MUTHAYAMMAL ENGINEERING COLLEGE

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Rasipuram - 637 408, Namakkal Dist., Tamil Nadu.

Curriculum/Syllabus

Programme Code : CS

Programme Name : B.E.-Computer Science and Engineering

Regulation : 2023

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Rasipuram - 637 408, Namakkal Dist., Tamil Nadu.

Ph. No.: 04287-220837
Email: info@mec.ac.in

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DESIGNING YOUR FUTURE
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.

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Department Vision & Mission

Department Vision

- To produce the Computer Science and Engineering graduates 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 prepare the graduates with Ethical values to become successful Entrepreneurs.

Program Educational Objectives

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 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.

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 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.

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 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 : **Lifelong learning:** Recognize the need for and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

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B.E. – Computer Science and Engineering
Grouping of Courses

I. Humanities and Social Sciences Courses (HS)

Sl.No.	Course Code	Course Title	Category	Contact Hours	Instruction Hours/Week/ Credit			
					L	T	P	C
1.	23HSS01	Technical and Communicative English - I	HS	3	2	0	2	3
2.	23HSS02	Technical and Communicative English – II	HS	3	0	3	3	3
3.	23HSS03	Technical English for Engineers	HS	3	2	0	0	2
4.	23HSS04	Communicative English for Engineers	HS	3	2	0	0	2
5.	23HSS05	Commercial English	HS	3	2	0	0	2
6.	23HSS06	Basics of Japanese Language	HS	3	2	0	0	2
7.	23HSS07	Basics of French	HS	3	2	0	0	2
8.	23HSS08	Heritage of Tamils	HS	1	1	0	0	1
9.	23HSS09	Tamils and Technology	HS	1	1	0	0	1

II. Basic Sciences (BS)

1.	23BSS01	Engineering Physics	BS	4	3	0	0	3
2.	23BSS02	Physics Laboratory	BS	2	0	0	2	2
3.	23BSS03	Bio and Nanomaterial Sciences	BS	4	3	0	0	3
4.	23BSS04	Materials Science	BS	4	3	0	0	3
5.	23BSS05	Applied Physics	BS	4	3	0	0	3
6.	23BSS11	Engineering Chemistry	BS	3	3	0	0	3
7.	23BSS12	Chemistry Laboratory	BS	2	0	0	2	2
8.	23BSS13	Applied Chemistry	BS	4	3	0	0	3
9.	23BSS21	Algebra and Calculus	BS	5	3	1	0	4
10.	23BSS22	Advanced Calculus and Complex Analysis	BS	5	3	1	0	4
11.	23BSS23	Differential Equations and Vector Analysis	BS	5	3	1	0	4
12.	23BSS24	Transforms and Partial Differential Equations	BS	5	3	1	0	4
13.	23BSS25	Discrete Mathematics	BS	5	3	1	0	4
14.	23BSS26	Statistics and Queueing Model	BS	5	3	1	0	4
15.	23BSS27	Statistics and Numerical Methods	BS	5	3	1	0	4
16.	23BSS28	Numerical Methods	BS	5	3	1	0	4

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17.	23BSS29	Probability and Random Processes	BS	5	3	1	0	4

III. General Engineering Science (GES)

1.	23GES01	Programming for problem solving using C	GES	3	3	0	0	3
2.	23GES02	Programming for Problem Solving Techniques	GES	3	3	0	0	3
3.	23GES03	Programming in C Laboratory	GES	2	0	0	2	2
4.	23GES04	Computer Peripherals and Programming Essentials	GES	3	3	0	0	3
5.	23GES06	Electrical and Electronics Sciences	GES	3	3	0	0	3
6.	23GES08	Python Programming	GES	3	3	0	0	3
7.	23GES09	Python Programming Laboratory	GES	2	0	0	2	2
8.	23GES24	Digital Principles and System Design	GES	3	3	0	0	3
9.	23GES25	Digital Principles and System Design Laboratory	GES	3	3	0	0	3

IV. Professional Core (PC)

1.	23CSF01	Data Structures and Algorithms	PC	3	3	0	0	3
2.	23CSF02	Object Oriented Programming with Java	PC	3	3	0	0	3
3.	23CSF03	Data Structures using Java Laboratory	PC	2	0	0	2	1
4.	23CSF04	Database Management Systems	PC	3	3	0	0	3
5.	23CSF05	Database Management Systems Laboratory	PC	2	0	0	2	1
6.	23CSF06	Software Engineering	PC	3	3	0	0	3
7.	23CSF07	Computer Networks	PC	3	3	0	0	3
8.	23CSF08	Formal Language and Automata Theory	PC	3	3	0	0	3
9.	23CSF09	Artificial Intelligence	PC	3	3	0	0	3
10.	23CSF10	Design and Analysis of Algorithms	PC	3	3	0	0	3
11.	23CSF11	Computer Organization and Architecture	PC	3	3	0	0	3
12.	23CSF12	Operating Systems	PC	3	3	0	0	3
13.	23CSF13	Operating Systems Laboratory	PC	2	0	0	2	1
14.	23CSF14	Mobile Application Development	PC	3	3	0	0	3
15.	23CSF15	Mobile Application Development Laboratory	PC	2	0	0	2	1
16.	23CSF16	Foundations of Data Science	PC	3	3	0	0	3
17.	23CSF17	Data Science Laboratory	PC	2	0	0	2	1
18.	23CSF18	Data Warehousing and Data Mining	PC	3	3	0	0	3
19.	23CSF19	Compiler Design	PC	3	3	0	0	3
20.	23CSF20	Compiler Design Laboratory	PC	2	0	0	2	1
21.	23CSF21	Object Oriented Analysis and Design	PC	3	3	0	0	3
22.	23CSF22	Case Tools Laboratory	PC	2	0	0	2	1
23.	23CSF23	CCNA – Introduction to Networks	PC	3	3	0	0	2
24.	23CSF24	Computer Networks Laboratory	PC	2	0	0	2	1
25.	23CSF25	Artificial Intelligence and Machine Learning	PC	3	3	0	0	3

26.	23CSF26	CCNA – Routing and Switching Essentials	PC	3	3	0	0	3
27.	23CSF27	Big Data and its Applications	PC	3	3	0	0	3
28.	23CSF28	Service Oriented Architecture	PC	3	3	0	0	3
29.	23CSF29	Data Analytics using R and Python	PC	3	3	0	0	3
30.	23CSF30	Theory of Computation	PC	3	3	0	0	3
31.	23CSF31	Cryptography and Network Security	PC	3	3	0	0	3
32.	23CSF32	Cryptography and Network Security Laboratory	PC	2	0	0	2	1
33.	23CSF33	Machine Learning Techniques	PC	3	3	0	0	3
34.	23CSF34	Data Analytics and Modeling Techniques	PC	3	3	0	0	3
35.	23CSF35	Software Project Management	PC	3	3	0	0	3
36.	23CSF36	Principles of Programming Languages	PC	3	3	0	0	3
37.	23CSF37	Distributed Operating Systems	PC	3	3	0	0	3
38.	23CSF38	PC Hardware Assembly and Troubleshooting	PC	3	3	0	0	2

V. Professional Elective (PE)

1.	23CSE01	Internet of Things	PE	3	3	0	0	3
2.	23CSE02	Internet of Things Laboratory	PE	2	0	0	2	1
3.	23CSE03	Advanced Data Structures	PE	3	3	0	0	3
4.	23CSE04	Servlets and JSP	PE	3	3	0	0	3
5.	23CSE05	Web Technologies Laboratory	PE	2	0	0	2	1
6.	23CSE06	Salesforce CRM and Platform	PE	3	3	0	0	3
7.	23CSE07	Salesforce CRM and Platform Laboratory	PE	2	0	0	2	1
8.	23CSE08	C# and.NET	PE	3	3	0	0	3
9.	23CSE09	AWS Academy Cloud Developing	PE	3	3	0	0	3
10.	23CSE10	AWS Academy Cloud Developing Laboratory	PE	2	0	0	2	1
11.	23CSE11	AWS Academy Cloud Architecting	PE	3	3	0	0	3
12.	23CSE12	AWS Academy Cloud Architecting Laboratory	PE	2	0	0	2	1
13.	23CSE13	Software Testing	PE	3	3	0	0	3
14.	23CSE14	Cloud Computing and IoT	PE	3	3	0	0	3
15.	23CSE15	Cloud Computing and IoT Laboratory	PE	2	0	0	2	1
16.	23CSE16	TCP/IP Design and Implementation	PE	3	3	0	0	3
17.	23CSE17	Network Routing Algorithms	PE	3	3	0	0	3
18.	23CSE18	Devops	PE	3	3	0	0	3
19.	23CSE19	Virtual Reality and Augmented Reality	PE	3	3	0	0	3
20.	23CSE20	Block Chain Technology	PE	3	3	0	0	3
21.	23CSE21	Design Patterns	PE	3	3	0	0	3
22.	23CSE22	Semantic Web	PE	3	3	0	0	3
23.	23CSE23	Software Project Management	PE	3	3	0	0	3
24.	23CSE24	Human Computer Interaction	PE	3	3	0	0	3

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25.	23CSE25	Speech and Language Processing	PE	3	3	0	0	3
26.	23CSE26	Ad-Hoc Networks	PE	3	3	0	0	3
27.	23CSE27	Digital Marketing	PE	3	3	0	0	3
28.	23CSE28	Robotics and its Applications	PE	3	3	0	0	3
29.	23CSE29	Internet Programming	PE	3	3	0	0	3
30.	23CSE30	Current Practices in Software	PE	3	3	0	0	3
31.	23CSE31	Computer Graphics	PE	3	3	0	0	3
32.	23CSE32	Distributed Programming	PE	3	3	0	0	3
33.	23CSE33	Enterprise Project Development using FOSS	PE	3	3	0	0	3
34.	23CSE34	Parallel Computing	PE	3	3	0	0	3
35.	23CSE35	Kernel Programming	PE	3	3	0	0	3
36.	23CSE36	Soft Computing Techniques	PE	3	3	0	0	3
37.	23CSE37	Storage infrastructure Management	PE	3	3	0	0	3
38.	23CSE38	Total Quality Management	PE	3	3	0	0	3
39.	23CSE39	Cloud Infrastructure Services	PE	3	3	0	0	3
40.	23CSE40	Graphics And Multimedia	PE	3	3	0	0	3
41.	23CSE41	Graphics And Multimedia Laboratory	PE	2	0	0	2	1
42.	23CSE42	Software Quality Assurance	PE	3	3	0	0	3
43.	23CSE43	Scaling and Connecting Networks	PE	3	3	0	0	3
44.	23CSE44	Open Stack Essentials	PE	3	3	0	0	3
45.	23CSE45	Software Defined Networks	PE	3	3	0	0	3
46.	23CSE46	Docker and Kubernetes	PE	3	3	0	0	3
47.	23CSE47	User Centric Design	PE	3	3	0	0	3
48.	23CSE48	Node.Js and React.Js	PE	3	3	0	0	3
49.	23CSE49	Agile Methodology	PE	3	3	0	0	3
50.	23CSE50	Text Mining	PE	3	3	0	0	3
51.	23CSE51	Angular JS	PE	3	3	0	0	3
52.	23CSE52	Deep Learning	PE	3	3	0	0	3
53.	23CSE53	Fog Computing	PE	3	3	0	0	3
54.	23CSE54	J2ee Technologies	PE	3	3	0	0	3
55.	23CSE55	Advanced Java Programming	PE	3	3	0	0	3
56.	23CSE56	Parallel And Distributed Computing	PE	3	3	0	0	3
57.	23CSE57	Information Security	PE	3	3	0	0	3
58.	23CSE58	Soft Computing	PE	3	3	0	0	3
59.	23CSE59	Speech Recognition	PE	3	3	0	0	3
60.	23CSE60	Python for Data Science	PE	3	3	0	0	3
61.	23CSE61	Bio-Inspired Computing	PE	3	3	0	0	3
62.	23CSE62	Video Analytics	PE	3	3	0	0	3
63.	23CSE63	Web Frameworks	PE	3	3	0	0	3

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64.	23CSE64	Quantum Computing	PE	3	3	0	0	3
65.	23CSE65	Network Programming And Management	PE	3	3	0	0	3
66.	23CSE66	Information Retrieval Systems	PE	3	3	0	0	3

VI. Employability Enhancement Courses (EEC)

1.	23CSP01	Soft Skill	EEC	2	0	0	2	1
2.	23CSP02	Internship	EEC	2	0	0	2	1
3.	23CSP03	Mini Project	EEC	2	0	0	2	1
4.	23CSP04	Project work-Phase I	EEC	6	0	0	6	3
5.	23CSP05	Project work-Phase II	EEC	15	0	0	15	12
6.	23CSP06	Comprehension	EEC	4	0	0	4	2
7.	23CSP07	Technical Seminar	EEC	4	0	4	0	2
8.	23CSP08	Entrepreneurship Development	EEC	3	3	0	0	3
9.	23CSP09	Professional Practices	EEC	6	0	0	6	3
10.	23CSP10	NPTEL- Introduction to Industry 4.0 and Industrial Internet of Things	EEC	-	-	-	-	-
11.	23CSP11	NPTEL- Introduction to Machine Learning	EEC	-	-	-	-	-
12.	23CSP12	NPTEL- The Joy of Computing using Python	EEC	-	-	-	-	-
13.	23CSP13	NPTEL-Data Analytics with Python	EEC	-	-	-	-	-
14.	23CSP14	Indian Constitution	EEC	-	-	-	-	-
15.	23CSP15	Value Education	EEC	-	-	-	-	-
16.	23CSP16	Disaster Management	EEC	-	-	-	-	-
17.	23CSP17	Pedagogy Studies	EEC	-	-	-	-	-
18.	23CSP18	Stress Management by Yoga	EEC	-	-	-	-	-
19.	23CSP19	Indian Constitution	EEC	-	-	-	-	-
20.	23CSP20	Value Education	EEC	-	-	-	-	-
21.	23CSP21	Disaster Management	EEC	-	-	-	-	-
22.	23CSP22	Pedagogy Studies	EEC	-	-	-	-	-
23.	23CSP23	Stress Management by Yoga	EEC	-	-	-	-	-

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B.E. – Computer Science and Engineering
Curriculum | UG - R2023
Semester -I

Sl.No.	Course Code	Course Title	Category	Contact Hours	Instruction Hours/Week/ Credit			
					L	T	P	C
Theory								
1.	23HSS01	Technical and Communicative English - I	HS	3	2	0	2	3
2.	23BSS21	Algebra and Calculus	BS	4	3	0	0	4
3.	23BSS01	Engineering Physics	BS	3	3	0	0	3
4.	23GES01	Programming for Problem Solving Using C	GES	3	3	0	0	3
5.	23GES06	Electrical and Electronics Sciences	GES	3	3	0	0	3
6.	23HSS08	Heritage of Tamils	HS	1	1	0	0	1
Practical								
7.	23BSS02	Physics Laboratory	BS	2	0	0	2	2
8.	23GES03	Programming in C Laboratory	GES	2	0	0	1	1
							Total Credit	**20**

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Semester -II

Sl.No.	Course Code	Course Title	Category	Contact Hours	Instruction Hours/Week/ Credit			
					L	T	P	C
Theory								
1.	23HSS01	Technical and Communicative English - I	HS	3	3	0	3	3
2.	23BSS22	Advanced Calculus and Complex Analysis	BS	4	3	1	0	4
3.	23BSS11	Engineering Chemistry	BS	3	3	0	0	3
4.	23GES08	Python Programming	GES	3	3	0	0	3
5.	23GES04	Computer Peripherals and Programming Essentials	GES	3	3	0	0	3
6.	23HSS09	Tamils and Technology	HS	1	1	0	0	1
Practical								
7.	23BSS12	Chemistry Laboratory	BS	2	0	0	2	2
8.	23GES09	Python Programming Laboratory	GES	2	0	0	2	1
							Total Credit	**20**

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Semester -III

Sl.No.	Course Code	Course Title	Category	Contact Hours	Instruction Hours/Week/ Credit			
					L	T	P	C
Theory								
1.	23CSF01	Data Structures and Algorithm	PC	3	3	0	0	3
2.	23CSF02	Object Oriented Programming with JAVA	PC	3	3	0	0	3
3.	23CSF04	Database Management Systems	PC	3	3	0	0	3
4.	23CSF06	Software Engineering	PC	3	3	0	0	3
5.	23BSS30	Discrete Mathematics	BSS	4	3	1	0	4
6.	23GES24	Digital Electronics	GES	3	3	0	0	3
Practical								
7.	23CSF03	Data Structures using Java Laboratory	PC	2	0	0	2	1
8.	23CSF05	Database Management Systems Laboratory	PC	2	0	0	2	1
9.	23GES25	Digital Electronics Laboratory	PC	2	0	0	2	1
							Total Credit	**22**

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Semester -IV

Sl.No.	Course Code	Course Title	Category	Contact Hours	Instruction Hours/Week/ Credit			
					L	T	P	C
Theory								
1.	23BSS27	Probability and Statistics	HS	5	3	1	0	4
2.	23CSF07	Computer Networks	PC	3	3	0	0	3
3.	23CSF08	Formal Language and Automata Theory	PC	3	3	0	0	3
4.	23GES30	Microprocessor and Microcontroller	GES	3	3	0	0	3
5.	23CSF14	Mobile Application Development	PC	3	3	0	0	3
6.	PE	Professional Elective- I	PE	3	3	0	0	3
Practical								
7.	23CSF15	Mobile Application Laboratory (Internship)	PC	2	0	0	2	1
8.	23GES31	Microprocessor and Microcontroller Laboratory	GES	2	0	0	2	1
9.	PE	Professional Elective I–Laboratory	PE	2	0	0	2	1
							Total Credit	**22**

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Semester -V

Sl.No.	Course Code	Course Title	Category	Contact Hours	Instruction Hours/Week/ Credit			
					L	T	P	C
Theory								
1.	23CSF10	Design and Analysis of Algorithms	PC	3	3	0	0	3
2.	23CSF11	Computer Organization & Architecture	PC	3	3	0	0	3
3.	23CSF12	Operating Systems	PC	3	3	0	0	3
4.	23CSF16	Foundations of Data Science	PC	3	3	0	0	3
5.	PE	Professional Elective- II	PE	3	3	0	0	3
6.	OE	Open Elective - I	OE	3	3	0	0	3
Practical								
7.	23CSF13	Operating Systems Laboratory	PC	2	0	0	2	1
8.	23CSF17	Data Science Laboratory	PC	2	0	0	2	1
9.	PE	Professional Elective- II - Laboratory	PE	2	0	0	2	1
							Total Credit	**21**

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Semester -VI

Sl.No.	Course Code	Course Title	Category	Contact Hours	Instruction Hours/Week/ Credit			
					L	T	P	C
Theory								
1.	23CSF18	Data Warehousing and Data Mining	PC	3	3	0	0	3
2.	23CSF19	Compiler Design	PC	3	3	0	0	3
3.	23CSF21	Object Oriented Analysis and Design	PC	3	3	0	0	3
4.	23CSF23	CCNA – Introduction to Networks	PC	3	3	0	0	2
5.	PE	Professional Elective- III	PE	3	3	0	0	3
6.	OE	Open Elective - II	OE	3	3	0	0	3
Practical								
7.	23CSF20	Compiler Design Laboratory	PC	2	0	0	2	1
8.	23CSF24	Computer Networks Laboratory	PC	2	0	0	2	1
9.	PE	Professional Elective- III Laboratory	PE	2	0	0	2	1
10.	23CSP01	Soft Skill	EEC	2	0	0	2	1
11.	23CSP03	Mini Project	EEC	2	0	0	2	1
							Total Credit	**22**

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B.E. – Compute Science and Engineering
Curriculum | UG - R2023
Semester -VII

Sl.No.	Course Code	Course Title	Category	Contact Hours	Instruction Hours/Week/ Credit			
					L	T	P	C
Theory								
1.	23CSF26	CCNA-Routing and Switching Essentials	PC	3	3	0	0	3
2.	23CSF27	Big Data and its Applications	PC	3	3	0	0	3
3.	HS	Professional Ethics and Entrepreneurship Development	HS	3	3	0	0	3
4.	PE	Professional Elective- IV	PE	3	3	0	0	3
5.	PE	Professional Elective- V	PE	3	3	0	0	3
6.	OE	Open Elective - III	OE	3	3	0	0	3
Practical								
7.	23CSP04	Project Work Phase – I	EEC	6	0	0	6	3
8.	23CSP02	Internship - III	EEC	2	0	0	2	1
							Total Credit	**22**

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B.E. – Computer Science and Engineering
Curriculum | UG - R2023
Semester -VIII

Sl.No.	Course Code	Course Title	Category	Contact Hours	Instruction Hours/Week/ Credit			
					L	T	P	C
Practical								
1.	23CSP05	Project Work Phase – II	EEC	15	0	0	15	12
							Total Credit	**12**

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B.E. – Computer Science and Engineering
Curriculum | UG - R2023

Summary of Course Component

Sl.No.	Course Area	Semesters								Total Credits	% of Credits
		I	II	III	IV	V	VI	VII	VIII		
1.	HS	4	4	-	-	-	-	3	-	11	6.88
2.	BS	9	9	4	4	-	-	-	-	26	16.25
3.	GES	7	7	4	4	-	-	-	-	22	13.75
4.	PC	-	-	13	10	14	13	6	-	56	35
5.	PE	-	-	-	4	4	4	6	-	18	11.25
6.	OE	-	-	-	-	3	3	3	-	9	5.62
7.	EEC	-	-	-	-	-	2	4	12	18	11.25
Total											**100.00**

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23GES01	PROGRAMMING FOR PROBLEM SOLVING USING C	L	T	P	C
		3	0	0	3

Course Objective:

- To understand basic programming concepts using C
- To gather knowledge for problem solving using conditional and looping
- To examine arrays and strings
- To illustrate the memory allocation using pointer
- To construct different datatypes using Structure, Union and perform operations on files

Course Outcomes:

23GES01.CO1	Understand the fundamentals of C programming.
23GES01.CO2	Implement different Operations on programming constructs.
23GES01.CO3	Illustrate various functions of arrays and string handling operations.
23GES01.CO4	Construct pointer to store address.
23GES01.CO5	Creating file handling operations on the files for C Programming.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23GES01.CO1	X	X	X	-	X	-	X	-	-	-	-	X	X	-	-
23GES01.CO2	X	X	X	-	X	-	-	-	-	-	-	X	X	-	-
23GES01.CO3	X	X	X	-	X	-	-	-	-	-	-	X	X	-	-
23GES01.CO4	X	X	X	X	X	-	-	-	-	-	-	X	X	X	-
23GES01.CO5	X	X	X	X	X	X	-	-	-	-	-	X	-	X	-

Unit-I PROBLEM SOLVING FUNDAMENTALS 9

Introduction to problem solving - Flow Chart, Algorithm, Pseudocode - Procedural Programming – Program Compilation, Execution, Debugging, Testing –Preprocessors - Basic features of C, Structure of C program – Data types - Storage Classes - Tokens in C - Input and Output Statements in C, Operators- Bitwise, Unary, Binary and Ternary Operators, Precedence and Associativity -Expression Evaluation.

