for computation – Turing Machines and Circuits – Analysis of computational problems.

UNIT III QUANTUM CIRCUITS AND APPLICATIONS & SEARCH ALGORITHMS 9

Quantum Circuits: Quantum algorithms – Single qubit and controlled operations – Universal quantum gates – Simulation of quantum systems. Quantum Fourier Transform: Phase estimation – Order-finding & Factoring applications – Hidden subgroup problem. Quantum Search Algorithms: Search as a quantum simulation – Quantum counting - Speeding up the solution of NP-complete problems – Quantum search of an unstructured database.

UNIT IV QUANTUM COMPUTERS: PHYSICAL REALIZATION 9

Guiding principles – Conditions for quantum computation – Harmonic oscillator quantum computer – Optical photon quantum computer – Optical cavity quantum electrodynamics – Iontraps – Nuclear magnetic resonance.

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UNIT V

QUANTUM INFORMATION 9

Quantum noise and quantum operations – Examples and application – Distance measure for quantum information – Quantum error-correction: Three qubit bit flip code& Three qubit phase flip code – Shor code - Theory of quantum error-correction - Constructing quantum codes - Stabilizer codes - Fault-tolerant quantum computation. Entropy and information – Introduction to quantum cryptography.

TEXT BOOKS: **TOTAL:L : 45**

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Michael A. Nielsen & Isaac L. Chuang	Quantum Computation and Quantum Information	Cambridge University Press, Tenth Edition	2010
2.	Phillip Kaye, Raymond Laflamme & Michele Mosca,	An Introduction to Quantum Computing	Oxford University Press, First Edition	2011

REFERENCE BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	V. Sahni,	Quantum Information Systems	Tata McGraw-Hill Publishing Company	2011
2.	M. A. Nielsen &I.Chuang,	Quantum Computation and Quantum Information	Cambridge University Press	2010
3	P. Kaye, R. Laflamme, and M. Mosca	An introduction to Quantum Computing	Oxford University Press	2010

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21CSE61	NETWORK PROGRAMMING AND MANAGEMENT	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

1. To explore the implement client/server communications using TCP Sockets.
2. To explore the usage of socket options for handling various sockets in programming.
3. To learn the work with handling of raw sockets.
4. To study the functionalities of SNMP and MIB structure.
5. To learn the various tools available to manage a network.

COURSE OUTCOMES

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

21CSE61.CO1 Implement client/server communications using TCP Sockets.
21CSE61.CO2 Describe the usage of socket options for handling various sockets in programming.
21CSE61.CO3 Understand handling of raw sockets. .
21CSE61.CO4 Explain functionalities of SNMP and MIB structure.
21CSE61.CO5 Experiment with various tools available to manage a network.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE61.CO1	x	-	x	-	-	x	-	-	-	-	-	x	-	x	-
21CSE61.CO2	-	x	-	-	x	x	-	-	-	x	x	-	x	x	-
21CSE61.CO3	-	-	x	-	-	x	-	-	x	-	-	x	-	-	x
21CSE61.CO4	x	x	-	x	-	-	x	-	-	x	-	-	x	-	-
21CSE61.CO5	x	-	-	-	-	x	x	-	-	x	-	x	x	-	-

UNIT I SOCKETS AND APPLICATION DEVELOPMENT 9

Sockets Introduction – socket address structures, value-result arguments, byte ordering and manipulation functions, address conversion functions, Elementary TCP Sockets – socket, connect, bind, listen, accept , fork and concurrent server design, getsockname and getpeername functions and TCP Client/Server Example- client/server programming through TCP sockets, Normal startup, termination, POSIX signal handling, Signal handling in server, Crashing, rebooting of server host, shutdown.

UNIT II SOCKET OPTIONS 9

I/O Multiplexing and Socket Options, Elementary SCTP Sockets- Interface Models, sctp_xx functions, shutdown function, Notifications, SCTP Client/Server Examples – One-to-Many, Head–of-Line Blocking, Controlling number of streams and Termination, IPv4 and IPv6 Interoperability–different interoperability scenarios.

UNIT III ADVANCED SOCKETS 9

Raw Socket Creation, Raw Socket Output, Raw Socket Input, Ping Program, Trace route Program, An ICMP Message Daemon, Data link Access- Introduction, BPF: BSD Packet Filter, DLPI: Data Link Provider Interface, Linux: SOCK_PACKET, libpcap: Packet Capture Library, Examining the UDP Checksum Field. Remote Login: Terminal line disciplines, Pseudo-Terminals, Terminal modes, Control Terminals, rlogin Overview, RPC Transparency Issues.

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UNIT IV SIMPLE NETWORK MANAGEMENT 9

SNMPv1: managed networks–SNMP models– organization model–information model–SNMPv2 communication model–functional model–major changes in SNMPv2–structure of management information, MIB–SNMPv2 protocol– compatibility with SNMPv1– SNMPv3– architecture– applications–MIB security, remote monitoring– SMI and MIB– RMQN1 and RMON2.

UNIT V NETWORK MANAGEMENT TOOLS AND APPLICATIONS 9

Network monitoring and management tools: SNMP tools – LibreNMS - Netflow, NfSen- Nagios- RANCID- SmokePing- Protocol analyzer - Network statistics Measurement systems - MIB engineering - NMS design. Network management applications: configuration management - fault management – performance management - event correlation techniques – security management

TOTAL:L : 45

TEXT BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	W. Richard Stevens	UNIX Network Programming Vol. I Sockets API	3nd Edition,Pearson,	2015
2.	Mani Subramanian	Network Management – Principles and Practice	Second Edition, Pearson Education	2013

REFERENCE BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	D.E. Comer	Internetworking with TCP/IP, Vol–I	Sixth Edition, Pearson Edition	2013
2.	Kenneth Stewart, Aubrey Adams, Allan Reid, Jim Lorenz	Designing and Supporting Computer Networks, CCNA Discovery Learning Guide	Cisco Press	-
3.	Elliotte Rusty Harold	Java Network Programming: Developing Networked Applications 4th Edition	O'Reilly Media; 4th edition	2013
4.	William Stallings Education	SNMP, SNMPv2, SNMPv3 and RMON 1 and 2	Third Edition, Pearson	2009

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21CSE62	INFORMATION RETRIEVAL SYSTEMS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

1. To explore the Information Retrieval Systems.
2. To explore the various modelling techniques.
3. To understand machine learning techniques for text classification and clustering.
4. To understand various search engine system operations.
5. To learn different techniques of recommender system.

COURSE OUTCOMES

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

21CSE62.CO1 Understand the basics of Information Retrieval.
21CSE62.CO2 Learn various modelling techniques to retrieve data
21CSE62.CO3 Apply appropriate method of classification or clustering
21CSE62.CO4 Design and implement innovative features in a search engine.
21CSE62.CO5 Design and implement a recommender system

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE62.CO1	X	X	X	-	-	-	-	-	X	-	X	X	X	X	-
21CSE62.CO2	X	X	X	X	X	X	-	-	-	-	X	X	X	X	X
21CSE62.CO3	X	X	X	X	X	-	-	X		X	X	X	X	-	X
21CSE62.CO4	X	X	X	X	-	-	-	X	-	X	X	X	X	X	X
21CSE62.CO5	X	X	X	X	-	X	-	X	-	-	X	X	X	X	X

UNIT I INTRODUCTION 9

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

UNIT II MODELING AND RETRIEVAL EVALUATION 9

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

UNIT III TEXT CLASSIFICATION AND CLUSTERING 9

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

UNIT IV WEB RETRIEVAL AND WEB CRAWLING 9

The Web – Search Engine Architectures – Cluster based Architecture – Distributed Architectures – Search Engine Ranking – Link based Ranking – Simple Ranking Functions – Learning to Rank – Evaluations -- Search Engine Ranking – Search Engine User Interaction – Browsing – Applications of a Web Crawler – Taxonomy – Architecture and Implementation – Scheduling Algorithms – Evaluation.