Unit-II CONDITIONAL STATEMENTS AND LOOPING CONSTRUCTS 9

Problem solving using Conditional or Selection or Branching Statements: Structure of if, if-else, else-if ladder, nested- if, switch constructs - Looping constructs: Structure of for, while, do-while constructs, usage of break, return, goto and continue keywords.

Unit-III ARRAYS AND STRINGS 9

1D Array – Declaration, Initialization, 2D Array - Declaration, Initialization, Multi-dimensional Arrays. Strings: Declaration, Initialization, String operations.

Unit-IV FUNCTIONS AND POINTERS 9

Functions: Built-in Functions, User defined functions, Call by value, Call by reference, Return type function – Function Prototypes –Recursion – Command Line Argument –Arrays and Functions – Strings and Functions. Pointers: Declaration – Pointer operators – Types of Pointers - Pointer arithmetic -Passing Pointers to a Function – Pointers as a function argument, Functions returning pointers.

Unit-V STRUCTURE, UNION AND FILE HANDLING 9

Structure: Create a Structure-Member initialization - Accessing Structure Members - Nested structures – Pointer and Structures – Array of structures -Self Referential Structures – type def-Unions, Files –Opening and Closing a Data File, Reading and writing a data file.

Total Periods: 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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23GES02	PROGRAMMING IN C LABORATORY	L	T	P	C
		0	0	2	1

Course Objective:

- Write a basic C Program
- Learn the knowledge about Conditional and Looping Statements
- Execute the programs using arrays and String
- Understand the concept about Functions and pointers
- Develop the program using File concept

Course Outcomes:

23GES02.CO1	Summarize the looping statement and decision making statements to workout various C programs.
23GES02.CO2	Illustrate one dimensional and two dimensional arrays for matrix.
23GES02.CO3	Formulate to handling string operations.
23GES02.CO4	Implement the parameters and access the values using function.
23GES02.CO5	Construct Structures and Union to store information in a single name and file handling operations.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23GES02.CO1	X	X	X	-	-	-	-	-	-	-	-	-	X	X	-
23GES02.CO2	X	X	X	-	-	-	-	-	-	-	-	-	-	X	X
23GES02.CO3	X	X	X	-	-	-	-	-	-	-	-	-	-	X	X
23GES02.CO4	-	X	X	-	X	-	-	-	-	-	-	-	-	X	X
23GES02.CO5	-	X	X	-	X	-	-	-	-	-	-	-	-	X	X

Sl.No.	List of Experiments
1.	Develop a program to find (i) Largest of three numbers (ii) Prime Number or not (iii) Fibonacci series
2.	Develop an interactive program to calculate roots of quadratic equation by accepting the coefficients.
3.	Develop a program (i) sum the series:1/1!+4/2!+27/3!+.....using functions (ii) Swap two values by using call by value and call by reference
4.	Develop a program to insert a number at a given location in an array
5.	Develop a program for matrix multiplication using two dimensional arrays
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 Periods: 30

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23GES08	PYTHON PROGRAMMING	L	T	P	C
		3	0	0	3

Course Objective:

- To understand basic programming concepts using Python
- To know about function and string
- Python data types Lists, Tuples and Dictionaries
- To construct file handling operations, modules and packages using python
- To Exemplify the concept of Tensorflow and Keras

Course Outcomes:

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												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
22GES08.CO1	X	X	-	-	X	X	-	X	X	-	X	-	X	X	-
23GES08.CO2	X	X	X	X	X	X	-	X	-	X	X	X	X	X	X
23GES08.CO3	X	X	-	X	-	X	-	X	X	X	X	-	X	-	X
23GES08.CO4	X	X	X	X	X	-	X	X	-	X	X	X	-	X	X
23GES08.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.

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 Periods: 45

Text Books:

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.	Guidovan Rossum and FredL. DrakeJr	An Introduction to Python	Network Theory Ltd	2011
3.	Matthew Scarpino	TensorFlow For Dummies	Wiley Publication	2018
4.	Antonio Gulli, SujitPal	Deep Learning with Keras	Packt Publishing	2017

Reference Books:

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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23GES04	COMPUTER PERIPHERALS AND PROGRAMMING ESSENTIALS	L	T	P	C
		3	0	0	3

Course Objective:

- To study the basics of computer and Assembling Disassembling hardware components
- To gather knowledge of operating system and its types, installation and booting
- To illustrate the MS-word, Ms-Excel and MS-PPT
- To examine the Input and Output devices
- To describe the networking essentials and working principles of internet

Course Outcomes:

23GES04.CO1	Identify the main components for the PC and working principles of computer.
23GES04.CO2	Install and configure Windows OS.
23GES04.CO3	Implement MS-Office suite.
23GES04.CO4	Demonstrate various input and output devices for PC.
23GES04.CO5	Classify various computer networking and software troubleshooting.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23GES04.CO1	X	X	-	-	X	X	-	X	X	-	X	-	X	X	-
23GES04.CO2	X	X	X	X	X	X	-	X	-	X	X	X	X	X	X
23GES04.CO3	X	X	-	X	-	X	-	X	X	X	X	-	X	-	X
23GES04.CO4	X	X	X	X	X	-	X	X	-	X	X	X	-	X	X
23GES04.CO5	X	X	X	X	-	-	X	X	X	X	X	X	X	X	X

Unit-I INTRODUCTION TO COMPUTER **9**

Basics of Computers: Definition of a Computer - Characteristics of computers, Applications of Computers – Block Diagram of a Digital Computer – I/O Devices, hardware, software human ware, application software, system software, Memories - Primary, Auxiliary and Cache Memory.

Assembling Dissembling Hardware Component: Identify Various Hardware Component-Identify front and rear panel port and connector-Understand Motherboard and Various Component on it-SMPS and its connection with Motherbord-Assembling and Dissembling PC Component.

Unit-II OS INSTALLATION AND WINDOWS UTILITIES **9**

Operating System Installation : Introduction-Types of OS- BIOS Overview.-Booting Process- UEFI Vs Legacy Boo- Various software for Make Bootable USB- Make Bootable USB (Single and Dual boot) - Difference between Installation and Upgrading Windows 10- Install Windows 10-Install Ubuntu- Create Dual boot System.

Windows Utilities: Hard Disk Partitioning-Third Party tools for Hard Disk Partitioning-Disk Cleanup and Disk Defragmentation-Create Windows System Image-Create Restore Point- Installation of Third Party Antivirus.

Unit-III MS OFFICE SUITE **9**

MS-Word : Features of MS-Word - MS-Word Window Components - Creating, Editing, Formatting and Printing of Documents – Headers and Footers – Insert/Draw Tables, Table Auto format – Page Borders and Shading – Inserting Symbols, Shapes, Word Art, Page Numbers, Mail Merge.

MS-Excel : Overview of Excel features – Creating a new worksheet, Selecting cells, Entering and editing Text, Numbers, Inserting Rows/Columns –Changing column widths and row heights, Formulae, Referencing cells , Changing font sizes and colors, Insertion of Charts, Auto fill, Sorting and Filtering a Database, Formatting Tables, Using Formulas (Sum, Count, Average, Max, Min and Round) Use of Pivot Table.

MS-PowerPoint: Features of PowerPoint – Creating a Presentation - Inserting and Deleting Slides in a

Presentation – Adding Clip Art/Pictures -Inserting Other Objects, Audio, Video - Resizing and scaling of an Object – Slide Transition – Custom Animation.

Unit-IV PC INPUT AND OUTPUT DEVICES 9

Input output devices and Storage devices: Input Devices: Mouse, Keyboard, Light pen, Track Ball, Joystick, MICR, Optical Mark Reader and Optical Character Reader Scanners, Voice system, Web Camera. Output Devices: Hard Copy Output Devices; Line Printers, Character Printers, Chain Printers, Dot-matrix Printers, Daisy Wheel Printer, Laser Printers, Ink Jet Printers; Plotters, Soft Copy device – Monitor, Sound Cards and speakers.

Unit-V COMPUTER NETWORKS AND INTERNET STANDARDS 12

Introduction to Internet, WWW and Web Browsers: Basic of Computer networks; LAN, WAN,MAN; Concept of Internet; Applications of Internet; connecting to internet; What is ISP; Knowing the Internet; Basics of internet connectivity related troubleshooting, World Wide Web; Web Browsing software, Search Engines; Understanding **URL; Domain name; IP Address**; Using e-governance website.

Basics of electronic mail; Getting an email account; Sending and receiving emails; Accessing sent emails; Using Emails; Document collaboration; Instant Messaging; Netiquettes.

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Ron Mansfield	Working in Microsoft Office	Tata Mc Graw Hill Edition	1995
2.	C.S. French	Data Processing and Information Technology	BPB Publications	1998
3.	P.K Sinha	Computer Fundamentals	BPB Publications	1992

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Ron White	How Computers Work	BPB Publications	2006
2.	B Govindarajalu	IBM PC and Clones – Hardware, Troubleshooting and Maintenance	McGraw – Hill Education	1991

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23GES09	PYTHON PROGRAMMING LABORATORY	L	T	P	C
		0	0	2	1

Course Objective:

- To write basic Python program
- To learn the knowledge about searching and sorting techniques
- To understand command line arguments
- To simulate the game
- To illustrate Tensor flow and Keras

Course Outcomes:

23GES09.CO1 Summarize the basic programs using python.

23GES09.CO2 Build various searching and sorting techniques.

23GES09.CO3 Implement the coding for matrices.

23GES09.CO4 Evaluate Command line arguments.

23GES09.CO5 Simulate game using python program.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23GES05.CO1	X	X	-	X	X	X	-	X	X	X	X	X	X	X	-
23GES05.CO2	X	X	X	X	X	X	-	X	-	X	X	X	X	X	X
23GES05.CO3	X	X	-	-	X	X	-	X	X	X	X	-	X	-	X
23GES05.CO4	X	X	X	X	X	-	X	X	-	X	X	X	-	X	X
23GES05.CO5	X	X	X	X	-	-	X	X	X	-	X	X	X	X	X

Sl.No.	List of Experiments
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 using2dimensionalarray.
9.	Programs that take command line arguments(word count)
10.	Find the most frequent words in a text read from a file
11.	Simulate elliptical orbits in Pygame
12.	Simulate bouncing ball using Pygame
13.	Object detection using Tensorflow
14.	Object detection using Keras

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Total Periods: 30

23GES13	DATA STRUCTURES USING PYTHON	L	T	P	C
		3	0	0	3

Course Objective:

- To Understand the basic concepts of Python Programming
- To know about Python Specific Data Structures
- To be exposed with various Linear Data Structures
- To use tree structures for searching techniques
- To be familiarized with various searching and sorting techniques

Course Outcomes:

23GES13.CO1	Understand the fundamental concept of python programming.
23GES13.CO2	Implement different operations on Python Specific Data Structures.
23GES13.CO3	Explain Abstract Data Types and linear Data Structures using Python.
23GES13.CO4	Analyze the efficiency of searching techniques using different tree data structures.
23GES13.CO5	Compare efficiency of various searching and sorting techniques using different data structures.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23GES13.CO1	X	-	X	-	X	-	-	-	-	-	-	X	X	X	X
23GES13.CO2	X	-	X	X	X	-	-	-	-	-	-	X	X	X	X
23GES13.CO3	X	X	X	X	X	-	-	-	-	-	X	X	X	X	X
23GES13.CO4	X	X	X	X	X	-	-	-	-	-	X	X	X	X	X
23GES13.CO5	X	X	X	X	X	-	-	-	-	-	X	X	X	X	X

Unit-I INTRODUCTION TO PYTHON **9**

Fundamentals of Python: Introduction - Objects in Python - Expressions - Operators and Precedence. Control Flows: Conditionals – Loops - Input and Output Statement.

Unit-II PYTHON SPECIFIC DATA STRUCTURES **9**

Data types in Python: List – Tuples – Set – Dictionaries - Comprehensions and its Types - Strings. Functions & Modules: Functions - Iterators and Generators - Modules and the Import Statement.

Unit-III LINEAR DATA STRUCTURES **9**

Data Structures: Introduction - Abstract Data Types - The Array Structure - The Python List. Linked List: Singly Linked List - Doubly Linked List - Circular Linked List – Stack - Queue.

Unit-IV NON LINEAR DATA STRUCTURES **9**

Trees: Binary Trees - Tree Traversals – Heaps - Binary Search Tree - Searching Min and Max Values. Graph: Introduction – Representation - Graph Traversals.

Unit-V SEARCHING AND SORTING **9**

Sorting: Bubble Sort - Selection Sort - Merge Sort - Quick Sort. **Searching:** Linear Search - Binary Search. Hashing: Linear Probing, Clustering, Rehashing Separate Chaining.

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Michael T. Goodrich, Roberto Tamassia, Micheal H Goldwasser	Data Structures and Algorithms in Python	Wiley	2013
2.	Rance D. Necaise	Data Structures and Algorithms Using Python	Wiley	2010
3.	Subrata Saha	Data Structures and Algorithms using Python	Cambridge University Press	2023

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Michael T. Goodrich, Roberto Tamassia, Micheal H Goldwasser	Data Structures and Algorithms in Python	Wiley	2013
2.	Rance D. Necaise	Data Structures and Algorithms Using Python	Wiley	2010
3.	Subrata Saha	Data Structures and Algorithms using Python	Cambridge University Press	2023

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23CSF01	DATA STRUCTURES AND ALGORITHMS	L	T	P	C
		3	0	0	3

Course Objective:

- To understand the concepts of ADTs and Linked list ADT
- To illustrate linear data structures – stacks, and queues
- To describe non-linear data structure – trees
- To apply Graph structures
- To classify sorting, searching and hashing algorithms

Course Outcomes:

23CSF01.CO1 Define linear and non-linear data structures.

23CSF01.CO2 Implement linear data structure Linked list operations.

23CSF01.CO3 Implement linear data structure Linked list operations.

23CSF01.CO4 Apply appropriate graph algorithms for graph applications.

23CSF01.CO5 Analyze the various searching and sorting algorithms.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSF01.CO1	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X
23CSF01.CO2	X	X	X	X	X	-	-	-	X	X	X	X	X	X	X
23CSF01.CO3	X	X	X	X	X	-	-	-	X	X	X	X	X	X	X
23CSF01.CO4	X	X	-	X	X	-	-	-	X	X	X	X	X	X	X
23CSF01.CO5	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X

Unit-I LINKED LIST **9**

Basic Terminologies: Elementary Data Organizations, Data Structure Operations: insertion, deletion, traversal etc. List ADT – Array-based implementation – Linked list implementation – Singly linked lists – Circularly linked lists – Doubly- linked lists – Applications of lists – Polynomial ADT.

Unit-II STACKS AND QUEUES **9**

Stack ADT – Operations – Applications – Balancing Symbols – Evaluating arithmetic expressions, Infix to Postfix conversion – Function Calls – Queue ADT – Operations – Circular Queue – DeQueue – Applications of Queues.

Unit-III TREES **9**

Tree ADT – Binary tree, implementation of tree, Tree traversal. Binary search tree, AVL tree, Splay tree, Applications of Tree.

Unit-IV GRAPHS **9**

B-Tree – B+ Tree – Graph Definition – Representation of Graphs – Types of Graph - Breadth-first traversal – Depth- first traversal –– Bi- connectivity - Topological Sort – Dijkstra's algorithm – Minimum Spanning Tree – Prim's algorithm – Kruskal's algorithm.

Unit-V SEARCHING, SORTING AND HASHING TECHNIQUES **9**

Searching – Linear Search – Binary Search. Sorting – Bubble sort – Selection sort – Insertion sort – Quick sort – Merge Sort – Hashing – Hash Functions – Separate Chaining – Open Addressing –Rehashing – Extendible Hashing.

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Michael T.Goodrich, Roberto Tamassia, Michael H.Goldwasser	Data structures and algorithms	Wiley publication, 6th edition	2014
2.	Data Structures and Algorithm Analysis in C++, 4th Edition	Mark Allen Weiss	Pearson Education	2014

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Langsam, Augenstein and Tanenbaum	Data Structures Using C and C++	Pearson Education, 2nd Edition	2015

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23CSF02	OBJECT ORIENTED PROGRAMMING WITH JAVA	L	T	P	C
		3	0	0	3

Course Objective:

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

Course Outcomes:

23CSF02.CO1 Understand Java programs using OOP principles.

23CSF02.CO2 Apply Java programs with the concepts inheritance and interfaces.

23CSF02.CO3 Construct Java applications using exceptions and I/O streams.

23CSF02.CO4 Develop Java applications with threads and generics classes.

23CSF02.CO5 Implement interactive Java programs using swings.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSF02.CO1	X	-	-	-	X	-	-	X	-	-	-	-	-	-	X
23CSF02.CO2	X	-	-	X	X	X	-	-	-	-	X	-	-	X	-
23CSF02.CO3	-	X	X	-	X	-	X	-	-	-	-	-	-	X	-
23CSF02.CO4	-	-	X	X	X	-	X	-	-	-	-	-	-	-	-
23CSF02.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

Stack ADT – Operations – Applications – Balancing Symbols – Evaluating arithmetic expressions, Infix to Postfix conversion – Function Calls – Queue ADT – Operations – Circular Queue – DeQueue – Applications of Queues.

Unit-III 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

Unit-V I/O, GENERICS, STRING HANDLING 9

I/O Basics – Reading and Writing Console I/O – Reading and Writing Files. Generics: Generic Programming – Generic classes – Generic Methods – Bounded Types – Restrictions and Limitations. Strings: Basic String class,

methods and String Buffer Class.

Total Periods: 45

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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23CSF03	DATA STRUCTURES USING JAVA LABORATORY	L	T	P	C
		0	0	2	1

Course Objective:

- Write a JAVA Program
- Learn the knowledge about linked list
- Execute the programs in Stack, Queue, Tree
- Implement the concepts of Graph
- Provide the knowledge about various searching and sorting techniques

Course Outcomes:

23CSF03.CO1 Classify various operations on singly and doubly linked list.

23CSF03.CO2 Illustrate stack programs using JAVA.

23CSF03.CO3 Apply the concept of queue using an array and Linked list.

23CSF03.CO4 Develop an algorithm for various graphs.