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UNIT V RECOMMENDER SYSTEM 9

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

TOTAL:L : 45

TEXT BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Ricardo Baeza-Yates and Berthier Ribeiro-Neto	Modern Information Retrieval: The Concepts and Technology behind Search	Second Edition, ACM Press Books	2011
2.	Ricci, F, Rokach, L. Shapira, B.Kantor	Recommender Systems Handbook	First Edition	2011

REFERENCE BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	C. Manning, P. Raghavan, and H. Schütze	Introduction to Information Retrieval,	Cambridge University Press	2008
2.	Stefan Buettcher, Charles L. A. Clarke and Gordon V. Cormack	Information Retrieval: Implementing and Evaluating Search Engines	The MIT Press	2010

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		L	T	P	C
21CSE63	FUNDAMENTALS OF DEVOPS	3	0	0	3

COURSE OBJECTIVES

1. To understand the concepts of software life cycle.
2. To learn the concepts of DevOps.
3. To Develop projects using DevOps.
4. Design and implement CI/CD.
5. Demonstrate DevOps maturity model.

COURSE OUTCOMES

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

21CSE63.CO1 Understand the basic concepts of software life cycle.
21CSE63.CO2 Know the concepts of DevOps.
21CSE63.CO3 Develop projects using DevOps.
21CSE63.CO4 Design and implement CI/CD.
21CSE63.CO5 Demonstrate DevOps maturity model.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE63.CO1	X	X	X	-	-	-	-	-	X	-	X	X	X	X	-
21CSE63.CO2	X	X	X	X	X	X	-	-	-	-	X	X	X	X	X
21CSE63.CO3	X	X	X	X	X	-	-	X		X	X	X	X	-	X
21CSE63.CO4	X	X	X	X	-	-	-	X	-	X	X	X	X	X	X
21CSE63.CO5	X	X	X	X	-	X	-	X	-	-	X	X	X	X	X

UNIT I AGILE SOFTWARE 9

Phases of Software Development life cycle. Values and principles of agile software

UNIT II INTRODUCTION TO DEVOPS 9

Fundamentals of DevOps: Architecture, Deployments, Orchestration, Need, Instance of applications, DevOps delivery pipeline, DevOps eco system.

UNIT III DEVOPS PROJECTS 9

DevOps adoption in projects: Technoiogy aspects, Agiling capabilities, Tool stack implementation, People aspect, processes.

UNIT IV CI/CD 9

CI/CD: Introduction to Continuous Integration, Continuous Delivery and Deployment , Benefits of CI/CD, Metrics to track CICD practices

UNIT V DEVOPS MATURITY MODEL 9

Devops Maturity Model: Key factors of DevOps maturity model, stages of Devops maturity model, DevOps maturity Assessment

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TOTAL:L : 45

TEXT BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Gene Kim , John Willis , Patrick Debois , Jez Humb	The DevOps Handbook: How to Create World-Class Agility, Reliability, and Security in Technology Organizations	1st Edition, O'Reilly publications	2016
2.	Mike Loukides	What is Devops? Infrastructure as code	1st Edition, O'Reilly publications	2012

REFERENCE BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Mandi Walls	Building a DevOps Culture	1st Edition, O'Reilly publications	2013
2.	Viktor Farcic	The DevOps 2.0 Toolkit: Automating the Continuous Deployment Pipeline With Containerized Microservices	1st Edition, CreateSpace Independent Publishing Platform publications	2016
3	Jez Humble and David Farley	Continuous Delivery: Reliable Software Releases Through Build, Test, and Deployment Automation	1st Edition	2010
4	Dave Harrison, Knox Lively	Achieving DevOps: A Novel About Delivering the Best of Agile, DevOps, and microservices	1st Edition, Apress publications	2019

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		L	T	P	C
21CSE64	UNIX INTERNALS	3	0	0	3

COURSE OBJECTIVES

1. To explore the Information Retrieval Systems.
2. To explore the various modelling techniques.
3. To understand machine learning techniques for text classification and clustering.
4. To understand various search engine system operations.
5. To learn different techniques of recommender system.

COURSE OUTCOMES

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

21CSE64.CO1 Understand the basics of Unix operating system.
21CSE64.CO2 To design and implement the subsystems of an operating system
21CSE64.CO3 Apply system calls for file systems.
21CSE64.CO4 Expertise the processes involved in Unix operating system.
21CSE64.CO5 Explain memory management and input output operations.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSE64.CO1	X	X	X	-	-	-	-	-	X	-	X	X	X	X	-
21CSE64.CO2	X	X	X	X	X	X	-	-	-	-	X	X	X	X	X
21CSE64.CO3	X	X	X	X	X	-	-	X		X	X	X	X	-	X
21CSE64.CO4	X	X	X	X	-	-	-	X	-	X	X	X	X	X	X
21CSE64.CO5	X	X	X	X	-	X	-	X	-	-	X	X	X	X	X

UNIT I OVERVIEW 9

General Overview of the System: History – System structure – User perspective –Operating System Services – Assumptions about Hardware. Introduction to the Kernel Architecture of the UNIX Operating System – Introduction to System Concept - The Buffer Cache - Buffer headers – Structure of the Buffer Pool – Scenarios for Retrieval of a Buffer– Reading and Writing Disk Blocks – Advantages and Disadvantages of the Buffer Cache.

UNIT II FILE SUBSYSTEM 9

Internal Representation of Files: Inodes – Structure of a Regular File – Directories –Conversion of a Path Name to an Inode – Super Block – Inode Assignment to a New File – Allocation of Disk Blocks.

UNIT III SYSTEM CALLS FOR THE FILE SYSTEM 9

Process States and Transitions – Layout of System Memory – The Context of a Process – Saving the Context of a Process – Manipulation of the Process Address Space - Process Control -process Creation – Signals – Process Termination – Awaiting Process Termination – Invoking other programs – User Id of a Process – Changing the size of a Process – Shell – System Boot and the INIT Process– Process Scheduling.

UNIT IV PROCESSES 9

Process States and Transitions – Layout of System Memory – The Context of a Process – Saving the Context of a Process – Manipulation of the Process Address Space - Process Control -process Creation – Signals – Process Termination – Awaiting Process Termination – Invoking other programs – User Id of a Process – Changing the size of a Process – Shell – System Boot and the INIT Process– Process Scheduling.

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UNIT V MEMORY MANAGEMENT AND I/O 9

Memory Management Policies - Swapping – Demand Paging - The I/O Subsystem: Driver Interface – Disk Drivers – Terminal Drivers.

TOTAL : L:45

TOTAL:L : 45

TEXT BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Maurice J. Bach	The Design of the Unix Operating Systeml	First Edition, Pearson Education	1999

REFERENCE BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	B. Goodheart, J. Cox	The Magic Garden Explainedl	Prentice Hall of India	1986
2.	S. J. Leffler, M. K. Mckusick, M. J. Karels and J. S. Quarterman	The Design and Implementation of the 4.3 BSD Unix Operating Systeml	Addison Wesley	1998
3	Robert Love	Linux Kernel Development	III Edition, Addison Wesley	2010

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21CSP01 **PROJECT WORK PHASE I**

L	T	P	C
0	0	6	3

COURSE OBJECTIVES

- The practical implementation of theoretical knowledge gained during the study from First year to Third year
- The student should be able implement their ideas/real time industrial problem/ current application of their engineering branch which they have studied in curriculum
- To build confidence in the student what he has learnt theoretically
- Describe the problem statement
- Analyze and process the experimental information

COURSE OUTCOMES:

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

21CSP01.CO1 Understand the technical concepts of project area.
21CSP01.CO2 Identify the problem and formulation
21CSP01.CO3 Design the problem statement
21CSP01.CO4 Formulate the algorithms by using the design
21CSP01.CO5 Develop the module