23CSF03.CO5 Build various sorting techniques.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSF03.CO1	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X
23CSF03.CO2	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X
23CSF03.CO3	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X
23CSF03.CO4	X	X	X	X	X	X	X	-	-	X	X	X	X	X	X
23CSF03.CO5	X	X	X	X	X	X	X	-	-	X	X	X	X	X	X

Sl.No. List of Experiments

1. Write a JAVA 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 JAVA 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 JAVA program that uses stack operations to convert a given infix expression into its postfix equivalent, Implement the stack using an array
4. Write a JAVA program to implement a double ended queue ADT using an array, using a doubly linked list
5. Write a JAVA 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 JAVA 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 Java program that implements dijkstra's algorithm to find the shortest path between the vertices
8. Write a Java program that implements to find the minimum spanning tree from a graph. a)Prim's algorithm b) Kruskal's algorithm

9. Write a JAVA program that implements a) Insertion sort algorithm to arrange a list of integers in ascending order
   b) Selection sort algorithm to arrange a list of elements in descending order
10. Write a JAVA program that implements a) Heap sort algorithm for sorting a list of integers in ascending order. b)Merge sort algorithm for sorting a list of integers in ascending order

Total Periods: 30

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23CSF04	DATABASE MANAGEMENT SYSTEMS	L	T	P	C
		3	0	0	3

Course Objective:

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

Course Outcomes:

23CSF04.CO1	Understand to draw the E-R diagram for the given Relation and use the Data model in Database Design.
23CSF04.CO2	Apply the Normalization in optimize storage space.
23CSF04.CO3	Design the Hashing Techniques and B+ Tree.
23CSF04.CO4	Analysis the Concept of Transaction with Concurrency Control and Timestamp in Database.
23CSF04.CO5	Evaluate SQL queries on Data Retrieval.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSF04.CO1	X	X	X	-	-	-	-	-	X	-	X	X	X	X	-
23CSF04.CO2	X	X	X	X	X	X	-	-	-	-	X	X	X	X	X
23CSF04.CO3	X	X	X	X	X	-	-	X	-	X	X	X	X	-	X
23CSF04.CO4	X	X	X	X	-	-	-	X	-	X	X	X	X	X	X
23CSF04.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.

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 Periods: 45

Text Books:

Sl.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 System	Pearson Education	2011

Reference Books:

Sl.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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23CSF05	DATABASE MANAGEMENT SYSTEMS LABORATORY	L	T	P	C
		0	0	2	1

Course Objective:

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

Course Outcomes:

23CSF05.CO1 Execute query using SQL DML/DDL Commands.

23CSF05.CO2 Implement programs using PL/SQL including stored procedures, cursors, packages etc.

23CSF05.CO3 Construct real time database application using current techniques.

23CSF05.CO4 Analyses the DB tool in various real time application.

23CSF05.CO5 Develop the VB as front end and SQL as back end.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSF05.CO1	X	X	X	X	-	-	-	-	-	X	X	X	X	X	X
23CSF05.CO2	X	X	X	X	X	X	-	-	-	X	X	X	X	X	X
23CSF05.CO3	X	X	X	X	X	-	-	X	-	X	X	X	X	X	X
23CSF05.CO4	X	X	X	X	-	X	-	X	-	X	X	X	X	X	X
23CSF05.CO5	X	X	X	X	X	X	-	X	-	X	X	X	X	X	X

Sl.No.	List of Experiments
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 Date and Built in Functions of 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

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Total Periods: 30

23CSF06	SOFTWARE ENGINEERING	L	T	P	C
		3	0	0	3

Course Objective:

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

Course Outcomes:

23CSF06.CO1 Define a plan to the software product by adopting suitable process model.

23CSF06.CO2 Design a architecture for the given project.

23CSF06.CO3 Create the programs according to programming standards.

23CSF06.CO4 Apply various testing strategies on the product.

23CSF06.CO5 Evaluate the product performance.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSF06.CO1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-
23CSF06.CO2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-
23CSF06.CO3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-
23CSF06.CO4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-
23CSF06.CO5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-

Unit-I INTRODUCTION **9**

Software Engineering, , Uses of Software Engineering, Characteristics of Software, A Systems Approach, An Engineering Approach, Members of the Development Team, Software Crisis, Planning and Managing the Project: Tracking Progress, Project Personnel, Effort Estimation, Risk Management, The Project Plan.

Unit-II MODELING AND AGILE DEVELOPMENT **9**

Software life cycle models and process, Software design and architecture concepts, Overview of software design method, Agile software development, Agile model, Agile SDLC models and methods, Agile methodology, Agile system development, Life cycle of Agile, Benefits and Limitations, Agile and traditional approach differences.

Unit-III REQUIREMENTS AND DESIGN THE ARCHITECTURE **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-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.

Unit-V DELIVERING THE SYSTEM **9**

Training, Documentation Maintaining the System: The Changing System, The Nature of Maintenance, Maintenance Problems, Measuring Maintenance Characteristics, Maintenance Techniques and Tools, Software Rejuvenation. Evaluating Products, Processes, and Resources: Approaches to Evaluation, Selecting an Evaluation

Technique, Assessment vs. Prediction, Evaluating Products, Evaluating Processes, Evaluating Resources.

Total Periods: 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,	2012

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23CSF07	COMPUTER NETWORKS	L	T	P	C
		3	0	0	3

Course Objective:

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

Course Outcomes:

23CSF07.CO1	Paraphrase the role of each layer in computer networks and its protocols.
23CSF07.CO2	Develop scheme for error detection and correction and Select flow control algorithm at link to link level.
23CSF07.CO3	Evaluate the performance of various routing algorithms in networks.
23CSF07.CO4	Analyze the flow control and congestion control algorithms for QoS at end to end level.
23CSF07.CO5	Define the actual communication and cryptographic authentication.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSF07.CO1	X	-	X	-	-	X	-	-	-	-	-	X	-	X	-
23CSF07.CO2	-	X	-	-	X	X	-	-	-	X	X	-	X	X	-
23CSF07.CO3	-	-	X	-	-	X	-	-	X	-	-	X	-	-	X
23CSF07.CO4	X	X	-	X	-	-	X	-	-	X	-	-	X	-	-
23CSF07.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

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 Periods: 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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23CSF08	FORMAL LANGUAGE & AUTOMATA THEORY	L	T	P	C
		3	0	0	3

Course Objective:

- To develop a formal notation for strings, languages and machines
- To learn finite automata concepts and to design finite automata to accept a set of strings of a language
- To Understand and apply context free grammars to generate strings
- To identify the hierarchy of formal languages, grammars and machines
- To distinguish between computability and non-computability and Decidability and Undesirability

Course Outcomes:

23CSF08.CO1	Write a formal notation for strings, languages and machines.
23CSF08.CO2	Design finite automata to accept a set of strings of a language.
23CSF08.CO3	Illustrate context free grammars to generate strings of context free language.
23CSF08.CO4	Distinguish between computability and non-computability and Decidability and undecidability.
23CSF08.CO5	Demonstrate the relation between regular expressions, automata, languages and grammar with formal mathematical methods.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSF08.CO1	X	-	X	-	-	X	-	-	-	-	-	X	-	X	-
23CSF08.CO2	-	X	-	-	X	X	-	-	-	X	X	-	X	X	-
23CSF08.CO3	-	-	X	-	-	X	-	-	X	-	-	X	-	-	X
23CSF08.CO4	X	X	-	X	-	-	X	-	-	X	-	-	X	-	-
23CSF08.CO5	X	-	-	-	-	X	X	-	-	X	-	X	X	-	-

Unit-I Finite Automata & Regular Expression 8

Basic Concepts of finite state system, Deterministic and non-deterministic finite automation and designing regular expressions, relationship between regular expression & Finite automata minimization of finite automation mealy & Moore Machines.

Unit-II Regular Sets of Regular Grammars 10

Basic Definition of Formal Language and Grammars. Regular Sets and Regular Grammars, closure proportion of regular sets, Pumping lemma for regular sets, decision Algorithms for regular sets, Myhell_Nerod Theory & Organization of Finite Automata

Unit-III Context Free Languages& Pushdown Automata 9

Context Free Grammars – Derivations and Languages –Relationship between derivation and derivation trees – ambiguity – simplification of CEG – Greiback Normal form –Chomsky normal forms – Problems related to CNF and GNF Pushdown Automata: Definitions – Moves –Instantaneous descriptions – Deterministic pushdown automata – Pushdown automata and CFL - pumping lemma for CFL -Applications of pumping Lemma.

Unit-IV Turing Machines 9

Turing machines – Computable Languages and functions – Turing Machine constructions – Storage infinite control – multiple tracks – checking of symbols – subroutines – two way infinite tape. Undesirability: Properties of recursive and Recursively enumerable languages – Universal Turing Machines as an undecidable problem – Universal Languages – Rice's Theorems

Unit-V Linear bounded Automata Context Sensitive Language 9

Chomsky Hierarchy of Languages and automata, Basic Definition & descriptions of Theory & Organization of

Linear bounded Automata Properties of context-sensitive languages.

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman	Introduction to Automata Theory, Languages, and Computation	Pearson Education	2003

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	H.R.Lewis and C.H.Papadimitriou	Elements of the theory of Computation	Second Edition, PHI	2011
2.	J.Martin	Introduction to Languages and the Theory of Computation	Third Edition, TMH	2016
3.	Micheal Sipser	Introduction of the Theory and Computation	Thomson Brokecole	2007
4.	Dexter C. Kozen	Automata and Computability, Undergraduate Texts in Computer Science	Springer	2008

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23CSF09	ARTIFICIAL INTELLIGENCE	L	T	P	C
		3	0	0	3

Course Objective:

- To understand the various characteristics of intelligent agents
- To learn the different search strategies in AI
- To represent knowledge in solving AI problems
- To analyse the different ways of designing software agents
- To know about the various applications of AI

Course Outcomes:

23CSF09.CO1 Use appropriate search algorithms for any AI problem.

23CSF09.CO2 Represent a problem using first order and predicate logic.

23CSF09.CO3 Provide the apt agent strategy to solve a given problem.

23CSF09.CO4 Design software agents to solve a problem.

23CSF09.CO5 Develop applications for NLP that use Artificial Intelligence.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSF09.CO1	X	-	-	-	X	-	-	X	-	-	-	-	-	-	X
23CSF09.CO2	X	-	-	X	X	X	-	-	-	-	X	-	-	X	-
23CSF09.CO3	-	X	X	-	X	-	X	-	-	-	-	-	-	X	-
23CSF09.CO4	-	-	X	X	X	-	X	-	-	-	-	-	X	-	-
23CSF09.CO5	-	-	X	-	X	-	X	-	-	-	-	-	-	X	-

Unit-I INTRODUCTION **9**

Introduction–Definition - Future of Artificial Intelligence – Characteristics of Intelligent Agents– Typical Intelligent Agents – Problem Solving Approach to Typical AI problems.

Unit-II PROBLEM-SOLVING METHODS **9**

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

Unit-III KNOWLEDGE REPRESENTATION **9**

First Order Predicate Logic – Prolog Programming – Unification – Forward Chaining - Backward Chaining – Resolution – Knowledge Representation - Ontological Engineering-Categories and Objects – Events - Mental Events and Mental Objects - Reasoning Systems for Categories - Reasoning with Default Information.

Unit-IV SOFTWARE AGENTS **9**

Architecture for Intelligent Agents – Agent communication – Negotiation and Bargaining – Argumentation among Agents – Trust and Reputation in Multi-agent systems

Unit-V ADVANCE CUSTOM TAGS AND JSTL **9**

AI applications – Language Models – Information Retrieval- Information Extraction – Natural Language Processing - Machine Translation – Speech Recognition – Robot – Hardware – Perception – Planning – Moving.

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	S. Russell and P. Norvig	Artificial Intelligence: A Modern Approach	Prentice-Hall, Third Edition	2009
2.	I.Bratko	Prolog: Programming for Artificial Intelligence	Fourth Edition, Addison-Wesley Educational Publishers Inc	2011

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	M. Tim Jones	Artificial Intelligence: A Systems Approach (Computer Science)	Jones and Bartlett Publishers, Inc.; First Edition	2008
2.	Nils J. Nilsson	The Quest for Artificial Intelligence	The Quest for Artificial Intelligence	2009
3.	William F. Clocksin and Christopher S. Mellish	Programming in Prolog: Using the ISO Standard	Fifth Edition, Springer	2003
4.	Gerhard Weiss	Multi Agent Systems	Second Edition, MIT Press	2013
5.	David L. Poole and Alan K. Mackworth	Artificial Intelligence: Foundations of Computational Agents	Cambridge University Press	2010

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23CSF10	DESIGN AND ANALYSIS OF ALGORITHMS	L	T	P	C
		3	0	0	3

Course Objective:

- Introduces the notations for analysis of the performance of algorithms
- Understand the data structure of disjoint sets
- Describes major algorithmic techniques (divide-and-conquer, backtracking, dynamic Programming, greedy, branch and bound methods) and mention problems for which each technique is appropriate
- To evaluate and compare different algorithms using worst-, average-, and best case analysis
- Explains the difference between tractable and intractable problems, and introduces the Problems that are P, NP and NP complete

Course Outcomes:

23CSF10.CO1	Analyze the performance of algorithms.
23CSF10.CO2	Ability to choose appropriate data structures and algorithm design methods for a specified application.
23CSF10.CO3	Evaluate specific data structures and the algorithm design methods for the impact the performance of programs.
23CSF10.CO4	To Learn about the sequence of database and shortest path arrangements.
23CSF10.CO5	To Know the applications of Deterministic Algorithms.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSF10.CO1	X	X	X	X	-	X	-	X	X	X	-	X	X	-	X
23CSF10.CO2	X	-	-	-	-	X	X	X	X	X	-	X	-	X	-
23CSF10.CO3	X	-	X	X	-	X	-	X	-	X	-	-	X	-	-
23CSF10.CO4	-	X	-	-	-	-	-	X	X	-	-	X	-	-	X
23CSF10.CO5	X	X	X	X	-	-	X	X	X	X	-	-	X	-	-

Unit-I INTRODUCTION **9**

Algorithm, Performance Analysis-Space complexity, Time complexity, Asymptotic Notations- Big oh notation, Omega notation, Theta notation and Little oh notation. Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort, Strassen's matrix multiplication.

Unit-II DISJOINT SETS **9**

Disjoint set operations, union and find algorithms Backtracking: General method, applications, n-queen's problem, sum of subsets problem, graph coloring.

Unit-III DYNAMIC PROGRAMMING **9**

General method, applications- Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Traveling sales person problem, Reliability design

Unit-IV GREEDY METHOD **9**

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

Unit-V BRANCH AND BOUND **9**

General method, applications - Travelling sales person problem, 0/1 knapsack problem - LC Branch and Bound solution, FIFO Branch and Bound solution. NP-Hard and NP-Complete problems: Basic concepts, non-deterministic algorithms, NP - Hard and NP-Complete classes, Cook's theorem.

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Ellis Horowitz, Satraj Sahni and Rajasekharan	Fundamentals of Computer Algorithms	University Press	2010

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Aho, Ullman and Hopcroft	Design and Analysis of algorithms	Pearson education	2002
2.	T. H. Cormen, C.E. Leiserson, R. L. Rivest, and C. Stein	Introduction to Algorithms	PHI Pvt. Ltd./ Pearson Education	2001

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23CSF11	COMPUTER ORGANIZATION AND ARCHITECTURE	L	T	P	C
		3	0	0	3

Course Objective:

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

Course Outcomes:

23CSF11.CO1 Describe data representation, instruction formats and the operation of a digital computer.

23CSF11.CO2 Illustrate the fixed point and floating-point arithmetic for ALU operation.

23CSF11.CO3 Discuss about implementation schemes of control unit and analyze pipeline performance.

23CSF11.CO4 Evaluate performance of memory systems.

23CSF11.CO5 Identify the methods of accessing I/O devices and the use of standard I/O interfaces.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSF11.CO1	X	-	-	-	X	-	-	X	-	-	-	-	-	-	X
23CSF11.CO2	X	-	-	X	X	X	-	-	-	-	X	-	-	X	-
23CSF11.CO3	-	X	X	-	X	-	X	-	-	-	-	-	-	X	-
23CSF11.CO4	-	-	X	X	X	-	X	-	-	-	-	-	X	-	-
23CSF11.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 - Micro programmed Control - Pipelining - Basic Concepts - Data Hazards - Instruction Hazards - Influence on Instruction Sets - Datapath and control considerations.

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).Thread Level Parallelism(TLP).

Total Periods: 45

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	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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23CSF12	OPERATING SYSTEMS	L	T	P	C
		3	0	0	3

Course Objective:

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

Course Outcomes:

23CSF12.CO1 Recall the basic architectural components involved in design an operating system.

23CSF12.CO2 Recognize the various scheduling algorithms for different types of operating system.

23CSF12.CO3 Construct resource management techniques and handling Deadlock issues.

23CSF12.CO4 Investigate to change the disk structure and access the files.

23CSF12.CO5 Integrate the different operating systems.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSF12.CO1	-	-	X	-	-	X	-	-	-	-	-	X	-	X	-
23CSF12.CO2	-	X	-	-	X	X	-	-	-	X	X	-	X	X	-
23CSF12.CO3	-	-	X	-	-	X	-	-	X	-	-	X	-	-	X
23CSF12.CO4	X	X	-	X	-	-	X	-	-	X	-	-	X	-	-
23CSF12.CO5	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

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 MEMORY MANAGEMENT 9

Swapping, 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

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 Periods: 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 Publishing 3rd 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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23CSF13	OPERATING SYSTEMS LABORATORY	L	T	P	C
		0	0	2	1

Course Objective:

- Remember programs in Linux environment using system call
- Understand the scheduling algorithms
- Apply page replacement algorithms
- Analyze file allocation methods
- Create and implement IPC mechanism using named and unnamed pipes

Course Outcomes:

23CSF13.CO1	Enumerate to develop application programs using system calls in Unix.
23CSF13.CO2	Estimate interprocesses communication between two processes.
23CSF13.CO3	Develop and solve synchronization problems.
23CSF13.CO4	Analyze to simulate operating system concepts such as scheduling, deadlock management, file management, and memory management.
23CSF13.CO5	Integrate to develop application programs using system calls in Unix.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSF13.CO1	-	-	X	-	-	X	-	-	-	-	-	X	-	X	-
23CSF13.CO2	-	X	-	-	X	X	-	-	-	X	X	-	X	X	-
23CSF13.CO3	-	-	X	-	-	X	-	-	X	-	-	X	-	-	X
23CSF13.CO4	X	X	-	X	-	-	X	-	-	X	-	-	X	-	-
23CSF13.CO5	X	-	-	-	-	X	X	-	-	X	-	X	X	-	-

Sl.No.	List of Experiments
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 Periods: 30

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23CSF14	MOBILE APPLICATION DEVELOPMENT	L	T	P	C
		3	0	0	3

Course Objective:

- Understand the basic concepts of the Android OS
- Describe the software Tools and user interfaces
- Able to design a simple mobile phone game
- Implementing intents and broadcast receivers in android application
- Develop and design apps for mobile devices using SQLite Database

Course Outcomes:

23CSF14.CO1	Ability to evaluate and select appropriate solutions to the mobile computing platform.
23CSF14.CO2	Apply suitable software tools and APIs for the development User Interface of a particular mobile application.
23CSF14.CO3	Demonstrate intents and broadcast receivers in android application.
23CSF14.CO4	Design a simple mobile phone game.
23CSF14.CO5	Develop and design apps for mobile devices using SQLite Database.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSF14.CO1	X	X	-	X	X	-	-	-	-	-	-	X	-	X	-
23CSF14.CO2	X	-	X	X	X	-	X	X	-	-	X	-	-	-	-
23CSF14.CO3	X	-	X	X	X	-	-	-	X	-	X	-	-	X	-
23CSF14.CO4	X	-	X	X	X	-	X	-	-	-	X	-	-	-	X
23CSF14.CO5	X	X	-	X	X	X	-	-	X	-	X	-	-	-	-

Unit-I INTRODUCTION TO ANDROID OPERATING SYSTEM 9

Android OS and Features - Android development framework; Installing and running applications on Android Studio, Creating AVDs, Types of Android application; Creating Activities, Activity Life Cycle, Activity states, monitoring state changes.

Unit-II ANDROID APPLICATION COMPONENTS 9

Android Manifest file, Externalizing recourses like Simple Values, Menus, etc, Building User Interfaces: Fundamental Android UI design, Layouts - Linear, Relative, Grid and Table Layouts. User Interface (UI) Components.

Unit-III FRAGMENTS 9

Creating fragments, Lifecycle of fragments, Fragment states, adding fragments to Activity, adding, removing and replacing fragments with fragment transactions, interfacing between fragments and Activities.

Unit-IV INTENTS AND BROADCASTS 9

Using intents to launch Activities, Types of Intents, Passing data to Intents, Getting results from Activities, Broadcast Receivers - Using Intent filters to service implicit Intents, Resolving Intent filters.

Unit-V DATABASE 9

Introduction to SQLite database, creating and opening a database, creating tables, inserting retrieving and deleting data.

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Reto Meier	Professional Android 4 Application Development	Wiley India, (Wrox)	2012
2.	James C Sheusi	Android Application Development for Java Programmers	Cengage Learning	2013

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Wei-Meng Lee	Beginning Android 4 Application Development	Wiley India, (Wrox)	2013
2.	Pradeep Kothari	Android Application Development (with Kitkat Support), Black Book	Prentice Hall of India	2014
3.	Erik Hellman	Android Programming: Pushing the Limits	1st Edition, Wiley Publications	2014

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23CSF15	MOBILE APPLICATION DEVELOPMENT LABORATORY	L	T	P	C
		0	0	2	1

Course Objective:

- Describe those aspects of mobile programming that make it unique from programming for other platforms
- Explain installation and working of Android
- Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces
- Program mobile applications for the Android operating system that use basic and advanced phone features
- Deploy applications to the Android marketplace for distribution

Course Outcomes:

23CSF15.CO1 Ability to install Android in Eclipse.

23CSF15.CO2 Understanding of the Android environment to develop projects.

23CSF15.CO3 Apply android widgets and their inclusion in projects.

23CSF15.CO4 Create android application for playing audio and video files.