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSP01.CO1	x	x	x	-	x	x	-	-	-	x	-	x	x	-	x
21CSP01.CO2	x	x	-	-	x	-	-	x	-	-	x	-	-	x	-
21CSP01.CO3	x	x	-	x	-	x	-	-	-	-	x	x	-	-	x
21CSP01.CO4	x	-	x	-	-	-	x	-	x	-	-	-	x	x	-
21CSP01.CO5	x	x	-	x	x	-	-	x	x	x	x	x	x	-	x

CONTENT

1. Project helped students to gather, organize, summarize and interpret technical literature with the purpose of formulating a project proposal.
2. B.E. Projects can be two types: Projects based on implementation of any application oriented problem, which will be more or less experimental in nature, and the others will be based on some innovative/ theoretical work.
3. In Project Phase-I the student will undertake project over the academic year, which will involve the analysis, design of a system or sub system in the area identified earlier in the field of Information Technology.
4. The topic must be formulated in consultation with the guide and project coordinator
5. The project will be undertaken preferably by a group of 1-3 students who will jointly work and implement the project.
6. The group will select a project with approval from a committee formed by the department of senior faculty to check the feasibility and approve the topic.

REVIEW COMMITTEE

1. The Head of the department/Project coordinator shall constitute a review committee for project work for project group
2. Project guide would be one member of that committee by default
3. The students or project group shall make presentation on the progress made by them before the committee.
4. The record of the remarks/suggestions of the review committee should be properly maintained and should be made available at the time of examination
5. Each student/group is required to give presentation as part of review for 10 to 15 minutes

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followed by a detailed discussion.

PROJECT WORK REVIEWS

1. Project work phases will have a minimum of three internal reviews by an appointed committee of faculty.
2. The final review will be done by an external faculty

Review 1: Finalization of scope - the objectives and scope of the project should be finalized in second week of their academic semester. Should finalize list of required hardware, software or other equipment for executing the project, test environment/tools

Review 2: Finalization - High level design, planning

Guidelines for Students and Faculty:

PROJECT REVIEW COMMITTEE

1. This committee will be responsible for evaluating the timely progress of the projects and communicating the progress report to the students.
2. As far as possible Students should finalize the same project title taken for Project.
3. Review committee should conduct "Feasibility Review" in first week after commencement of the term.
4. Review Committee should finalize the scope of the project.
5. If change in project topic is unavoidable then the students should complete the process of project approval by submitting synopsis along with the review of important papers. This new project topic should be approved by review committee

TERM WORK

1. The term work will consist of a report prepared by the student on the project allotted to them
2. They should use appropriate tools for the preparation of the report like project planning, UML diagram, testing tools, referencing tools etc.

REPORT STRUCTURE

- Contents
- List of Abbreviations
- List of Figures
- List of Graphs
- List of TableS
  1. Introduction and aims/motivation and objectives
  2. Literature Survey
  3. Problem Statement
  4. Project Requirements
  5. System Analysis Proposed Architecture/ high level design of the project
  6. Verification Validation
  7. Project Plan 8. Conclusion

References
Appendices
Base Paper(s)

EVALUATION GUIDELINES

A panel of examiner will evaluate the viability of project / project scope.

The panel will also verify that all the suggestions/comments in the review document are taken care and accordingly allot the term work marks.
Oral examination in the form of presentation will be based on the project work completed by the candidates. Preliminary report must also be presented during the oral examination.