23CSF15.CO5 Deploy the application to the android marketplace for distribution.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSF15.CO1	X	X	-	X	X	-	-	-	-	-	-	X	-	X	-
23CSF15.CO2	X	-	X	X	X	-	X	X	-	-	X	-	-	-	-
23CSF15.CO3	X	-	X	X	X	-	-	-	X	-	X	-	-	X	-
23CSF15.CO4	X	-	X	X	X	-	X	-	-	-	X	-	-	-	X
23CSF15.CO5	X	X	-	X	X	X	-	-	X	-	X	-	X	-	-

Sl.No.	List of Experiments
1.	Installation of Android in eclipse and study of Android Development Tools, Components and Architecture
2.	Creating and Running Android Virtual Device (AVD)
3.	Running Hello World Android Project
4.	Working with different Android User Interface
5.	A simple android application to study various android widgets like text boxes, buttons, toggle Buttons and Images
6.	Working with Android Activity life cycle
7.	Working with intents
8.	Working with fragments
9.	Working with TTS engine in Android
10.	A simple android application for playing audio and video files

Total Periods: 30

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23CSF16	FOUNDATIONS OF DATA SCIENCE	L	T	P	C
		3	0	0	3

Course Objective:

- To understand the data science fundamentals and process
- To learn to describe the data for the data science process
- To learn to describe the relationship between data
- To utilize the Python libraries for Data Wrangling
- To present and interpret data using visualization libraries in Python

Course Outcomes:

23CSF16.CO1 Define the data science process.

23CSF16.CO2 Understand different types of data description for data science process.

23CSF16.CO3 Gain knowledge on relationships between data.

23CSF16.CO4 Use the Python Libraries for Data Wrangling.

23CSF16.CO5 Apply visualization Libraries in Python to interpret and explore data.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSF16.CO1	X	X	X	X	X	-	-	-	X	X	X	X	X	X	X
23CSF16.CO2	X	X	-	X	X	-	-	-	X	X	X	X	X	X	X
23CSF16.CO3	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X
23CSF16.CO4	X	X	X	X	X	-	-	-	X	X	X	X	X	X	X
23CSF16.CO5	X	X	X	X	X	-	-	-	X	X	X	X	X	X	X

Unit-I INTRODUCTION 9

Retrieving data – Data preparation - Exploratory Data analysis – build the model– presenting findings and building applications - Data Mining - Data Warehousing – Basic Statistical descriptions of Data

Unit-II DESCRIBING DATA 9

Types of Data - Types of Variables -Describing Data with Tables and Graphs –Describing Data with Averages - Describing Variability - Normal Distributions and Standard (z) Scores.

Unit-III DESCRIBING RELATIONSHIPS 9

Correlation –Scatter plots –correlation coefficient for quantitative data –computational formula for correlation coefficient – Regression –regression line –least squares regression line – Standard error of estimate – interpretation of r2 –multiple regression equations –regression towards the mean.

Unit-IV PYTHON LIBRARIES FOR DATA WRANGLING 9

Basics of Numpy arrays –aggregations –computations on arrays –comparisons, masks, boolean logic – fancy indexing – structured arrays – Data manipulation with Pandas – data indexing and selection – operating on data – missing data – Hierarchical indexing – combining datasets – aggregation and grouping – pivot tables.

Unit-V DATA VISUALIZATION 9

Importing Matplotlib – Line plots – Scatter plots – visualizing errors – density and contour plots – Histograms – legends – colors – subplots – text and annotation – customization – three dimensional plotting - Geographic Data with Basemap -Visualization with Seaborn.

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	David Cielen, Arno D. B. Meysman, and Mohamed Ali	Introducing Data Science	Manning publications	2016
2.	Robert S. Witte and John S. Witte	Statistics	Eleventh Edition, Wiley Publications	2017
3.	Jake VanderPlas	Python Data Science Handbook	O'Reilly	2016

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Allen B. Downey	Think Stats: Exploratory Data Analysis in Python	Green Tea Press	2014

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23CSF17	DATA SCIENCE LABORATORY	L	T	P	C
		0	0	2	1

Course Objective:

- To understand the python libraries for data science
- To understand the basic Statistical and Probability measures for data science
- To learn descriptive analytics on the benchmark data sets
- To apply correlation and regression analytics on standard data sets
- To present and interpret data using visualization packages in Python

Course Outcomes:

23CSF17.CO1 Demonstrate the Python Libraries for Data Science.

23CSF17.CO2 Select the Statistical and Probability measures for Data Science.

23CSF17.CO3 Design a Benchmark datasets based on analytics.

23CSF17.CO4 Illustrate the correlation and regression analytics on datasets.

23CSF17.CO5 Implement the visualization package in Python.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSF17.CO1	X	-	X	-	X	X	-	-	-	-	-	X	-	X	-
23CSF17.CO2	-	X	-	-	X	X	-	-	-	X	X	-	X	X	-
23CSF17.CO3	-	-	X	-	-	X	-	-	X	-	-	X	-	-	X
23CSF17.CO4	X	X	-	X	-	-	X	-	-	X	-	-	X	-	-
23CSF17.CO5	X	-	-	-	-	X	X	-	-	X	-	X	X	-	-

Sl.No.	List of Experiments
1.	Download, install and explore the features of NumPy, SciPy, Jupyter, Statsmodels and Pandas packages
2.	Working with Numpy arrays
3.	Working with Pandas data frames
4.	Reading data from text files, Excel and the web and exploring various commands for doing descriptive analytics on the Iris data set
5.	Use the diabetes data set from UCI and Pima Indians Diabetes data set for performing the following: a. Univariate analysis: Frequency, Mean, Median, Mode, Variance, Standard Deviation, Skewness and Kurtosis. b. Bivariate analysis: Linear and logistic regression modeling c. Multiple Regression analysis d. Also compare the results of the above analysis for the two data sets.
6.	Apply and explore various plotting functions on UCI data sets. a. Normal curves b. Density and contour plots c. Correlation and scatter plots d. Histograms e. Three dimensional plotting
7.	Visualizing Geographic Data with Basemap

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Total Periods: 30

23CSF18	DATA WAREHOUSING AND DATA MINING	L	T	P	C
		3	0	0	3

Course Objective:

- To explore the basics of data ware housing
- 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:

23CSF18.CO1 Analyze the concepts of data ware housing.

23CSF18.CO2 Acquire the preprocessing of data and apply mining techniques on it.

23CSF18.CO3 Analysis frequent pattern on data mining.

23CSF18.CO4 Develop various classification algorithms.

23CSF18.CO5 Organize different types of clustering algorithm using weka tool.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSF18.CO1	X	-	X	X	-	-	X	-	-	X	-	X	X	X	-
23CSF18.CO2	X	X	-	-	X	-	X	X	X	X	-	-	X	-	-
23CSF18.CO3	X	X	X	X	-	X	-	-	X	X	X	X	X	-	-
23CSF18.CO4	X	X	X	-	X	X	-	X	X	X	X	-	-	-	X
23CSF18.CO5	X	X	X	X	-	X	-	-	X	X	X	X	X	X	-

Unit-I DATAWAREHOUSING,BUSINESS ANALYSIS ANDONLINEANALYTICAL PROCESSING(OLAP) 9

Basic Concepts-Warehouse Modelling–Schemas - Data cube – Multidimensional Data Model– Concept hierarchy - Dimension-Measures-OLAP operations-Starnet query model-Dataware house design process-Datacube 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.

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. Weka Tool–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 Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Pang-Ning Tan, Michael Stein bach, Vipin Kumar	Introduction to Data Mining (Second Edition)	Pearson Education	2021
2.	R Parteek Bhatia	Data Mining and Data Warehousing : Principles and Practical Techniques	Cambridge	2019
3.	Jiawei Hanand MichelineKamber	Data Mining Concepts and Techniques	Elsevier	2012

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Alex Berson and Stephen J.Smith	Data Warehousing, Data Mining & OLAP	Tata McGraHill	2016
2.	K.P.Soman,Shyam Diwakar And V.Ajay	Insight into Data Mining Theory and Practice	Eastern Economy	2006

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23CSF19	COMPILER DESIGN	L	T	P	C
		3	0	0	3

Course Objective:

- To understand the basic concepts of compilers
- To explore the functions of Lexical Analyzer
- To develop the functions of parsing techniques in Syntax Analysis
- To identify the process of Syntax directed translation and Intermediate Code Generation
- To learn the concepts of Code Generation and Code Optimization

Course Outcomes:

23CSF19.CO1 Construct the various phases of compiler using compiler construction tools.

23CSF19.CO2 Design a lexical analyzer using LEX language.

23CSF19.CO3 Apply different parsing algorithms to develop parser for a grammar.

23CSF19.CO4 Generate the Intermediate Languages for code generation.

23CSF19.CO5 Implement code generation schemes and optimized compilers.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSF19.CO1	X	X	-	-	-	-	X	X	-	X	-	X	X	-	-
23CSF19.CO2	-	-	X	-	X	X	-	X	X	X	-	-	X	-	X
23CSF19.CO3	-	X	-	-	-	X	X	-	-	-	X	X	-	X	-
23CSF19.CO4	X	-	X	X	X	-	-	-	X	-	X	-	X	-	X
23CSF19.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

Syntax directed Definitions-Run-Time Environments-Storage Organization- Storage Allocation Strategies. Intermediate Code Generation–Intermediate languages–Declarations– Assignment Statements-Boolean expressions– Flow of Control statements-Back patching-Procedure calls-Type Checking-Runtime Environments.

Unit-IV SYNTAX DIRECTED TRANSLATION& INTERMEDIATE CODE GENERATION 9

Basics of Numpy arrays –aggregations –computations on arrays –comparisons, masks, boolean logic – fancy indexing – structured arrays – Data manipulation with Pandas – data indexing and selection – operating on data – missing data – Hierarchical indexing – combining datasets – aggregation and grouping – pivot tables.

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 Periods: 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
2.	Sudha Rani .S, Karthi .M, Rajkumar.Y	Compiler Design	Dream Tech, Wiley	2019

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Randy Allen,KenKennedy	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 Cooperand 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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23CSF20	COMPILER DESIGN LABORATORY	L	T	P	C
		0	0	2	1

Course Objective:

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

Course Outcomes:

23CSF20.CO1 Design Lexical analyzer for given language using C and LEX tools.

23CSF20.CO2 Convert BNF rules into YACC form to generate various parsers.

23CSF20.CO3 Generate machine code from the intermediate code forms.

23CSF20.CO4 Evaluate the Symbol table.

23CSF20.CO5 Implement code optimization techniques.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSF20.CO1	X	-	-	-	-	-	X	X	-	X	-	X	X	-	-
23CSF20.CO2	-	-	X	-	X	X	-	X	X	X	-	-	X	-	X
23CSF20.CO3	-	X	-	-	-	X	X	-	-	-	X	X	-	X	-
23CSF20.CO4	X	-	X	X	X	-	-	-	X	-	X	-	X	-	X
23CSF20.CO5	X	X	X	X	-	-	-	-	X	-	-	X	X	X	-

Sl.No. **List of Experiments**

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 Periods: 30

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23CSF21	OBJECT ORIENTED ANALYSIS AND DESIGN	L	T	P	C
		3	0	0	3

Course Objective:

- To grasp the foundational principles of Object-Oriented Systems Development
- To explain the evolution of objects over time
- To streamline intricate patterns utilizing generalization and abstract classes
- To verify the accuracy of UML Interaction diagrams
- To execute the process of object mapping to a database system effectively

Course Outcomes:

23CSF21.CO1	Employ a Unified approach to analyze the requirements comprehensively.
23CSF21.CO2	Utilize UML to identify objects, relationships, services, and attributes.
23CSF21.CO3	Design real-time applications by applying General Responsibility Assignment Software Patterns.
23CSF21.CO4	Establish connections between class diagrams and corresponding program outlines.
23CSF21.CO5	Formulate an effective test design tailored to a given test object.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSF21.CO1	X	-	-	-	X	-	-	X	-	-	-	-	-	-	X
23CSF21.CO2	X	-	-	3	X	X	-	-	-	-	X	-	-	X	-
23CSF21.CO3	-	X	X	-	X	-	X	-	-	-	-	-	-	X	-
23CSF21.CO4	-	-	X	X	X	-	X	-	-	-	-	-	X	-	-
23CSF21.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.

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 Periods: 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 Designand 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	SecondEdition, 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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23CSF22	CASE TOOLS LABORATORY	L	T	P	C
		0	0	2	1

Course Objective:

- Understand the concept of d mechanism involved in UML
- Study the different types of relationships in classes, objects and terms related to diagrams
- Develop and test the Domain objects layer
- Apply GOF patterns for viewing a system as a set of procedures.
- Prepare case studies for Testing techniques

Course Outcomes:

23CSF22.CO1	Identify the requirements of project according to the objective.
23CSF22.CO2	Design the individual module of the given project.
23CSF22.CO3	Implement use case diagrams and add interface to class diagrams.
23CSF22.CO4	Demonstrate Software Development.
23CSF22.CO5	Perform a different software testing methods.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSF22.CO1	X	-	-	-	-	-	X	X	-	X	-	X	X	-	-
23CSF22.CO2	-	-	X	-	X	X	-	X	X	X	-	-	X	-	X
23CSF22.CO3	-	X	-	-	-	X	X	-	-	-	X	X	-	X	-
23CSF22.CO4	X	-	X	X	X	-	-	-	X	-	X	-	X	-	X
23CSF22.CO5	X	X	X	X	-	-	-	-	X	-	-	X	X	X	-

Sl.No.	List of Experiments
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

Sl.No.	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
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 Periods: 30

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23CSF23	CCNA-INTRODUCTION TO NETWORKS	L	T	P	C
		2	0	0	2

Course Objective:

- To describe how networks impact our daily lives
- To describe the role of data networking in the human network
- To identify the key components of any data network
- To describe network access, Ethernet and network layers concept
- To illustrate the characteristics of network architectures: fault tolerance, scalability, quality of service and security

Course Outcomes:

23CSF23.CO1	Identify and describe internet architecture, structure, functions, components, and models.
23CSF23.CO2	Describe the use of OSI and TCP layered models.
23CSF23.CO3	Identify and describe the nature and roles of protocols and services at the application, network, data link, and physical layers.
23CSF23.CO4	Describe principles and structure of IP addressing and the fundamentals of Ethernet concepts, media, and operations.
23CSF23.CO5	Build simple LAN topologies by applying basic principles of cabling, device configuration, and IP subnetting.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSF23.CO1	X	X	-	X	X	-	-	-	-	-	-	X	-	X	-
23CSF23.CO2	X	-	X	X	X	-	X	X	-	-	X	-	-	-	-
23CSF23.CO3	X	-	X	X	X	-	-	-	X	-	X	-	-	X	-
23CSF23.CO4	X	-	X	X	X	-	X	-	-	-	X	-	-	-	X
23CSF23.CO5	X	X	-	X	X	X	-	-	X	-	X	-	X	-	-

Unit-I **6**

Exploring the Network: Globally Connected-LANs, WANs, and the Internet -The Network as a Platform-The Changing Network Environment, Configuring a Network Operating System: Introduction-IOS Bootcamp-Getting Basic-Addressing Schemes, Network Protocols and Communications: Rules of Communication-Network Protocols and Standards-Moving Data in the Network, Standards Organizations: Open Standards, Internet Standards, Electronic and Communications Standards.

Unit-II **6**

Network Access: Physical Layer Protocols-Network Media-Data Link Layer Protocols-Media Access Control, Ethernet: Introduction-Ethernet Protocol -Address Resolution Protocol –LAN Switches, Network Layer- Network Layer Protocols- Routing-Routers- Configuring a Cisco Router.

Unit-III **6**

Transport Layer: Introduction-Transport Layer Protocols-TCP and UDP, IP Addressing: Introduction-IPv4 Network Addresses -IPv6 Network Addresses -Connectivity Verification, Subnetting IP Networks: Introduction-Subnetting IPv4 Network-Addressing Schemes-Design Considerations for IPv6.

Unit-IV **6**

Application Layer: Introduction-Application Layer Protocols -Well-Known Application Layer Protocols and Service -The Message Heard around the World, It's a Network: Introduction-Create and Grow-Keeping the Network Safe-Basic Network Performance- Managing IOS Configuration Files-Integrated Routing Services.

Unit-V **6**

MAC and IP: Destination on Same Network, Destination on Remote Network. ARP: ARP Overview, ARP Functions, Removing Entries from an ARP Table, ARP Tables on Networking Devices, ARP Issues: ARP Broadcasts and ARP Spoofing. IPv6 Neighbor Discovery = IPv6 Neighbor Discovery Messages IPv6 Neighbor Discovery—Address Resolution.

Total Periods: 30

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Todd Lammle	CCNA Routing and Switching Study Guide 1st Edition	Wiley	2013
2.	Wendell Odom	Cisco C cnet/CCNA , Icnd1 100 - 101 Official Cert Guide	Pearson Education	2013

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Wendell Odom	Cisco CCNA Routing and Switching Guide Icnd2 200 – 101 1st Edition	Pearson Education	2013
2.	Kevin Wallace	CCNP Routing and Switching ROUTE 300-101 Official Cert	Cisco Press	2014

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23CSF24	COMPUTER NETWORKS LABORATORY	L	T	P	C
		0	0	2	1

Course Objective:

- To learn a communication between two desktop computers
- Learn to implement the different protocols
- To be familiar with IP Configuration
- To be familiar with the various routing algorithms
- To be familiar with simulation tools in NS

Course Outcomes:

23CSF24.CO1	Demonstrate the Communication Error between two desktop computers.
23CSF24.CO2	Select the different protocols in link-to-link level.
23CSF24.CO3	Design a Program using sockets for command.
23CSF24.CO4	Illustrate and compare the various routing algorithms.
23CSF24.CO5	Use the simulation tool and code for classical Encryption Techniques.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSF24.CO1	-	-	X	-	-	X	-	-	-	-	-	X	-	X	-
23CSF24.CO2	-	X	-	-	X	X	-	-	-	X	X	-	X	X	-
23CSF24.CO3	-	-	X	-	-	X	-	-	X	-	-	X	-	-	X
23CSF24.CO4	X	X	-	X	-	-	X	-	-	X	-	-	X	-	-
23CSF24.CO5	X	-	-	-	-	X	X	-	-	X	-	X	X	-	-

Sl.No.	List of Experiments
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 Periods: 30

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23CSF25	ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING	L	T	P	C
		3	0	0	3

Course Objective:

- To learn the distinction between optimal reasoning vs. human like reasoning
- To understand the concepts of state space representation, exhaustive search, heuristic search together with the time and space complexities
- To know first order logic representation
- Explains machine learning techniques such as decision tree learning, Bayesian learning etc
- To understand computational learning theory

Course Outcomes:

23CSF25.CO1	Ability to formulate an efficient problem space for a problem expressed in natural language.
23CSF25.CO2	Select a search algorithm for a problem and estimate its time and space complexities.
23CSF25.CO3	Possess the skill for representing knowledge using the appropriate technique for a given problem.
23CSF25.CO4	Understand the concepts of computational intelligence like machine learning.
23CSF25.CO5	Ability to get the skill to apply machine learning techniques to address the real time problems in different areas.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSF25.CO1	X	X	-	X	-	X	-	X	X	X	-	X	X	-	X
23CSF25.CO2	X	-	-	-	-	X	X	X	X	X	-	X	-	X	-
23CSF25.CO3	X	-	-	X	-	X	-	X	-	X	-	-	X	-	-
23CSF25.CO4	-	X	-	-	-	-	-	X	X	-	-	X	-	-	X
23CSF25.CO5	X	X	-	X	-	-	X	X	X	X	-	-	X	-	-

Unit-I PROBLEM SOLVING BY SEARCH-I 9

Introduction to AI, Intelligent Agents Problem Solving by Search –II: Problem-Solving Agents, Searching for Solutions, Uninformed Search Strategies: Breadth-first search, Uniform cost search, Depth-first search, Iterative deepening Depth-firstsearch, Bidirectional search, Informed (Heuristic) Search Strategies: Greedy best-first search, A* search, Heuristic Functions, Beyond Classical Search: Hill-climbing search, Simulated annealing search, Local Search in Continuous Spaces, Searching with Non-Deterministic Actions, Searching with Partial Oservations, Online Search Agents and Unknown Environment.

Unit-II PROBLEM SOLVING BY SEARCH-II AND PROPOSITIONAL LOGIC ADVERSARIAL SEARCH 9

Games, Optimal Decisions in Games, Alpha–Beta Pruning, Imperfect Real-Time Decisions. Constraint Satisfaction Problems: Defining Constraint Satisfaction Problems, Constraint Propagation, Backtracking Search for CSPs, Local Search for CSPs, The Structure of Problems. Propositional Logic: Knowledge-Based Agents, The Wumpus World, Logic, Propositional Logic, Propositional Theorem Proving: Inference and proofs, Proof by resolution, Horn clauses and definite clauses, Forward and backward chaining, Effective Propositional Model Checking, Agents Based on Propositional Logic.