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TOTAL: P :90

21CSP02 **PROJECT WORK - PHASE II**

L	T	P	C
0	0	15	12

COURSE OBJECTIVES

1. Plan an experimental design to solve Engineering problems
2. Develop an attitude of team work and independent working on real time problems
3. Analyze and process the experimental information
4. Evaluate, interpret and justify the experimental results
5. Develop a dissertation report

COURSE OUTCOMES:

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

21CSP02.CO1 Design an experiment to solve engineering / societal problems using modern tools
21CSP02.CO2 Develop lifelong learning to keep abreast of latest technologies.
21CSP02.CO3 Implement the workflow to provide sustainable solutions
21CSP02.CO4 Interpret the experimental results and the impact on society and environment
21CSP02.CO5 Investigate the application for the real time problems

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSP02.CO1	x	x	x	x	x	-	-	-	x	-	-	-	x	x	x
21CSP02.CO2	x	x	x	-	x	x	-	x		-	x	x	x	x	-
21CSP02.CO3	x	x	x	x	x	-	-	-	x	-	x	-	x	-	x
21CSP02.CO4	x	x	x	x	-	x	x	x	-	x	x	x	x		-
21CSP02.CO5	x	x	x	-	-	-	x	x	x	x	-	x	-	x	x

PROJECT WORK REVIEWS

- Project work phases will have a minimum of three internal reviews by an appointed committee of faculty.
- The final review will be done by an external faculty

Review 3: Implementation Status and testing document

Review 4: Final Project Demonstration, Project Report and proper Result analysis

The group will submit at the end of semester II.

1. The Workable project.
2. Project report (Word Document) in the form of bound journal complete in all respect – 1 copy for the Institute, 1 copy for guide and 1 copy of each student in the group for certification.

The project report contains the details:

1. Problem definition
2. Requirement specification

   System design details (UML diagrams)

   System implementation – code documentation – dataflow diagrams/ algorithm, protocols used

   Test result and procedure

   Conclusions.

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Appendix

a.Tools used

b. References

c. Papers published/certificates

TOTAL: P : 180

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21CSP03	COMPREHENSION	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES

- To write effective and coherent paragraphs
- To comprehend the overall and internal organization of an academic essay
- To write an effective thesis statement
- To understand vocabulary
- To use pre-writing strategies to plan writing.

COURSE OUTCOMES:

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

21CSP03.CO1	Write a paragraph with a topic sentence, support, and concluding sentence
21CSP03.CO2	Produce coherent and unified paragraphs with adequate support and detail of the topic
21CSP03.CO3	Write an effective introduction thesis statement that addresses the writing prompt and conclusion
21CSP03.CO4	Produce appropriate vocabulary and correct word forms
21CSP03.CO5	Produce accurate grammatical structures for the paragraph writing.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSP03.CO1	x	-	-	-	x	x	x	x	x	x	-	x	-	x	-
21CSP03.CO1	x	-	-	-	-	x	-	x	x	x	-	x	-	-	x
21CSP03.CO1	x	x	x	x	x	x	-	-	x	x	x	x	-	x	-
21CSP03.CO1	x	-	-	-	-	x	-	-	x	x	x	x	x	-	x
21CSP03.CO1	x	-	-	-	x	x	-	-	x	x	x	x	x	x	-

COMPREHENSION TOPICS

1. Cloud Computing for Small Businesses
2. Role of Information Technology in Corporate Functions
3. Knowledge Management
4. The Impact of Cloud Computing
5. Cluster computing
6. Computer Forensics
7. The Internet of Things
8. Data Security
9. Green Computing
10. Issue on eGovernment Development and Applications
11. Big Data
12. Design of Reversible Computing Systems
13. Social Platforms

TOTAL : P :60

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21CSP04 **TECHNICAL SEMINAR**

L	T	P	C
0	4	0	2

COURSE OBJECTIVES

- To develop Communication and Presentation skill
- To expose students to the 'real' working environment and get acquainted with the organization structure
- To develop the business operations and administrative functions
- To promote and develop presentation skills and import a knowledgeable society
- To set the stage for future recruitment by potential employers

COURSE OUTCOMES:

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

21CSP04.CO1 Develop a skill for work in actual working environment.
21CSP04.CO2 Utilize available technical resources in efficient manner
21CSP04.CO3 Write technical documents and give oral presentations related to the work completed
21CSP04.CO4 Prepare a presentation in latest trends in Information Technology
21CSP04.CO5 Implement the presentation in latest trends in Information Technology