Unit-III LOGIC AND KNOWLEDGE REPRESENTATION FIRST-ORDER LOGIC 9

Representation, Syntax and Semantics of First-Order Logic, Using First-Order Logic, Knowledge Engineering in First- Order Logic. Inference in First-Order Logic: Propositional vs. First-Order Inference, Unification and Lifting, Forward Chaining, Backward Chaining, Resolution. Knowledge Representation: Ontological Engineering, Categories and Objects, Events. Mental Events and Mental Objects, Reasoning Systems for Categories, Reasoning with Default Information.

Unit-IV INTRODUCTION TO ML 9

Well-posed learning problems, designing a learning system, Perspectives and issues in machine learning Concept learning and the general to specific ordering – introduction, a concept learning task, concept learning as search, find-S: finding a maximally specific hypothesis, version spaces and the candidate elimination algorithm, remarks on version spaces and candidate elimination, inductive bias. Decision Tree Learning – Introduction, decision tree representation, appropriate problems for decision tree learning, the basic decision tree learning algorithm, hypothesis space search in decision tree learning, inductive bias in decision tree learning, issues in decision tree learning.

Unit-V ARTIFICIAL NEURAL NETWORKS-1 9

Introduction, neural network representation, appropriate problems for neural network learning, perceptions, multilayer networks and the back-propagation algorithm. Artificial Neural Networks-2- Remarks on the Back-Propagation algorithm, An illustrative example: face recognition, advanced topics in artificial neural networks. Evaluation Hypotheses – Motivation, estimation hypothesis accuracy, basics of sampling theory, a general approach for deriving confidence intervals, difference in error of two hypotheses, comparing learning algorithms.

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Tom M. Mitchell	Machine Learning	MGH	2014
2.	Stuart Russell and Peter Norvig	Artificial Intelligence A Modern Approach	Pearson Education, Third Edition	2022

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	E. Rich and K.Knight	Artificial Intelligence, 3rd Edition	TMH	1991
2.	Patrick Henny Winston	Artificial Intelligence, 3rd Edition	Pearson Education	1992
3.	Shivani Goel	Artificial Intelligence	Pearson Education	2013
4.	Patterson	Artificial Intelligence and Expert systems	Pearson Education	2015
5.	Stephen Marshland	Algorithmic Perspective	Taylor & Francis	2014

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23CSF26	CCNA–ROUTING AND SWITCHING ESSENTIALS	L	T	P	C
		3	0	0	3

Course Objective:

- To discuss the concepts of primary switched networks and Configuration
- To describe the concepts of VLAN and routing concepts
- To illustrate Inter-VLAN Routing and static routing concepts
- To describes the architecture, components, and operation of routers and explains the principles of routing and routing protocols
- To analyze, configure, verify, and troubleshoot the primary routing protocols RIPv1, RIPv2, EIGRP, and OSPF with analyzing the routing process

Course Outcomes:

23CSF26.CO1	Describe the purpose, nature, and operations of a router; describe the purpose and nature of routing tables.
23CSF26.CO2	Describe the purpose and procedure of configuring static routes.
23CSF26.CO3	Develop Inter-VLAN Routing and static routing based applications.
23CSF26.CO4	Design and implement a classless IP addressing scheme for a given network.
23CSF26.CO5	Describe the basic features and concepts of link-state routing protocols to configure and verify the RIPv1, RIPv2, single area OSPF, and EIGRP operations in a small routed network.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSF26.CO1	X	X	-	X	X	-	-	-	-	-	-	X	-	X	-
23CSF26.CO2	X	-	X	X	X	-	X	X	-	-	X	-	-	-	-
23CSF26.CO3	X	-	X	X	X	-	-	-	X	-	X	-	-	X	-
23CSF26.CO4	X	-	X	X	X	-	X	-	-	-	X	-	-	-	X
23CSF26.CO5	X	X	-	X	X	X	-	-	X	-	X	-	X	-	-

Unit-I **9**

Introduction to Switched Networks-Objectives-Key Terms-Introduction-LAN Design The Switched Environment. Basic Switching Concepts and Configuration-Objectives-Key Terms Introduction-Basic Switch Configuration-Configure Switch Ports-Switch Security: Management and Implementation.

Unit-II **9**

VLANs Objectives-Key Terms-Introduction-VLAN Segmentation-VLANs in a Multiswitched Environment- VLAN Implementations-VLAN Trunks-Dynamic Trunking Protocol-Troubleshoot VLANs and Trunks-VLAN Security and Design-Design Best Practices for VLANs Routing Concepts-Objectives-Key Terms- Introduction-Functions of a Router Connect Devices-Basic Settings on a Router-Verify Connectivity of Directly Connected-Networks Switching Packets Between Networks-Path Determination-Analyze the Routing Table-Directly Connected RoutesStatically Learned Routes- Dynamic Routing Protocols.

Unit-III **9**

Inter-VLAN Routing-Objectives-Key Terms-Introduction-Inter-VLAN Routing Configuration Configure Legacy Inter-VLAN Routing-Configure Router-on-a-Stick Inter-VLAN Routing Troubleshoot Inter-VLAN Routing-Layer 3 Switching-Troubleshoot Layer 3 Switching. Static Routing-Objectives-Key Terms- Introduction-Static Routing-Types of Static Routes-Configure IPv4 Static Routes-Configure IPv4 Default Routes-Configure IPv6 Static Routes -Configure IPv6 Default Routes-Review of CIDR and VLSM-CIDR-VLSM-Configure IPv6.

Unit-IV **9**

Routing Dynamically-Routing Dynamically-Dynamic Routing Protocol-Operation Dynamic Versus Static Routing-Routing Protocol Operating Fundamentals-Types of Routing Protocols - Distance Vector Routing Protocol Operation-Types of Distance Vector Routing Protocols-RIP and RIPng Routing-Configuring the RIPng Protocol-Link-State Dynamic Routing Single-Area OSPF-Characteristics of OSPF-OSPF Messages- OSPF Operation-Configuring Single-Area-OSPFv2.

Unit-V **9**

Access Control Lists-IP ACL Operation-Standard Versus Extended IPv4 ACLS-Wildcard Masks in ACLs-Guidelines for ACL Creation- Securing VTY Ports with a Standard IPv4 ACL-IPv6 ACLs. DHCP-Dynamic Host Configuration Protocol v4-Configuring a Basic DHCPv4 Server Configure DHCPv4 Client-Troubleshoot DHCPv4. Network Address Translation for IPv4 - NAT Operation-Types of NAT-Benefits of NAT- Configuring NAT-Configuring Dynamic NAT Configuring- Port Address Translation (PAT)-Port Forwarding.

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Todd Laemmle	CCNA Routing and Switching Study Guide	Wiley; 1 edition	2013
2.	Wendell Odom	Cisco Ccnet/CCNA" Icnd1 100 - 101 Official Cert Guide	Pearson Education	2013

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Wendell Odom	Cisco CCNA Routing and Switching" Icnd2 200 - 101 Official Cert Guide	Pearson Education, 1st Edition	2013
2.	Kevin Wallace	CCNP Routing and Switching ROUTE" 300-101 Official Cert Guide	Cisco Press	2014

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23CSF27	BIG DATA AND ITS APPLICATIONS	L	T	P	C
		3	0	0	3

Course Objective:

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

Course Outcomes:

23CSF27.CO1	Work with big data tools and its analysis techniques.
23CSF27.CO2	Analyze data by utilizing clustering and classification algorithms.
23CSF27.CO3	Learn and apply different mining algorithms and recommendation systems for large volumes of data.
23CSF27.CO4	Perform analytics on data streams.
23CSF27.CO5	Learn NoSQL databases and management.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSF27.CO1	X	X	-	X	-	X	-	X	X	X	-	X	X	-	X
23CSF27.CO2	X	-	-	-	-	X	X	X	X	X	-	X	-	X	-
23CSF27.CO3	X	-	-	X	-	X	-	X	-	X	-	-	X	-	-
23CSF27.CO4	-	X	-	-	-	-	-	X	X		-	X	-	-	X
23CSF27.CO5	X	X	-	X	-	-	X	X	X	X	-	-	X	-	-

Unit-I INTRODUCTION TO BIG DATA **9**

Evolution of Big data — Best Practices for Big data Analytics — Big data characteristics — Validating — The Promotion of the Value of Big Data — Big Data Use Cases- Characteristics of Big Data Applications — Perception and Quantification of Value -Understanding Big Data Storage — A General Overview of High-Performance Architecture — HDFS — MapReduce and YARN — Map Reduce Programming Model.

Unit-II CLUSTERING AND CLASSIFICATION **9**

Advanced Analytical Theory and Methods: Overview of Clustering — K-means — Use Cases — Overview of the Method-Determining the Number of Clusters — Diagnostics — Reasons to Choose and Cautions .- Classification: Decision Trees Overview of a Decision Tree — The General Algorithm — Decision Tree Algorithms — Evaluating a Decision Tree — Decision Trees in R — Naïve Bayes — Bayes? Theorem — Naïve Bayes Classifier.

Unit-III ASSOCIATION AND RECOMMENDATION SYSTEM **9**

Advanced Analytical Theory and Methods: Association Rules — Overview — Apriori Algorithm — Evaluation of Candidate Rules — Applications of Association Rules — Finding Association& finding similarity — Recommendation System: Collaborative Recommendation- Content Based Recommendation — Knowledge Based Recommendation- Hybrid Recommendation Approaches.

Unit-IV STREAM MEMORY **9**

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

Analytics

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

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

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Anand Rajaraman and Jeffrey David Ullman	Mining of Massive Datasets	Cambridge University Press	2012
2.	David Loshin	Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph	Morgan Kaufmann/El sevier Publishers	2013

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	EMC Education Services	Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data	Wiley publishers	2015
2.	Bart Baesens	Analytics in a Big Data World: The Essential Guide to Data Science and its Applications	Wiley Publishers	2015
3.	Dietmar Jannach and Markus Zanker	Recommender Systems: An Introduction	Cambridge University Press	2000
4.	Kim H. Pries and Robert Dunnigan	Big Data Analytics: A Practical Guide for Managers	CRC Press	2015
5.	Jimmy Lin and Chris Dyer	Data-Intensive Text Processing with MapReduce", Synthesis Lectures on Human Language Technologies, Vol. 3, No. 1, Pages 1-177	Morgan Claypool publishers	2010

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23CSF28	SERVICE ORIENTED ARCHITECTURE	L	T	P	C
		3	0	0	3

Course Objective:

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

Course Outcomes:

23CSF28.CO1	Understand XML technologies.
23CSF28.CO2	Understand service orientation, benefits of SOA.
23CSF28.CO3	Understand web services and WS standards.
23CSF28.CO4	Use web services extensions to develop solutions.
23CSF28.CO5	Understand and apply service modeling, service oriented analysis and design for application development.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSF28.CO1	-	-	X	X	X	-	-	X	-	-	X	-	X	-	-
23CSF28.CO2	X	-	X	X	X	-	X	-	-	-	X	-	-	-	X
23CSF28.CO3	-	X	X	-	X	-	X	-	-	-	-	-	-	X	-
23CSF28.CO4	-	-	X	X	X	-	X	-	-	-	-	-	X	-	-
23CSF28.CO5	-	-	X	-	X	-	X	-	-	-	X	-	-	X	-

Unit-I XML **9**

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

Unit-II SOA BASICS **9**

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

Unit-III WEB SERVICE STANDARDS **9**

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

Unit-IV WEB SERVICE EXTENSIONS **9**

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

Unit-V SERVICE ORIENTED DESIGN **9**

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

Total Periods: 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 , JamesWebber	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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23CSF29	DATA ANALYTICS USING R AND PYTHON	L	T	P	C
		3	0	0	3

Course Objective:

- Understand the important keywords in R like Business Intelligence, Business Analytics
- 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
- Apply the basic concepts of clustering techniques in real time application
- Implement the Practical Data Science Using Python
- Construct using Numpy, pandas and Jupyter Notebook environment for writing, testing, and debugging Python code

Course Outcomes:

23CSF29.CO1	Understand the basics in R programming in terms of constructs, control statements, string functions.
23CSF29.CO2	Apply critical programming language concepts such as data types, iteration, control structures, functions, and boolean operators.
23CSF29.CO3	Implement a variety of data formats into R using RStudio.
23CSF29.CO4	Analyze a data set in numpy and pandas.
23CSF29.CO5	Visualize data attributes using matplotlib and other R packages.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSF29.CO1	X	X	-	-	-	-	-	-	-	-	-	-	X	X	-
23CSF29.CO2	X	-	X	-	X	-	-	-	-	-	-	X	-	-	-
23CSF29.CO3	X	-	-	X	X	-	-	-	-	-	-	-	-	X	-
23CSF29.CO4	-	X	X	X	X	-	-	-	X	-	-	X	-	X	X
23CSF29.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

Clustering – types, Cluster analysis, techniques - Partitioning methods, Hierarchical clustering, Fuzzy clustering, Density-based clustering, Model-based clustering.

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 Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Gareth James,Daniela Written	An introduction to statistical learning 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	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	2019

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23CSF30	THEORY OF COMPUTATION	L	T	P	C
		3	0	0	3

Course Objective:

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

Course Outcomes:

23CSF30.CO1	Design Finite Automata using its theoretical concept.
23CSF30.CO2	Convert Regular expressions to FA and minimize Automata.
23CSF30.CO3	Simplify CFG to CNF and GNF.
23CSF30.CO4	Design PDA for the Given Grammar.
23CSF30.CO5	Construct Turing Machine for given grammar.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSF30.CO1	X	X	X	-	-	-	-	-	-		-		X	X	-
23CSF30.CO2	X	X	-	-	X	-	-	-	-	-	-	-	X	X	-
23CSF30.CO3	X	X	X	-	-	-	-	-	-	-	-	-	-	X	X
23CSF30.CO4	X	X	X	-	-	-	-	-	-	-	-	-	-	X	X
23CSF30.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

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–**Chomsky hierarchy of languages. -Types of Grammar-**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.

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.

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 Periods: 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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23CSF31	CRYPTOGRAPHY AND NETWORK SECURITY	L	T	P	C
		3	0	0	3

Course Objective:

- To understand basics of Cryptography and Network Security
- To be able to secure a message over insecure channel by various means
- To learn about how to maintain the Confidentiality, Integrity and Availability of a data
- To gain the principles of public key cryptosystems, hash functions and digital signature
- To understand various protocols for network security to protect against the threats in the networks

Course Outcomes:

23CSF31.CO1	Provide security of the data over the network.
23CSF31.CO2	Do research in the emerging areas of cryptography and network security.
23CSF31.CO3	Implement various networking protocols.
23CSF31.CO4	Protect any network from the threats in the world.
23CSF31.CO5	Design various Security practices and System security standards.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSF31.CO1	X	-	-	X	X	-	X	-	X	-	-	-	X	-	-
23CSF31.CO2	X	-	-	-	-	X	-	X	X	X	-	-	X		-
23CSF31.CO3	X	X	X	-	-	X	-	X	X	X	-	-	-	X	-
23CSF31.CO4	X	X	X	X	X	-	-	-	X	X	X	X	-	X	X
23CSF31.CO5	X	X	X	X	X	-	X	-	X	X	X	X	-	X	X

Unit-I INTRODUCTION TO CRYPTOGRAPHY 9

Introduction to security attacks - services and mechanism - introduction to cryptography - Conventional Encryption: Conventional encryption model - classical encryption techniques - substitution ciphers and transposition ciphers – cryptanalysis – steganography - stream and blockciphers - Modern Block Ciphers: Block ciphers principals - Shannon's theory of confusion anddiffusion - fiestal structure - data encryption standard(DES) - strength of DES - differential and linearcrypt analysis of DES - block cipher modes of operations - triple DES – AES.

Unit-II CONFIDENTIALITY AND MODULAR ARITHMETIC 9

Confidentiality using conventional encryption - traffic confidentiality - key distribution - random number generation - Introduction to graph - ring and field - prime and relative prime numbers - modular arithmetic - Fermat's and Euler's theorem - primality testing - Euclid's Algorithm - Chinese Remainder theorem - discrete algorithms.

Unit-III UBLIC KEY CRYPTOGRAPHY AND AUTHENTICATION REQUIREMENTS 9

Principles of public key crypto systems - RSA algorithm - security of RSA - key management – Diffle- Hellman key exchange algorithm - introductory idea of Elliptic curve cryptography – Elgamel encryption - Message Authentication and Hash Function: Authentication requirements - authentication functions - message authentication code - hash functions - birthday attacks – security of hash functions and MACS.

Unit-IV INTEGRITY CHECKS AND AUTHENTICATION ALGORITHMS 9

MD5 message digest algorithm - Secure hash algorithm (SHA) Digital Signatures: Digital Signatures - authentication protocols - digital signature standards (DSS) - proof of digital signature algorithm - Authentication Applications: Kerberos and X.509 - directory authentication service - electronic mail security- pretty good privacy (PGP) - S/MIME.

Unit-V IP SECURITY AND SYSTEM SECURITY 9

IP Security: Architecture - Authentication header - Encapsulating security payloads - combining security associations - key management-Web Security: Secure socket layer and transport layer security - secureelectronic transaction (SET) - System Security: Intruders - Viruses and related threads - firewall design principals – trusted systems.

Total Periods: 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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23CSF32	CRYPTOGRAPHY AND NETWORK SECURITY LABORATORY	L	T	P	C
		0	0	2	1

Course Objective:

- To know different cipher techniques
- Develop the Various Security Algorithm
- To study network security tools and vulnerability assessment tools
- To generate different open source tools for network security and analysis
- Develop the Various Security Algorithm

Course Outcomes:

23CSF32.CO1 Develop code for classical Encryption Techniques to solve the problems.

23CSF32.CO2 Build cryptosystems by applying symmetric and public key encryption algorithms.

23CSF32.CO3 Construct code for authentication algorithms.

23CSF32.CO4 Develop a signature scheme using Digital signature standard.

23CSF32.CO5 Demonstrate the network security system using open source tools.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSF32.CO1	X	-	-	X	X	-	X	-	X	-	-	-	X	-	-
23CSF32.CO2	X	-	-	-	-	X	-	X	X	X	-	-	X		-
23CSF32.CO3	X	X	X	-	-	X	-	X	X	X	-	-	-	X	-
23CSF32.CO4	X	X	X	X	X	-	-	-	X	X	X	X	-	X	X
23CSF32.CO5	X	X	X	X	X	-	X	-	X	X	X	x	-	X	X

Sl.No.	List of Experiments
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.	Automated Attack and Penetration Tools Exploring N-Stalker, a Vulnerability Assessment Tool
11.	Defeating Malware i) Building Trojans ii) Rootkit Hunter

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Total Periods: 30

23CSF33	MACHINE LEARNING TECHNIQUES	L	T	P	C
		3	0	0	3

Course Objective:

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

Course Outcomes:

23CSF33.CO1	Differentiate between supervised, unsupervised, semi-supervised machine learning approaches.
23CSF33.CO2	Discuss the decision tree algorithm and identity and overcome the problem of overfitting.
23CSF33.CO3	Discuss and apply the back propagation algorithm and genetic algorithms to various problems.
23CSF33.CO4	Apply the Bayesian concepts to machine learning.
23CSF33.CO5	Analyse and suggest appropriate machine learning approaches for various types of problems.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSF33.CO1	X	X	-	-	X	X	-	X	X	-	X	-	X	X	-
23CSF33.CO2	X	X	X	X	X	X	-	X	-	X	X	X	X	X	X
23CSF33.CO3	X	X	-	X	-	X	-	X	X	X	X	-	X	-	X
23CSF33.CO4	X	X	X	X	X	-	X	X	-	X	X	X	-	X	X
23CSF33.CO5	X	X	X	X	-	-	X	X	X	X	X	X	X	X	X

Unit-I INTRODUCTION **9**

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

Unit-II NEURAL NETWORKS AND GENETIC ALGORITHMS **9**

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

Unit-III BAYESIAN AND COMPUTATIONAL LEARNING **9**

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

Unit-IV INSTANT BASED LEARNING **9**

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

Unit-V ADVANCED LEARNING **9**

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

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Tom M. Mitchell	Machine Learning	McGraw-Hill Education (India) Private Limited	2013

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Ethem Alpaydin	Introduction to Machine Learning (Adaptive Computation and Machine Learning),	The MIT Press	2016
2.	Stephen Marsland	Machine Learning: An Algorithmic Perspective	CRC Press	2009

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23CSF34	DATA ANALYTICS AND MODELING TECHNIQUES	L	T	P	C
		3	0	0	3

Course Objective:

- To understand the basic principles of Data Analytics
- To learn the various Data Analytic methods
- To understand the various clustering algorithms and its application on data
- To work with stream data model and computing
- To understand the advanced techniques in Data Analytics

Course Outcomes:

23CSF34.CO1	Evaluate the use of data from acquisition through cleaning, warehousing, analytics, and visualization to the ultimate business decision.
23CSF34.CO2	Mine data and carry out predictive modeling and analytics to support business decision-making.
23CSF34.CO3	Suggest prescriptive modeling techniques for real-world problems.
23CSF34.CO4	Execute real-time analytical methods on streaming datasets to react quickly to customer needs.
23CSF34.CO5	Demonstrate the advanced techniques in data analytics.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSF34.CO1	X	-	-	X	X	-	X	-	X	-	-	-	X	-	-
23CSF34.CO2	X	-	-	-	-	X	-	X	X	X	-	-	X		-
23CSF34.CO3	X	X	X	-	-	X	-	X	X	X	-	-	-	X	-
23CSF34.CO4	X	X	X	X	X	-	-	-	X	X	X	X	-	X	X
23CSF34.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.

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 - Tabular Stores - Object Data Stores - Graph Databases Hive-Sharding-Hbase - Analyzing big data with twitter - Big data for E-Commerce - Big data for blogs - Review of Basic Data Analytic Methods using R.

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Jiawei Han, Micheline Kamber, 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, Graph"	Elsevier, Morgan Kaufmann	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.	2021
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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23CSF35	SOFTWARE PROJECT MANAGEMENT	L	T	P	C
		3	0	0	3

Course Objective:

- 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:

23CSF35.CO1	Able to practice the process of project management and its application in delivering successful projects.
23CSF35.CO2	Deconstructing the activities in the project management.
23CSF35.CO3	Evaluate the risks and hazards in the project management.
23CSF35.CO4	Apprise the right person to managing people and organizing team.
23CSF35.CO5	Evaluate a project to develop the scope of work, provide accurate effort estimation methods for software.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSF35.CO1	X	X	-	-	-	X	X	-	-	-	X	-	X	-	-
23CSF35.CO2	X	X	X	-	X	-	-	-	X	-	-	-	X	-	-
23CSF35.CO3	-	-	-	-	-	X	X	-	-	-	X	-	-	X	-
23CSF35.CO4	-	-	-	-	X	X	X	-	X	-	X	-	-	X	-
23CSF35.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.

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 Periods: 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 Software Project 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 practices tools 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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23CSF36	PRINCIPLES OF PROGRAMMING LANGUAGES	L	T	P	C
		3	0	0	3

Course Objective:

- 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:

23CSF36.CO1	Acquire the skills for expressing syntax and semantics in formal notation.
23CSF36.CO2	Explain Names, Bindings, and Scopes of programming languages.
23CSF36.CO3	Illustrate the concept of subprogram.
23CSF36.CO4	Demonstrate the concepts of concurrency.
23CSF36.CO5	Summarize the concept of functional programming language.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSF36.CO1	X	X	-	-	-	X	X	-	-	-	X	-	X	-	-
23CSF36.CO2	X	X	X	-	X	-	-	-	X	-	-	-	X	-	-
23CSF36.CO3	-	-	-	-	-	X	X	-	-	-	X	-	-	X	-
23CSF36.CO4	-	-	-	-	X	X	X	-	X	-	X	-	-	X	-
23CSF36.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, and 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, and 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 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 Periods: 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 Dream tech	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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23CSF37	DISTRIBUTED OPERATING SYSTEMS	L	T	P	C
		3	0	0	3

Course Objective:

- 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:

23CSF37.CO1	Overview of Distributed Operating Systems.
23CSF37.CO2	Understand the concepts of communication in distributed operating systems.
23CSF37.CO3	Know how the memory are shared and synchronization in DOS.
23CSF37.CO4	Access resources in DOS and handling files in DOS.
23CSF37.CO5	Describe the security level in DOS.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSF37.CO1	X	X	-	-	-	X	X	-	-	-	X	-	X	-	-
23CSF37.CO2	X	X	X	-	X	-	-	-	X	-	-	-	X	-	-
23CSF37.CO3	-	-	-	-	-	X	X	-	-	-	X	-	-	X	-
23CSF37.CO4	-	-	-	-	X	X	X	-	X	-	X	-	-	X	-
23CSF37.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 Periods: 45

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 practices tools 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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23CSF38	PC HARDWARE ASSEMBLY AND TROUBLE SHOOTING	L	T	P	C
		3	0	0	3

Course Objective:

- To study the essential parts of a computer in detail
- Introduce various peripheral devices available for computers and their detailed working concepts
- Overview of multiple interfaces and another hardware overview
- Assemble/set up and upgrade personal computer systems and discuss power supplies and the skills to troubleshoot various power-related problems
- To check the installation/connection and maintenance of the computer and its associated peripherals

Course Outcomes:

23CSF38.CO1	Identify the main components for the PC, familiarize themselves with PC memories such as RAM and ROM devices and so on.
23CSF38.CO2	Identify various peripheral devices available and their working.
23CSF38.CO3	Understand various concepts of hardware and its interface and control.
23CSF38.CO4	Perform basic installation of PC. The importance of maintenance is understood.
23CSF38.CO5	Understand overall PC hardware, interfacing, maintenance and troubleshooting.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSF38.CO1	X	X	-	-	-	X	X	-	-	-	X	-	X	-	-
23CSF38.CO2	X	X	X	-	X	-	-	-	X	-	-	-	X	-	-
23CSF38.CO3	-	-	-	-	-	X	X	-	-	-	X	-	-	X	-
23CSF38.CO4	-	-	-	-	X	X	X	-	X	-	X	-	-	X	-
23CSF38.CO5	-	X	-	X	X	-	-	-	-	-	X	X	X	-	-

Unit-I INTRODUCTION 9

Introduction - Computer Organization – Number Systems and Codes – Memory – ALU – CU – Instruction prefetch – Interrupts – I/O Techniques – Device Controllers – Error Detection Techniques – Microprocessor – Personal Computer Concepts – Advanced System Concepts – Microcomputer Concepts – OS – Multitasking and Multiprogramming – Virtual Memory – Cache Memory – Modern PC and User.

Unit-II PERIPHERAL DEVICES 9

Introduction – Keyboard – CRT Display Monitor – Printer – Magnetic Storage Devices – FDD – HDD – Special Types of Disk Drives – Mouse and Trackball – Modem – Fax-Modem – CD ROM Drive – Scanner – Digital Camera – DVD – Special Peripherals.

Unit-III PC HARDWARE OVERVIEW 9

Introduction – Hardware BIOS DOS Interaction – The PC family – PC hardware – Inside the System Box – Motherboard Logic – Memory Space – Peripheral Interfaces and Controllers – Keyboard Interface – CRT Display interface – FDC – HDC.

Unit-IV INSTALLATION AND PREVENTIVE MAINTENANCE 9

Introduction – system configuration – pre installation planning – Installation practice – routine checks – PC Assembling and integration – BIOS setup – Engineering versions and compatibility – preventive maintenance – DOS – Virus – Data Recovery.

Unit-V TROUBLESHOOTING 9

Introduction – computer faults – Nature of faults – Types of faults – Diagnostic programs and tools – Microprocessor and Firmware – Programmable LSI" s – Bus Faults – Faults Elimination process – Systematic Troubleshooting – Symptoms observation and analysis – fault diagnosis – fault rectification – Troubleshooting levels – FDD, HDD, CDROM Problems.

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	B. Govindarajalu	IBM PC Clones Hardware, Troubleshooting and Maintenance	2/E, TMH	2002

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Peter Abel, Niyaz Nizamuddin	IMB PC Assembly Language and Programming	Pearson Education	2007
2.	Scott Mueller	Repairing PC's	PHI	1995

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23CSE01	INTERNET OF THINGS	L	T	P	C
		3	0	0	3

Course Objective:

- 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:

23CSE01.CO1 Summarize the underlying architectures and models in IoT.

23CSE01.CO2 Analyze various protocols for IoT at the different layers for IoT.

23CSE01.CO3 Apply the web of things and cloud of things Models.

23CSE01.CO4 Develop different models for network dynamics.

23CSE01.CO5 Study the needs and suggest appropriate solutions for Industrial applications.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE01.CO1	X	-	X	-	X	-	-	X	-	X	-	X	X	X	-
23CSE01.CO2	X	X	-	-	X	-	-	X	X	X	-	-	X	-	-
23CSE01.CO3	X	X	X	X	-	X	-	-	X	X	X	X	-	X	-
23CSE01.CO4	X	X	X	X	-	X	-	-	X	X	X	-	X	-	X
23CSE01.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**

Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Issues with IoT Standardization – Unified Data Standards – Protocols – IEEE 802.15.4 – BACNet Protocol – Modbus – KNX – Zigbee Architecture – Network layer – APS layer – Security.

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.

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, Synchronization and Software Agents. Applications - Smart Grid – Electrical Vehicle Charging.

Total Periods: 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 oswarthick, 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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23CSE02	INTERNET OF THINGS LABORATORY	L	T	P	C
		0	0	2	1

Course Objective:

- 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:

23CSE02.CO1 Summarize the underlying architectures and models in IoT.

23CSE02.CO2 Analyze various protocols for IoT at the different layers for IoT.

23CSE02.CO3 Apply the web of things and cloud of things Models.

23CSE02.CO4 Develop different models for network dynamics.

23CSE02.CO5 Study the needs and suggest appropriate solutions for Industrial applications.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE02.CO1	X	-	X	-	X	-	-	X	-	X	-	X	X	X	-
23CSE02.CO2	X	X	-	-	X	-	-	X	X	X	-	-	X	-	-
23CSE02.CO3	X	X	X	X	-	X	-	-	X	X	X	X	-	X	-
23CSE02.CO4	X	X	X	X	-	X	-	-	X	X	X	-	X	-	X
23CSE02.CO5	X	X	X	X	-	X	-	-	X	X	X	X	X	X	-

Sl.No.	List of Experiments
1.	Building basic circuit diagrams using breadboard and Working of a Multimeter
2.	Simple circuit using IC on breadboard
3.	Simple Relay circuit design for ON-OFF condition
4.	Switch on an LED if a button is pressed
5.	Changing brightness of LED using potentiometer
6.	Change the brightness of LED (Fade in/ Fade out) using PWM
7.	DC motor speed control using serial communication
8.	Interfacing Wi-Fi module with Arduino
9.	Sending information about the patient in home to the doctor's PC/mobile
10.	Design a simple circuit to measure the pH value of wastewater
11.	Design a simple circuit to maintain the CO2 level inside the room
12.	Design a simple circuit to apply Hall effect sensor

Total Periods: 30

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23CSE03	ADVANCED DATA STRUCTURES	L	T	P	C
		3	0	0	3

Course Objective:

- To review the basic data structures such as list, stack & queue and introduce concurrency on them
- To learn advanced search structures such as Splay tree, Red Black trees, Multi way search tree and Skip lists
- To study advanced heap structures such as Leftist Heaps, Binomial Heaps and Fibonacci Heaps
- To introduce various advanced concurrent structures
- To learn the various advanced algorithms

Course Outcomes:

23GES06.CO1 Explain the laws and theorems of electrical networks.

23GES06.CO2 Outline the parameters of AC circuits.

23GES06.CO3 Explain the constructional features of electric machines.

23GES06.CO4 Illustrate the characteristics of semiconductor diodes.

23GES06.CO5 Explain the Characteristics of transistors and opto-electronic devices.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE03.CO1	X	X	X	-	-	-	-	-	-	-	-	-	X	X	-
23CSE03.CO2	X	X	X	-	-	-	-	-	-	-	-	-	X	X	-
23CSE03.CO3	-	X	X	-	X	-	-	-	-	-	-	-	X	X	-
23CSE03.CO4	-	X	X	-	X	-	-	-	-	-	-	X	-	X	-
23CSE03.CO5	-	-	X	X	X	-	-	-	-	-	-	-	X	X	-

Unit-I DATA STRUCTURES AND CONCURRENCY 9

Review of elementary data structures – data structures and concurrency – locking linked lists – coarse-grained synchronization – fine-grained synchronization – lazy synchronization – non-blocking synchronization – concurrent queues – bounded partial queues – unbounded lock-free queues – dual data structures – concurrent stacks – elimination back off stack.

Unit-II ADVANCED SEARCH STRUCTURES 9

Binary Search tree - Splay tree - Red Black trees – Interval tree - 2-D tree – Digital Search tree – Multi wayTrie - Skip lists.

Unit-III ADVANCED HEAP STRUCTURES 9

Min heap - Min-Max heap - Double ended heap – Leftist Heaps - Binomial Heaps – Fibonacci Heaps – SkewHeaps - Interval Heap.

Unit-IV ADVANCED CONCURRENT STRUCTURES 9

Concurrent hashing – closed-address hash sets – lock-free hash sets – open-addressed hash sets – lock-based concurrent skip lists – lock-free concurrent skip lists – concurrent priority queues – bounded priority queue – unbounded priority queue – concurrent heap – skip list based unbounded priority queues.

Unit-V 9

Introduction to Approximation algorithms: Vertex cover - Travelling Salesman Problem - knapsack problem. Introduction to Randomized algorithms – Randomized Searching and Sorting - Online hiring problem.

Introduction to Parallel algorithms – parallel sorting algorithms - Odd-even transposition sort - Quick sort based parallel sort.

Total Periods: 45

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	S.K. Chang	Data Structures and Algorithms– Series of Software Engineering and Knowledge Engineering.	World Scientific Publishing	2003
2.	M. Herlihy and N. Shavit, Morgan Kaufmann	The Art of Multiprocessor Programming	Pearson education	2012
3.	E. Horowitz, S.Sahni and Dinesh Mehta	Fundamentals of Data structures in C++	Universities Press	2007
4.	Thomas H Cormen, Charles E Leiserson, Ronald L Rivest and Clifford Stein	Introduction to Algorithms	Prentice Hall of India, New Delhi	2007
5.	Michael J. Quinn	Parallel Computing: Theory & Practice	Tata McGraw Hill Edition.	2003

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23CSE04	SERVLETS AND JSP	L	T	P	C
		3	0	0	3

Course Objective:

- To Explain the concepts required for developing the web applications using Servlets
- To Introduce concepts of JSP
- To Discuss in detail, the scripting elements and directives in JSP
- To Illustrate the development of Simple and advanced custom tags
- To Discuss the use of Java Beans and its real world applications

Course Outcomes:

23CSE04.CO1	Construct and deploy small-to-medium scale web by using Java Server Page technology and servlets.
23CSE04.CO2	Apply Model-View-Controller architecture to develop projects.
23CSE04.CO3	Understand and manage JSP action and custom tags.
23CSE04.CO4	Analyze, design, develop and deploy web applications using Java Beans.
23CSE04.CO5	Able to do server side programming with Java Servlets, JSP and PHP and client side scripting using java Script and DHTML.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE04.CO1	X	X	-	-	X	X	-	X	X	-	X	-	X	X	-
23CSE04.CO2	X	X	X	X	X	X	-	X	-	X	X	X	X	X	X
23CSE04.CO3	X	X	-	X	-	X	-	X	X	X	X	-	X	-	X
23CSE04.CO4	X	X	X	X	X	-	X	X	-	X	X	X	-	X	X
23CSE04.CO5	X	X	X	X	-	-	X	X	X	X	X	X	X	X	X

Unit-I SERVLETS 9

Web Application - Java Servlets - Servlet Lifecycle – Servlet API-Servlet Interface-Http Servlet Class - Generic Servlet Class, Servlet Config, Servlet Context, Servlet Communication-ServletBrowser Communication, Web-Component Communication, Servlet-Applet Communication, Session Tracking, Web Security.

Unit-II INTRODUCTION TO JSP 9

Introduction to Java Server Pages - Features of JSP – JSP Tag Library-Life Cycle of JSP-SyntaxDirectives-Actions-Implicit Objects - Client request - Server response - Cookies Handling-Session Tracking-MVC Architecture - 3-tier architecture.

Unit-III JSP SCRIPTING ELEMENTS AND DIRECTIVES 9

Forms of Scripting Elements - Predefined Variables - Examples using Scripting Elements - SP Directives - JSP Page Directive - JSP Include Di.

Unit-IV JSP ACTIONS AND CUSTOM TAGS 9

JSP Actions - include Action - forward Action - plugin Action - Java Beans - Bean Related – Actions - Custom Tag - Types of Tags - Creating Custom Tags.

Unit-V ADVANCE CUSTOM TAGS AND JSTL 9

Introduction - Using Simple Tag - Using tag files - JSP Standard Tag Library – purpose JSTL - Using Expression Language - Using JSTL.

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Joel Murach and Michael Urban	Murachs Java Servlets & JSP	Murachs Books, 3rd Edition	2014
2.	Mahesh P. Matha	JSP and Servlets: A Comprehensive Study	Prentice-Hall of India Pvt.Ltd	2013
3.	Giulio Zambon	Beginning JSP, JSF and Tomcat: Java Web Development	Apress Kindle edition	2012

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Santosh Kumar K	Jdbc, Servlets, And Jsp Black Book	Dreamtech Press, New edition	2008
2.	Panduranga, S.N., Goyal	Beginning Jsp 2	Springer/A Press	2004
3.	Phil Hanna	The Complete reference JSP 2.0	Tata McGraw-Hill Education	2003

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23CSE05	WEB TECHNOLOGIES LABORATORY	L	T	P	C
		0	0	2	1

Course Objective:

- To develop an ability to design and implement static and dynamic website
- Choose best technologies for solving web client/server problems
- Develop interactive Web applications using Node JS and Express JS
- Create website using server side scripting language PHP
- Develop Data base applications using Mongo DB/MySQL

Course Outcomes:

23CSE05.CO1	Design Static Web pages and Dynamic Web pages using HTML and validate with JavaScript respectively.
23CSE05.CO2	Identify the best technologies for solving web client/server problems.
23CSE05.CO3	Develop interactive Web applications using Node JS and ExpressJS.
23CSE05.CO4	Create website using server side scripting language PHP.
23CSE05.CO5	Demonstrate the CRUD application using Flask and MongoDB.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE05.CO1	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X
23CSE05.CO2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
23CSE05.CO3	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X
23CSE05.CO4	X	X	X	X	X	X	X	-	-	X	X	X	X	X	X
23CSE05.CO5	X	X	X	X	X	X	X	-	-	-	X	X	X	X	X

Sl.No.	List of Experiments
1.	Design Static Webpage using HTML Components
2.	Design Webpage using CSS
3.	Create Dynamic Webpage using JavaScript
4.	Develop Dynamic Webpage Using PHP Script
5.	Develop PHP application with Database connection
6.	Implement Modules in NodeJS
7.	Develop mini application using Express and NodeJS
8.	Implement HTTP methods using Flask
9.	Implement Sessions concept using Flask
10.	Develop CRUD operations using MongoDB
11.	Develop Main Project using Python/Express and MongoDB/MySql

Total Periods: 30

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23CSE06	SALESFORCE CRM AND PLATFORM	L	T	P	C
		3	0	0	3

Course Objective:

- Develop a fundamental grasp of Salesforce as a CRM solution and a flexible platform, including its administrative tools and customizable features for practical use
- Utilize Salesforce's administrative capabilities and configurable options effectively to meet business needs
- Implement custom business logic using Apex triggers and classes, leveraging SOQL and DML operations for tailored solutions
- Explain the functioning of trigger code within Salesforce's Save Order of Execution and transaction framework
- Demonstrate the customization of the user interface using Visualforce markup code

Course Outcomes:

23CSE06.CO1	Gain proficiency in Salesforce platform fundamentals.
23CSE06.CO2	Utilize Salesforce's customizable features to streamline business processes.
23CSE06.CO3	Employ Apex Programming and Visual force for tailored solutions.
23CSE06.CO4	Create Apex programs incorporating SOQL and DML operations, as well as testing and executing Triggers.
23CSE06.CO5	Implement Visual force pages alongside diverse controllers for enhanced functionality.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE06.CO1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
23CSE06.CO2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
23CSE06.CO3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
23CSE06.CO4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
23CSE06.CO5	X	X	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.

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 Periods: 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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23CSE07	SALESFORCE CRM AND PLATFORM LABORATORY	L	T	P	C
		0	0	2	1

Course Objective:

- 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:

23CSE07.CO1 Analyze salesforce platform and Developer console basics.

23CSE07.CO2 Enhance the SOQL database, .net, and visual force.

23CSE07.CO3 Apply Apex basic for Admin and Trigger.

23CSE07.CO4 Create conference management application.

23CSE07.CO5 Implement visualforce application with the lightning design system.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE07.CO1	X	X	X	X	X	-	-	X	-	X	X	X	X	X	X
23CSE07.CO2	X	X	X	X	X	X	-	X	X	-	X	X	X	X	-
23CSE07.CO3	X	X	X	X	-	X	-	X	X	X	X	X	X	X	X
23CSE07.CO4	X	X	X	X	X	X	-	X	X	-	-	X	X	X	X
23CSE07.CO5	X	X	X	X	X	X	-	X	X	-	X	X	X	X	X

Sl.No.	List of Experiments
1.	Salesforce Basic
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 Periods: 45

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23CSE08	C# AND . NET	L	T	P	C
		3	0	0	3

Course Objective:

- 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:

23CSE08.CO1 Understand the basic concepts of C#.

23CSE08.CO2 Summarize Object-Oriented concepts in C#.

23CSE08.CO3 Ability to develop web pages using ASP.NET Core platform.

23CSE08.CO4 Implement the data manipulation concept using Razor Pages.

23CSE08.CO5 Integrate the concept of MVC in ASP.NET Core platform.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE08.CO1	X	X	X	-	-	-	-	-	-	-	-	-	X	X	-
23CSE08.CO2	X	X	X	-	-	-	-	-	-	-	-	-	X	X	-
23CSE08.CO3	X	X	X	-	-	-	-	-	-	-	-	-	-	X	X
23CSE08.CO4	X	X	X	-	-	-	-	-	-	-	-	-	-	X	X
23CSE08.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.