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSP04	x	-	x	-	-	x	x	-	-	-	-	-	x	-	-
21CSP04	-	-	x	-	x	-	-	x	x	x	-	-	-	-	x
21CSP04	x	-	x	-	x	-	-	-	-	x	x	-	-	x	-
21CSP04	-	-	x	x	x	-	-	-	x	-	x	-	x	x	-
21CSP04	x	-	x	-	x	x	-	-	x	-	-	x	x	x	x

Seminar Topic:

1. Seminar topic should relate to the Information Technology, Some of the seminar topics are listed below:
2. FreeNet
3. Linear Programming in Cloud
4. Blackberry Technology
5. Biometric Security Systems
6. Credit Card Fraud Detection
7. Vehicle Management System
8. Smartshader Technology
9. Digital Piracy
10. Google Glass
11. Data Recover
12. Cyber and Social Terrorism
13. Space Mouse
14. Pill Camera
15. Ambient Intelligence
16. Mind Reading Computer

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17. Honeypots
18. Security through Obscurity
19. Electronic Banking
20. Gi-Fi

SCHEME OF EVALUATION

I. The Course is evaluated based on:

- Presentation
- Student's reports
- PPT presentation
- Presentation will take place in the weekly class. The presentation is evaluation by your class in charge
- Report must be submitted during presentation. The report evaluation is done by your class in charge.
- A Viva voce comprising comprehensive questions based on the presentation

TOTAL : P :50

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21CSP05 **ENTREPRENEURSHIP DEVELOPMENT** **L T P C**
3 0 0 3

COURSE OBJECTIVES

- To promote strong entrepreneurship among Engineers, Managers and Science students.
- To promote entrepreneurship among relevant sectors in the state.
- To collaborate with other organizations and institutions.
- To organize entrepreneurship development and awareness programs.
- To develop close links between industry-Institute by interaction programs. High priority to activities designedto bring about improvement in the performance of the industry.

COURSE OUTCOMES:

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

21CSP05.CO1	Identifying real problems and a solutions people want Pitching solutions, such as products and services.
21CSP05.CO2	Developing and managing early stage software.
21CSP05.CO3	Achieve high degree of productivity in a small team via agile, high quality practices and teamorganization approaches
21CSP05.CO4	Create a production software development environment.
21CSP05.CO5	Achieve customer satisfaction in the development of IT products and services

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSP05	x	-	x	x	-	-	-	-	-	x	-	x	x	x	-
21CSP05	x	x	-	-	x	-	-	x	x	x	-	-	x	-	-
21CSP05	x	x	x	x	-	x	-	-	x	x	x	x	x	x	-
21CSP05	x	x	x	x	-	x	-	-	x	x	x	-	x	-	x
21CSP05	x	x	x	x	-	x	-	-	x	x	x	x	x	x	-

UNIT I CONCEPT OF ENTREPRENEURSHIP: **9**

Meaning and characteristics of entrepreneurship, entrepreneurial culture, socio-economic origin of entrepreneurship, factors affecting entrepreneurship, conceptual model of entrepreneurship, traits of a good entrepreneur, entrepreneur, intra-preneur and manager ENTREPRENEURIAL MOTIVATION: motivating, compelling and facilitating factors, entrepreneurial ambition, achievement motivation theory and Kakinada experiment.

UNIT II ESTABLISHMENT OF ENTREPRENEURIAL SYSTEMS **9**

Search, processing and selection of idea, Input requirements SMALL SCALE INDUSTRY: meaning, importance, characteristics, advantages and problems of SSIs. Steps for starting a small industry, guidelines for project report registration as SSI.

UNIT III ASSISTANCE TO SSI **9**

need for incentives & subsidies, need for institutional support, role of government and other institutions

UNIT IV FUNCTIONAL PLANS **9**

Marketing plan- marketing research for the new venture, steps in preparing marketing plan, contingency planning; Organizational plan- Forms of ownership, designing organizational structure, job design, manpower planning; Financial plan- cash budget, working capital, proforma income statement, Proforma cash flow, proforma balance sheet, break even analysis.