Total Periods: 45

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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23CSE09	AWS ACADEMY CLOUD DEVELOPING	L	T	P	C
		3	0	0	3

Course Objective:

- 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:

23CSE09.CO1 Create on AWS.

23CSE09.CO2 Develop AWS Identity and Access Management for programmatic access.

23CSE09.CO3 Apply Container with AWS Lambda.

23CSE09.CO4 Organize solutions with Amazon API Gateway.

23CSE09.CO5 Construct secure applications and deploying applications.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE09.CO1	X	-	X	-	X	-	-	-	-	X	-	X	X	X	-
23CSE09.CO2	X	X	-	-	X	-	-	X	X	X	-	-	X	-	-
23CSE09.CO3	X	X	X	X	X	X	-	-	X	-	X	X	X	-	-
23CSE09.CO4	X	X	X	-	X	-	X	X	X	X	X	-	-	-	X
23CSE09.CO5	-	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

Introducing 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

Preamble 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 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 Periods: 45

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23CSE10	AWS ACADEMY CLOUD DEVELOPING LABORATORY	L	T	P	C
		0	0	2	1

Course Objective:

- 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:

23CSE10.CO1 Generate AWS Cloud9.

23CSE10.CO2 Create IAM user and Group.

23CSE10.CO3 Developing Amazon S3 and Amazon API Gateway using AWS SDK.

23CSE10.CO4 Implement Docker Container.

23CSE10.CO5 Demonstrate AWS Lambda with API Gateway.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE10.CO1	X	-	X	-	X	-	-	-	-	X	-	X	X	X	-
23CSE10.CO2	X	X	-	-	X	-	-	X	X	X	-	-	X	-	-
23CSE10.CO3	X	X	X	X	X	X	-	-	X	-	X	X	X	-	-
23CSE10.CO4	X	X	X	-	X	-	X	X	X	X	X	-	-	-	X
23CSE10.CO5	-	X	X	X	-	-	-	-	X	X	X	X	-	-	-

Sl.No. **List of Experiments**

1. Activity - AWS Documentation Scavenger Hunt
2. Introduction to AWS Cloud9
3. Educator Demo - AWS Cloud9
4. Educator Demo - Create an IAM User and IAM Group
5. Developing with Amazon S3 using the AWS SDK
6. Activity - Calculate Read Capacity Units (RCUs)
7. Activity - Calculate Write Capacity Units (WCUs)
8. Working with Docker Containers
9. Developing with AWS Lambda and Amazon API Gateway using the AWS SDK Sandbox

Total Periods: 30

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23CSE11	AWS ACADEMY CLOUD ARCHITECTING	L	T	P	C
		3	0	0	3

Course Objective:

- 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:

23CSE11.CO1 Understand IT related work and access Amazon Web Services.

23CSE11.CO2 Develop code for AWS Cloud Formatting & Amazon DynamoDB.

23CSE11.CO3 Construct real time database application using current techniques.

23CSE11.CO4 Demonstrate Cloud based architectures.

23CSE11.CO5 Design real time application with performance metrics.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE11.CO1	X	X	-	-	X	-	-	X	-	-	X	-	X	-	-
23CSE11.CO2	X	-	X	X	X	-	X	-	-	-	X	-	-	X	-
23CSE11.CO3	X	-	X	-	X	X	X	-	-	X	X	-	-	-	X
23CSE11.CO4	X	X	X	-	X	X	-	--	X	-	X	X	X	-	-
23CSE11.CO5	X	-	-	-	X	-	-	X	-	X	X	-	-	X	-

Unit-I 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 Availability 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 Availability 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 Cloud Formation. 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 Cloud Front, 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 **ARCHITECTED PILLARS: SECURITY,RELIABILITY,PERFORMANCE EFFICIENCY** **9**

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

Total Periods: 45

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23CSE12	AWS ACADEMY CLOUD ARCHITECTING LABORATORY	L	T	P	C
		0	0	2	1

Course Objective:

- 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:

23CSE12.CO1 Develop Auto scaling with AWS Lambda.

23CSE12.CO2 Deploy AWS Cloud formation.

23CSE12.CO3 Decoupling the infrastructure.

23CSE12.CO4 To implement Serverless Architecture and Amazon Cloud Front.

23CSE12.CO5 Construct Amazon Route 53 and sandbox.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE12.CO1	X	-	X	X	-	-	X	-	-	X	-	X	X	X	-
23CSE12.CO2	X	X	-	-	X	-	X	X	X	X	-	-	X	-	-
23CSE12.CO3	X	X	X	X	-	X	-	-	X	X	X	X	X	-	-
23CSE12.CO4	X	X	X	-	X	X	-	X	X	X	X	-	-	-	X
23CSE12.CO5	X	X	X	X	-	X	-	-	X	X	X	X	X	X	-

Sl.No.	List of Experiments
1.	Making Environment Highly Available
2.	Using Auto Scaling with AWS Lamba
3.	Automating Infrastructure Deployment with AWS Cloud Formation
4.	Decoupling Infrastructure
5.	Implementing a Serverless Architecture with AWS Managed Services
6.	Introduction to Amazon CloudFron
7.	Multi-Region Failover With Amazon Route 53
8.	Sandbox

Total Periods: 30

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23CSE13	SOFTWARE TESTING	L	T	P	C
		3	0	0	3

Course Objective:

- To explore the activities, process and techniques carried out in testing process
- To explore the different types of testing strategies
- To learn the testing levels carried out during the testing phase of a software
- To study the prepare test plan based on the requirements and specifications
- To learn the Automation testing tools in the production environment

Course Outcomes:

23CSE13.CO1 Understand all the activities, process and techniques carried out in testing process.

23CSE13.CO2 Understand the different types of testing strategies.

23CSE13.CO3 Identify all the testing levels carried out during the testing phase of a software.

23CSE13.CO4 Understand how to prepare test plan based on the requirements and specifications.

23CSE13.CO5 Apply the Automation testing tools in the production environment.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE13.CO1	X	X	X	-	-	-	-	-	X	-	X	X	X	X	-
23CSE13.CO2	X	X	X	X	X	X	-	-	-	-	X	X	X	X	X
23CSE13.CO3	X	X	X	X	X	-	-	X		X	X	X	X	-	X
23CSE13.CO4	X	X	X	X	-	-	-	X	-	X	X	X	X	X	X
23CSE13.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.

Total Periods: 45

Text Books:

Sl.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:

Sl.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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23CSE14	CLOUD COMPUTING AND IOT	L	T	P	C
		3	0	0	3

Course Objective:

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

Course Outcomes:

23CSE14.CO1	At the end of the course, the students will able to Construct three cloud deployment models, and Overview of AWS Global infrastructure.
23CSE14.CO2	Implement the different AWS compute services.
23CSE14.CO3	Create virtual firewalls with security groups.
23CSE14.CO4	Construct the availability of different alternative database solutions.
23CSE14.CO5	Implement AWS Shared Responsibility Model, Examine IAM users, groups, and roles.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE14.CO1	X	X	X	-	-	-	-	-	-		-		X	X	-
23CSE14.CO2	X	X	-	-	X	-	-	-	-	-	-	-	X	X	-
23CSE14.CO3	X	X	X	-	-	-	-	-	-	-	-	-	-	X	X
23CSE14.CO4	X	X	X	-	-	-	-	-	-	-	-	-	-	X	X
23CSE14.CO5	-	X	X	-	-	-	-	X	-	-	-	-	X	X	-

Unit-I INTRODUCTION TO CLOUD **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 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 INTRODUCTION TO IoT **9**

IoT devices, Networking basics, IoT networking connectivity protocols, IoT networking data messaging protocols, Analyzing data to infer protocol and device characteristics. IoT Analytics for the Cloud: Introduction to elastic analytics, Decouple key components, Cloud security and analytics, Designing data processing for analytics, Applying big data technology to storage.

Unit-V IoT Exploring **9**

Exploring IoT Data: Exploring and visualizing data, Techniques to understand data quality, Basic time series analysis, Statistical analysis.

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Bernard Golden	Amazon Web Service For Dummies	John Wiley & Sons	2013
2.	Arshdeep Bahga and Vijay Madisetti	Internet of Things – A Hands on Approach	Universities Press	2015
3.	Kevin, Townsend, Carles, Cufí, Akiba and Robert Davidson	Getting Started with Bluetooth Low Energy	O'Reilly	2014

Reference Books:

Sl.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.	Madhur Bhargava	IoT Projects with Bluetooth Low Energy	Packt Publishing	2017

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23CSE15	CLOUD COMPUTING AND IOT LABORATORY	L	T	P	C
		0	0	2	1

Course Objective:

- To understand and study Amazon EC2
- To work with EBS and VPC, web server and DB server
- To construct scale and load balance of cloud architecture
- To learn about how to integrate the security aspect into their IoT design taking into consideration all the threats that can possibly happen
- To develop web applications in cloud

Course Outcomes:

23CSE15.CO1	Construct Amazon EC2.
23CSE15.CO2	Examine with EBS and Develop VPC.
23CSE15.CO3	Assemble DB Server and Implement scale and load balance of cloud architecture.
23CSE15.CO4	Understand the vision of IoT from a global context for secure and smart city.
23CSE15.CO5	Use of Devices, Gateways and Data Management in IoT. Its security building state of the art architecture in IoT, with Security deployment.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE15.CO1	X	X	X	-	-	-	-	-	-	X	-		X	X	-
23CSE15.CO2	X	X	-	-	X	-	X	-	-	-	-	-	X	X	-
23CSE15.CO3	X	X	X	-	-	-	-	-	-	X	-	-	-	X	X
23CSE15.CO4	X	X	X	-	-	-	-	-	-	-	-	-	-	X	X
23CSE15.CO5	-	X	X	-	-	-	-	X	-	-	-	-	X	X	-

Sl.No.	List of Experiments
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.	Introduction to Open Source Hardware & its Application. a. Arduino **b.** Raspberry Pi
8.	Exploring various types of Sensors
9.	Develop Applications using Arduino and Raspberry Pi
10.	Explore the working of AWS IoT Device Defender

Total Periods: 30

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23CSE16	TCP/IP DESIGN AND IMPLEMENTATION	L	T	P	C
		3	0	0	3

Course Objective:

- Understand the IP addressing schemes
- Describe the fundamentals of network design and implementation
- Implement the design of TCP/IP networks
- Analyze the network management issues
- Learn to design and implement network applications

Course Outcomes:

23CSE16.C01 Design the TCP/IP networks.

23CSE16.CO2 Illustrate the TCP connection establishment and termination.

23CSE16.CO3 Apply the algorithms of IP Implementation.

23CSE16.CO4 Classify the network management issues.

23CSE16.CO5 Implement the network applications.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE16.C01	X	X	X	-	X	X	X	X	X	-	-	X	X	X	X
23CSE16.CO2	X	X	X	X	-	X	-	X	X	-	-	X	X	X	X
23CSE16.CO3	X	X	X	X	-	X	-	X	X	-	-	X	X	X	X
23CSE16.CO4	X	X	-	X	X	X	X	X	X	-	-	X	-	X	X
23CSE16.CO5	X	X	X	X	X	X	X	X	X	-	-	X	X	X	X

Unit-I INTRODUCTION **9**

Internetworking concepts and architecture model – classful Internet address – CIDR – Subnetting and Supernetting – AARP – RARP- IP- IP Routing – ICMP – IPV6.

Unit-II TCP **9**

Services – header – connection establishment and termination – interactive data flow – bulk data flow – timeout and retransmission – persist timer – keep alive timer – futures and performance.

Unit-III IP IMPLEMENTATION **9**

IP global software organization –routing table–routing algorithms – fragmentation and reassembly – error processing (ICMP) – Multicast Processing (IGMP).

Unit-IV TCP IMPLEMENTATION I **9**

Data structure and input processing – transmission control blocks – segment format – comparison– finite state machine implementation – Output processing – mutual exclusion –computing the computing the TCP Data length.

Unit-V TCP IMPLEMENTATION II **9**

Timers – events and messages – timer process – deleting and inserting timer event – flow control and adaptive retransmission – congestion avoidance and control – urgent data processing and push function.

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Douglas E	Internetworking with TCP/IP Principles, Protocols and Architecture	Comer Vol 1,Vth Edition 2006 and Vol2, III Edition	1999
2.	W.Richard Stevens	TCP/IP Illustrated Volume 1	Pearson Education	2003

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Forouzan	TCP/IP ProtocolSuite Second Edition	Tata MCGraw Hill	-
2.	W.Richard Stevens	TCP/IP Illustrated Volume 2	Pearson Education	2003

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23CSE17	NETWORK ROUTING ALGORITHMS	L	T	P	C
		3	0	0	3

Course Objective:

- Understand the principles behind the data transfer mechanisms over the conventional network
- Ability to configure routing algorithms over the routers
- Analyze the data traversal through various cross points (routers) in the network
- Design routing algorithms for any conventional networks
- Illustrate the various types of key routing protocols used in modern computer networks

Course Outcomes:

23CSE17.CO1 Understand and explore the basics of Computer Networks and Various Protocols.

23CSE17.CO2 Administrate a network and schedule flow of information.

23CSE17.CO3 Examine the network security issues in Mobile and ad hoc networks.

23CSE17.CO4 Demonstrate the TCP/IP and OSI fashions with merits and demerits.

23CSE17.CO5 Evaluate the shortest path by using Routing algorithms. Design the Application layer protocols.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE17.CO1	X	X	X	X	X	X	X	X	X	-	-	X	-	X	X
23CSE17.CO2	X	X	X	X	X	X	X	X	X	-	-	X	-	X	X
23CSE17.CO3	X	X	X	X	-	X	X	X	-	-	-	X	X	X	X
23CSE17.CO4	X	X	X	X	X	X	-	X	X	-	-	X	X	X	X
23CSE17.CO5	X	X	X	X	-	X	-	X	X	-	-	X	X	X	X

Unit-I NETWORK ROUTING: BASICS AND FOUNDATIONS 9

An Introduction to Routing algorithms - Functions of Router - IP Addressing - Protocol Stack Architecture - Network Topology and Management architectures – PSTN - Communication Technologies - Standards committees - Network Protocol Analyzer.

Unit-II ROUTERS AND ADDRESS LOOKUP ALGORITHMS 9

Types of routers - Elements of a router - Packet flow - Packet processing - Router architectures - Impact of addressing on lookup - longest prefix matching - Binary tries and Multi-bit Tries.

Unit-III ROUTING ALGORITHMS: SHORTEST PATH AND WIDEST PATH 9

Bellman Ford algorithm and distance vector approach - Dijikstra's algorithm - Comparison of Bellman Ford algorithm and Dijikstra's algorithm - shortest and widest path computation - k-shortest path algorithms, Routing Protocols: Framework and Principles .

Unit-IV ROUTING IN IP NETWORKS 9

IP Routing and Distance Vector Protocol Family - Routers, Networks, and Routing information Basics - IP Traffic Engineering, BGP, Internet Routing Architectures.

Unit-V ROUTING IN WIRELESS NETWORKS 9

Internet based mobile ad-hoc networking - Destination sequenced Distance Vector (DSDV), Dynamic source Routing (DSR) - Ad-hoc on demand Distance Vector (AODV) - Temporarily Ordered Routing algorithm (TORA).

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	D.Medhi and K.Ramasamy	Network Routing : Algorithms, Protocols and Architectures	Morgan Kaufmann, First Edition	2007
2.	Steen Strub M	Routing in Communication networks	Prentice Hall International	1995

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	C.Siva Ram Murthy and B.S.Manoj.	Adhoc Wireless Networks.	Pearson Education	2007

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23CSE18	DEVOPS	L	T	P	C
		3	0	0	3

Course Objective:

- To understand the concepts of software life cycle
- To learn the concepts of DevOps
- To Develop projects using DevOps
- Design and implement CI/CD
- Demonstrate DevOps maturity model

Course Outcomes:

23CSE18.CO1 Understand the basic concepts of software life cycle.

23CSE18.CO2 Know the concepts of DevOps.

23CSE18.CO3 Develop projects using DevOps.

23CSE18.CO4 Design and implement CI/CD.

23CSE18.CO5 Demonstrate DevOps maturity model.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE18.CO1	X	X	X	-	-	-	-	-	X	-	X	X	X	X	-
23CSE18.CO2	X	X	X	X	X	X	-	-	-	-	X	X	X	X	X
23CSE18.CO3	X	X	X	X	X	-	-	X		X	X	X	X	-	X
23CSE18.CO4	X	X	X	X	-	-	-	X	-	X	X	X	X	X	X
23CSE18.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: Technology aspects, Agiling capabilities, Tool stack implementation, Peopleaspect, 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.

Total Periods: 45

Text Books:

Sl.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:

Sl.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, Create Space 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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23CSE19	VIRTUAL REALITY AND AUGMENTED REALITY	L	T	P	C
		3	0	0	3

Course Objective:

- Understand the knowledge of historical and modern overviews and perspectives on virtual reality
- To learn the fundamentals of sensation, perception, and perceptual training
- Illustrate the scientific, technical, and engineering aspects of augmented and virtual reality systems
- Justify the Evaluation of virtual reality from the lens of design
- Understand the knowledge of historical and modern overviews and perspectives on virtual reality

Course Outcomes:

23CSE19.CO1	Develop software that reflects fundamental techniques for the design and deployment of VR and AR experiences.
23CSE19.CO2	Analyze how VR and AR systems work.
23CSE19.CO3	Evaluate the benefits and drawbacks of specific AR and VR techniques on the human body.
23CSE19.CO4	Defend the use of particular designs for AR and VR experiences.
23CSE19.CO5	Identify the state-of-the-art AR and VR design problems and solutions from the industry and academia.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE19.CO1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
23CSE19.CO2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
23CSE19.CO3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
23CSE19.CO4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
23CSE19.CO5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Unit-I INTRODUCTION TO VIRTUAL REALITY **9**

Defining Virtual Reality, History of VR, Human Physiology and Perception, Key Elements of Virtual Reality Experience, Virtual Reality System, Interface to the Virtual World-Input & output- Visual, Aural & Haptic Displays, Applications of Virtual Reality.

Unit-II REPRESENTING THE VIRTUAL WORLD **9**

Representation of the Virtual World, Visual Representation in VR, Aural Representation in VR and Haptic Representation in VR.

Unit-III THE GEOMETRY OF VIRTUAL WORLDS &THE PHYSIOLOGY OF HUMAN VISION **9**

Geometric Models, Changing Position and Orientation, Axis-Angle Representations of Rotation, Viewing Transformations, Chaining the Transformations, Human Eye, eye movements & implications for VR.

Unit-IV INTRODUCTION TO AUGMENTED REALITY (A.R) **9**

What Is Augmented Reality - Defining augmented reality, history of augmented reality, The Relationship Between Augmented Reality and Other Technologies-Media, Technologies, Other Ideas Related to the Spectrum Between Real and Virtual Worlds, applications of augmented reality **Augmented Reality Concepts**- How Does Augmented Reality Work? Concepts Related to Augmented Reality, Ingredients of an Augmented Reality Experience.

Unit-V AUGMENTED REALITY HARDWARE **9**

Augmented Reality Hardware – Displays – Audio Displays, Haptic Displays, Visual Displays, Other sensory displays, Visual Perception , Requirements and Characteristics, Spatial Display Model. **Processors –** Role of Processors, Processor System Architecture, Processor Specifications. **Tracking & Sensors -** Tracking,

Calibration, and Registration, Characteristics of Tracking Technology,Stationary Tracking Systems, Mobile Sensors, Optical Tracking, Sensor Fusion.

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Steven M. LaValle,	Virtual Reality	Cambridge University Press, 2016	2016
2.	William R Sherman and Alan B Craig, (The Morgan Kaufmann Series in Computer Graphics)	Understanding Virtual Reality: Interface, Application and Design.	Morgan Kaufmann Publishers, San Francisco, CA, 2018	2018
3.	Alan B Craig, William R Sherman and Jeffrey D Will	Developing Virtual Reality Applications: Foundations of Effective Design	Morgan Kaufmann	2016
4.	Allan Fowler-AR	Game Development‖, 1st Edition,	A press Publications, 2018, ISBN 9781484236178	2018
5.	By Schmalstieg / Hollerer, Pearson Education India;	Augmented Reality: Principles & Practice	First edition(12 October 2016), ISBN-10: 9332578494	2016

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Gerard Jounghyun Kim	Designing Virtual Systems: The Structured Approach	Springer	2005
2.	Doug A Bowman, Ernest Kuijff, Joseph J LaViola, Jr and Ivan Poupyrev	3D User Interfaces, Theory and Practice	Addison Wesley, USA	2015

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23CSE20	BLOCK CHAIN TECHNOLOGY	L	T	P	C
		3	0	0	3

Course Objective:

- 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:

23CSE20.CO1 Understand the use cases in Block Chain.

23CSE20.CO2 Demonstrate the digital transaction in same and different bank.

23CSE20.CO3 Implement the Bitcoin transactions.

23CSE20.CO4 Summarizes the functions of bitcoin and make use of it to solve problems.