UNIT V SOURCES OF FINANCE **9**

Debt or Equity financing, commercial banks, venture capital; financial institutions supporting entrepreneurs; legal issues- intellectual property rights, patents, trademarks, copy rights, trade secrets, licensing franchising.

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TOTAL: L: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Gupta C. B. and Srinivasan N. P	Entrepreneurial Development	Sultan Chand &Sons	2014
2.	Vasant Desai	Management of a SmallScale Industry	Himalaya Publishing House	2011

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Sangeetha Sharma	EntrepreneurshipDevelopment	PHI Learning Pvt. Ltd	2016
2	K Ramachandran	Entrepreneurship Development	Tata McGraw-Hill	2009
3	Abhishek Nirjar	EntrepreneurshipDevelopment	CBS Publishers	2014
4	S. Anil Kumar	EntrepreneurshipDevelopment	New Age International	2008
5	Fang Zhao	Information Technology Entrepreneurship and Innovation	O'Reilly	2008

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21CSP06	PROFESSIONAL PRACTICES	L	T	P	C
		0	0	6	3

COURSE OBJECTIVES

- To examine important professional issues in contemporary practice and
- To help students become an effective participant in a team of IT professionals.
- To have gained a thorough understanding of the various issues/factors and IT professional faces and how oneshould respond.
- To have learned what are considered professional behavior in the IT field
- To have learned about the current IT practices.

COURSE OUTCOMES:

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

21CSP06.CO1 Describe the various issues/factors an information technology professional
21CSP06.CO2 Describe professional behavior in the information technology.
21CSP06.CO3 Recognize what are the current issues in IT and the emerging technology
21CSP06.CO4 Write properly formatted and organized technical reports
21CSP06.CO5 Develop professional attitude from the perspectives of experienced IT practitioners

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21CSP06	x	-	x	x	-	x	-	-	-	x	-	x	-	x	-
21CSP06	x	x	-	-	-	-	-	x	x	x	-	-	x	x	x
21CSP06	x	-	x	x	-	x	x	-	x	x	x	x	-	x	x
21CSP06	x	x	x	x	-	x	-	-	x	x	x	-	x	-	x
21CSP06	x	x	x	x	-	x	x	-	x	x	x	x	-	x	-

CONTENT

1. Discipline-specific knowledge and capabilities: appropriate to the level of study related to an InformationTechnology profession.
2. Communication: using oral, written and interpersonal communication to inform, motivate and effect change
3. Digital literacy: using technologies to find, use and disseminate information
4. Critical thinking: evaluating information using critical and analytical thinking and judgment
5. Problem solving: creating solutions to authentic (real world and ill-defined) problems
6. Self-management: working and learning independently, and taking responsibility for personal actions.
7. Teamwork: working and learning with others from different disciplines and backgrounds
8. Global citizenship: engaging ethically and productively in the professional context and with diverse communitiesand cultures in a global context

I **Information Technology Professionalism**

A. Privacy and confidentiality
B. Computer ethics
C. Intellectual property issues
D. Computer crime and fraud
E. Professional bodies
F. Impact of information technology on society

II **Information Technology Practices**

A. Effects of standardization
B. Effectiveness vs efficiency
C. Distributed systems issues
D. Emerging technologies

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E. Quality issues
F. Current issues

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Schultz, Robert A	Contemporary Issues inEthics and Information Technology	IRM Press	2006
2.	Baase S	A Gift of Fire, Social, Legaland Ethical Issues for Computers and the Internet	Prentice Hall	2003

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Johnson DG	Computer Ethics	Prentice Hall	2001
2.	Spinello RA	CyberEthics: Morality and Law in Cyberspace	Jones and Bartlett	2000

WEB URLs

1. www.infosec.gov.hk
2. www.pcpd.org.hk
3. www.ipd.gov.hk
4. www.ogcio.gov.hk
5. www.hkcs.org.hk

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