23CSE20.CO5 Demonstrates the foundations with Decentralized Applications.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE20.CO1	X	X	X	-	X	-	-	-	-	X	-	-	X	-	X
23CSE20.CO2	-	-	-	X	X	X	X	-	-	-	-	X	-	X	X
23CSE20.CO3	X	-	X	X	-	-	X	X	-	-	-	-	X	X	-
23CSE20.CO4	-	X	-	-	-	X	X	-	-	-	X	X	-	X	X
23CSE20.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.

Total Periods: 45

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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23CSE21	DESIGN PATTERNS	L	T	P	C
		3	0	0	3

Course Objective:

- Understand the fundamental concepts of design patterns
- Demonstrate the Design Problems
- Categorize creational, structural and behavioral patterns
- Choose different creational, structural and behavioral patterns to solve design problems
- Analyze the Behavioral Patterns

Course Outcomes:

23CSE21.CO1 Learn fundamental concepts of design patterns.

23CSE21.CO2 Identify and apply the appropriate design pattern to solve real-time problems.

23CSE21.CO3 Know how to format a document using document editor.

23CSE21.CO4 Label out the solutions to design problems using creational, structural and behavioral patterns.

23CSE21.CO5 Classify the Chain of Responsibility.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE21.CO1	X	-	X	-	-	-	-	-	X	-	-	X	-	X	-
23CSE21.CO2	X	-	X	X	-	X	-	-	-	-	X	X	X	X	X
23CSE21.CO3	X	X	X	X	-	-	-	X	-	X	X	X	-	X	-
23CSE21.CO4	X	-	X	X	-	-	-	X	-	X	X	X	X	X	X
23CSE21.CO5	X	X	X	-	-	X	-	X	-	-	X	X	-	X	X

Unit-I INTRODUCTION 9

Introduction: Design Pattern, Design Patterns in Smalltalk MVC, Describing Design Patterns, The Catalog of Design Patterns, Organizing the Catalog, How Design Patterns Solve Design Problems, How to Select a Design Pattern, How to Use a Design Pattern.

Unit-II CASE STUDY AND DESIGNING A DOCUMENT 9

A Case Study: Designing a Document Editor: Design Problems, Document Structure, Formatting, Embellishing the User Interface, Supporting Multiple Look-and-Feel Standards, Supporting Multiple Window Systems, User Operations Spelling Checking and Hyphenation.

Unit-III CREATIONAL PATTERNS 9

Creational Patterns: Abstract Factory, Builder, Factory Method, Prototype, Singleton.

Unit-IV STRUCTURAL PATTERNS 9

Structural Patterns: Adapter, Bridge, Composite, Decorator, Façade, Flyweight, Proxy.

Unit-V BEHAVIORAL PATTERNS 9

Behavioral Patterns: Chain of Responsibility, Command, Interpreter, Iterator, Mediator, Memento, Observer, Strategy, Template Method, Visitor.

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Erich Gamma, Richard Helm, Ralph Johnson	Design Patterns: Elements of Reusable Object-Oriented Software 1st Edition	Pearson Education	1994
2.	W.Richard Stevens	TCP/IP Illustrated Volume1	Pearson Education	2003

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	John Vlissides, Grady Booch	Design Patterns: Elements of Reusable Object-Oriented Software 1st Edition	Pearson Education	1994
2.	W.Richard Stevens	TCP/IP Illustrated Volume 2	Pearson Education	2003

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23CSE22	SEMANTIC WEB	L	T	P	C
		3	0	0	3

Course Objective:

- To learn Web Intelligence
- To learn Knowledge Representation for the Semantic Web
- To learn Ontology Engineering
- To learn Semantic Web Applications, Services and Technology
- To learn about Web services

Course Outcomes:

23CSF22.CO1 Understand the characteristics of Semantic Web.

23CSF22.CO2 Apply SOAP and UDDI to web services.

23CSF22.CO3 Handle multiple web services using Orchestration.

23CSF22.CO4 Create documents using XML.

23CSF22.CO5 Construct and use Ontologies.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSF22.CO1	X	X	-	X	-	X	-	X	X	X	-	X	X	-	X
23CSF22.CO2	X	-	-	-	-	X	X	X	X	X	-	X	-	X	-
23CSF22.CO3	X	-	-	X	-	X	-	X	-	X	-	-	X	-	-
23CSF22.CO4	-	X	-	-	-	-	-	X	X	-	-	X	-	-	X
23CSF22.CO5	X	X	-	X	-	-	X	X	X	X	-	-	X	-	-

Unit-I INTRODUCTION 9

Introduction to Semantic Web, the Business Case for the Semantic Web, XML and Its Impact on the Enterprise.

Unit-II WEB SERVICES 9

Uses, Basics of Web Services, SOAP, UDDI, Orchestrating Web Services, Securing Web Services, Grid Enabled and Semantic Web of Web Services.

Unit-III RESOURCE DESCRIPTION FRAMEWORK 9

Features, Capturing Knowledge with RDF. XML Technologies: XPath, The Style Sheet Family: XSL, XSLT, and XSL FO, XQuery, XLink, XPointer, XInclude, XMLBase, XHTML, XForms, SVG.

Unit-IV TAXONOMIES AND ONTOLOGIES 9

Overview of Taxonomies, Defining the Ontology Spectrum, Topic Maps, Overview of Ontologies, Syntax, Structure, Semantics, and Pragmatics, Expressing Ontologies Logically, Knowledge Representation.

Unit-V SEMANTIC WEB APPLICATION 9

Semantic Web Services, e-Learning, Semantic Bioinformatics, Enterprise Application Integration, Knowledge Base. Semantic Search Technology: Search Engines, Semantic Search, Semantic Search Technology, Web Search Agents, Semantic Methods, Latent Semantic Index Search, TAP, Swoogle.

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Berners Lee, Godel and Turing	Thinking on the Web	Wiley Interscience	2008

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Web Services, and Knowledge Management by Michael C. Daconta, Leo J. Obrst, Kevin T. Smith	The Semantic Web: A Guide to the Future of XML	Wiley Publishing, Inc	2003
2.	Trends and Research in Ontology Based Systems, J.Davies, R.Studer, P.Warren	Semantic Web Technologies	John Wiley & Sons	2006
3.	Information Sharing on the semantic Web	Heiner Stuckenschmidt; Frank Van Harmelen	Springer Publications.	2005

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23CSE23	SOFTWARE PROJECT MANAGEMENT	L	T	P	C
		3	0	0	3

Course Objective:

- 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:

23CSE23.CO1	Able to practice the process of project management and its application in delivering successful projects.
23CSE23.CO2	Deconstructing the activities in the project management.
23CSE23.CO3	Evaluate the risks and hazards in the project management.
23CSE23.CO4	Apprise the right person to managing people and organizing team
23CSE23.CO5	Evaluate a project to develop the scope of work, provide accurate effort estimation methods for software.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE23.CO1	X	X	-	-	-	X	X	-	-	-	X	-	X	-	-
23CSE23.CO2	X	X	X	-	X	-	-	-	X	-	-	-	X	-	-
23CSE23.CO3	-	-	-	-	-	X	X	-	-	-	X	-	-	X	-
23CSE23.CO4	-	-	-	-	X	X	X	-	X	-	X	-	-	X	-
23CSE23.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.

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 Periods: 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 Software Project 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 practices tools and Techniques	J cross Publication	2010
4.	Richard E. Fairly	Managing and Leading Software projects	Weilly and sons	2009
5.	Ramesh, Gopalaswamy	Managing Global Projects	Tata McGraw Hill	2001

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23CSE24	HUMAN COMPUTER INTERACTION	L	T	P	C
		3	0	0	3

Course Objective:

- 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:

23CSE24.CO1 Understand the Human Computer Interaction (HCI) principles while developing software.

23CSE24.CO2 Identify the appropriate design model for HCI.

23CSE24.CO3 Postulate appropriate interaction styles.

23CSE24.CO4 Design a web interface for HCI.

23CSE24.CO5 Apply HCI in real time systems.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE24.CO1	X	X	X	-	-	-	-	-	X	-	X	X	X	X	-
23CSE24.CO2	X	X	X	X	X	X	-	-	-	-	X	X	X	X	X
23CSE24.CO3	X	X	X	X	X	-	-	X		X	X	X	X	-	X
23CSE24.CO4	X	X	X	X	-	-	-	X	-	X	X	X	X	X	X
23CSE24.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 9

Designing Web Interfaces – Drag & Drop – Purpose – Module, List, Object, Action, Collection - Challenge – Direct Selection – Toggle, Collected, Object, Hybrid – Contextual Tools.

Unit-V 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 Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale,	Human Computer nteraction	Pearson Education	2009
2.	Bill Scott and Theresa Neil	Designing Web Interfaces	O'Reilly	2009

Reference Books:

Sl.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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23CSE25	SPEECH AND LANGUAGE PROCESSING	L	T	P	C
		3	0	0	3

Course Objective:

- To explore the fundamental concepts of Natural Language Processing
- To know the different grammars of language modelling and learn the techniques for word level analysis
- To understand the working of syntactic and semantic analysis
- To familiar with pragmatic analysis and natural language generation systems
- To study about machine translation, information retrieval and lexical resources

Course Outcomes:

23CSE25.CO1 Familiarize with concept of Natural Language Processing.

23CSE25.CO2 Construct the various language models and analyze the natural language using word level.

23CSE25.CO3 Examine the syntactic and semantic analysis for the natural language text.

23CSE25.CO4 Analysis the resolution technique for pragmatic and develop NLG systems.

23CSE25.CO5 Apply Natural Language Processing technique and evaluate the lexical resources.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE25.CO1	X	X	-	X	X	-	-	-	-	-	-	X	-	X	-
23CSE25.CO2	X	-	X	X	X	-	X	X	-	-	X	-	-	-	-
23CSE25.CO3	X	-	X	X	X	-	-	-	X	-	X	-	-	X	-
23CSE25.CO4	X	-	X	X	X	-	X	-	-	-	X	-	-	-	X
23CSE25.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.

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 Periods: 45

Text Books:

Sl.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:

Sl.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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23CSE26	ADHOC NETWORK	L	T	P	C
		3	0	0	3

Course Objective:

- To Gain a deep understanding of the principles and protocols governing Ad-Hoc Networks
- To Develop skills in designing and configuring decentralized communication networks
- To Explore techniques for dynamic routing, resource management, and data transmission in ad-hoc environments
- To Analyze the performance and limitations of various ad-hoc network architectures and algorithms
- To Apply theoretical knowledge to real-world scenarios through hands-on experimentation and simulations

Course Outcomes:

23CSE26.CO1	Understand the fundamental concepts, principles, and characteristics of Ad-Hoc Networks.
23CSE26.CO2	Design and configure decentralized communication networks, considering dynamic connectivity and resource constraints.
23CSE26.CO3	Implement and evaluate routing protocols, addressing challenges such as node mobility and network scalability.
23CSE26.CO4	Analyze the performance and effectiveness of Ad-Hoc Networks through simulation and experimentation.
23CSE26.CO5	Apply acquired knowledge to solve practical problems in ad-hoc network deployment and management.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE26.CO1	X	-	-	-	X	-	-	X	-	-	-	-	-	-	X
23CSE26.CO2	X	-	-	X	X	X	-	-	-	-	X	-	-	X	-
23CSE26.CO3	-	X	X	-	X	-	X	-	-	-	-	-	-	X	-
23CSE26.CO4	-	-	X	X	X	-	X	-	-	-	-	-	X	-	-
23CSE26.CO5	-	-	X	-	X	-	X	-	-	-	X	-	-	X	-

Unit-I INTRODUCTION **9**

Mobile Ad Hoc Network: History, Definition - MANET Applications and Scenarios - Ad Hoc Network Characteristics Classification of Ad Hoc Networks, Communication, Topology, Configuration - Modeling and Simulation Tools: Network Models, Topology Control Models, Mobility Models.

Unit-II MOBILE AD HOC ROUTING PROTOCOLS **9**

Routing Protocols - Secure Routing - Current Routing Protocols - Routing Protocols Performance - Ad Hoc Routing Protocols Analysis - Proactive versus Reactive Simulation Comparison - Performance Metrics in Ad Hoc Networks.

Unit-III COMMUNICATION PROTOCOL OF MANETs **9**

MANET Routing : AODV, DSR, OLSR, FSLS, ZRP - OSPF over MANET - Multicriteria Optimization Applied to MANET Routing - Characterization of an Optimization Problem - Multicriteria Optimization Methods – Quality of service State Information: QoS in Ad Hoc Networks, Stateful and Stateless Approaches, Proposed Hybrid Stateless Model.

Unit-IV MOVING SMART OBJECTS AND UNDERWATER AD HOC NETWORK **9**

Smart Objects on MANETs - Global Routing - Local Routing - Current Status of Object Mobility - Current Issuesand Future Challenges: Vehicular Ad Hoc Networks, VANETs' Applications and Messages, Performance Evaluation Metrics for VANETs, Simulation of Vehicular Networks, Transport Layer Protocol for VANETs, Broadcast in VANETs - Underwater Wireless: Underwater Communication Issues - Communication Protocols -Applications

of Underwater Acoustic Systems

Unit-V WIRELESS MESH NETWORK 9

WMN Architecture - PHY and MAC Layers - Network Layers - Routing Metrics for Wireless Multi-hop Networks - Wireless Mesh Network Modeling and Simulation - Cross-Layer Approaches - Cross-Layer Design - BNR Architecture - Bayesian Network Queries - Protocol Performance.

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Jonathan Loo, Jaime Lloret Mauri, and Jesús Hamilton Ortiz	Mobile Ad Hoc Networks Current Status and Future Trends	CRC Press, Taylor & Francis Group	2012
2.	Stefano Basagni Marco Conti Silvia Giordano Ivan Stojmenovic	Mobile Ad Hoc Networking : Cutting Edge Directions	Wiley	2013

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	G Ram Mohana Reddy, Kiran M	Mobile Ad Hoc Networks Bio-Inspired Quality of Service Aware Routing Protocols	CRC Press, Taylor & Francis Group	2017
2.	Dr. Mahendra Sharma, Roopali Gupta and Laveena Sehgal	Secure Routing in Mobile Ad hoc Networks	AkiNik Publications	2022
3.	Xin Wang	Mobile Ad-Hoc Networks: Applications	Springer	2011

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23CSE27	DIGITAL MARKETING	L	T	P	C
		3	0	0	3

Course Objective:

- To Acquire proficiency in digital marketing fundamentals
- To Effectively utilize a variety of digital marketing tools
- To Create customized strategies for target demographics
- To Analyze campaign performance metrics for optimization
- To Stay abreast of evolving digital marketing trends

Course Outcomes:

23CSE27.CO1 Proficiency in diverse digital marketing strategies.

23CSE27.CO2 Mastery of analytics for campaign evaluation.

23CSE27.CO3 Effective content marketing skills.

23CSE27.CO4 Personalized campaign creation based on consumer behavior.

23CSE27.CO5 Continuous adaptation to industry trends.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE27.CO1	X	-	-	-	X	-	-	X	-	-	-	X	-	-	X
23CSE27.CO2	X	-	-	X	X	X	-	-	-	-	X	-	-	X	-
23CSE27.CO3	X	X	X	X	X	-	X	-	X	-	-	-	-	X	-
23CSE27.CO4	-	-	X	X	X	-	X	-		-	-	-	X	-	-
23CSE27.CO5	-	X	X	-	X	-	X	-	-	-	X	X	-	X	-

Unit-I INTRODUCTION TO DIGITAL MARKETING 9

Meaning of Digital Marketing, Differences from Traditional Marketing, Return of Investments on Digital Marketing vs. Traditional Marketing, E Commerce, Tools used for successful marketing, SWOT Analysis of Business for Digital Marketing, Meaning of Blogs, Websites, Portal and Their Differences, Visibility, Visitor Engagement, Conversion Process, Retention, Performance Evaluation.

Unit-II SEARCH ENGINE OPTIMIZATION (SEO) 9

On page Optimization Techniques, Off Page Optimization Techniques, Preparing Reports, Creating Search Campaigns, Creating Display Campaigns. Social Media Optimization (SMO): Introduction to Social Media Marketing, Advanced Facebook Marketing,

Unit-III WORDPRESS WEBSITE CREATION 9

Word press Blog Creation, Twitter Marketing, Linkedln Marketing, Instagram Marketing, social media Analytical Tools. Search Engine Marketing: Meaning and Use of Search Engine Marketing, Tools used — Pay Per Click, Google Adwords, Display Advertising Techniques, Report Generation

Unit-IV WEBSITE TRAFFIC AND GOOGLE WEB 9

Website Traffic Analysis, Affiliate Marketing and Ad Designing: Google Analytics, Online Reputation Management, EMail Marketing, Affiliate Marketing, Understanding Ad Words Algorithm, Advertisement Designing.

Unit-V KEYWORD RESEARCH AND MAPPING 9

What are Keywords, Types of Keywords, Keyword-based on length, History of Keyword Research, LSI Keywords Understanding your target market, Keyword Density, Google keyword planner – Creating Local Listing In Search Engine, Google Places Setup (Including Images, Videos, Map Etc)- Search Engine Visibility Reports Verification Of Listing – Google Reviews.

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Damian Ryan, Calvin Jones	Understanding Digital Marketing Marketing Strategies For Engaging the Digital Generation	Kogan Page	2021
2.	Alex Trengove Jones, Anna Malczyk and Justin Beneke	Internet Marketing	Get Smarter	2020

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Rob Stokes	EMarketing The Essential Guide to Marketing in a digital world	Quirk eMarketing	2017
2.	Francesca James, Hannan Durham	Fifty Shades of Digital Marketing	BookBoon.com	2020
3.	Aaron Matthew Wall	SEO Book	SEO BOOK	2021

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23CSE28	ROBOTICS AND ITS APPLICATIONS	L	T	P	C
		3	0	0	3

Course Objective:

- Comprehend and analyze the basic principles of Robotics and explore its core concepts
- Examine diverse categories of robots to understand their functionalities and applications
- Delve into the intelligent component designed for controlling robotic movements effectively
- Learn about different strategies for mapping paths in robotics, enhancing navigation efficiency
- Explore the functionality of cutting-edge robotic gadgets through practical examples and demonstrations

Course Outcomes:

23CSE28.CO1	Recognize the importance and societal effects of robotics and automation across engineering fields.
23CSE28.CO2	Define the key elements and structure of robotic systems.
23CSE28.CO3	Understand diverse path planning methods and assess the range of robot movements.
23CSE28.CO4	Select appropriate actuators and end-effectors for specific robotic tasks.
23CSE28.CO5	Implement robotics principles to streamline repetitive and dangerous activities, while classifying robots based on their design and real-world uses.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE28.CO1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
23CSE28.CO2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
23CSE28.CO3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
23CSE28.CO4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
23CSE28.CO5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Unit-I INTRODUCTION TO ROBOTICS 9

Introduction to Robotics and Automation, laws of robot, brief history of robotics, basic components of robot, robot specifications, classification of robots, human system and robotics, safety measures in robotics, social impact, Robotics market and the future prospects, advantages and disadvantages of robots.

Unit-II ROBOT ANATOMY AND MOTION ANALYSIS 9

Anatomy of a Robot, Robot configurations: polar, cylindrical, Cartesian, and jointed arm configurations, Robot links and joints, Degrees of freedom: types of movements, vertical, radial and rotational traverse, roll, pitch and yaw, Wok volume/envelope, Robot kinematics: Introduction to direct and inverse kinematics, transformations and rotation matrix.

Unit-III ROBOT DRIVES AND END EFFECTORS 9

Robot drive systems: Hydraulic, Pneumatic and Electric drive systems, classification of end effectors, mechanical grippers, vacuum grippers, magnetic grippers, adhesive gripper, gripper force analysis and gripper design, 1 DoF, 2 DoF, multiple degrees of freedom robot hand, tools as end effectors, Robot control types: limited sequence control, point-to-point control, playback with continuous path control, and intelligent control.

Unit-IV PATH PLANNING 9

Definition-Joint space technique, Use of P-degree polynomial-Cubic, polynomial- Cartesian space technique, parametric descriptions, straight line and circular paths, position and orientation planning.

Unit-V ROBOTICS APPLICATIONS: MATERIAL HANDLING 9

Pick and place, palletizing and depalletizing, machining loading and unloading, welding & assembly, Medical, agricultural and space applications, unmanned vehicles: ground, Ariel and underwater applications, robotic for

computer integrated manufacturing. Types of robots: Manipulator, Legged robot, wheeled robot, aerial robots, Industrial robots, Humanoids, Robots, Autonomous robots, and Swarm robots.

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1	S.R. Deb	Robotics Technology and flexible automation	Tata McGraw-Hill Education	2009
2	Mikell P. Groover et. al	Industrial Robots - Technology, Programming and Applications	McGraw Hill, Special Edition	2012

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1	Richard D Klafter, Thomas A Chmielewski, Michael Negin	Robotics Engineering – An Integrated Approach	Eastern Economy Edition, Prentice Hall of India Pvt. Ltd	2016
2	Fu K S, Gonzalez R C, Lee C.S.G,	Robotics: Control, Sensing, Vision and Intelligence	McGraw Hill, https://www.robots.com/applications.	2012.

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23CSE29	INTERNET PROGRAMMING	L	T	P	C
		3	0	0	3

Course Objective:

- Understand Different Internet Technologies
- Learn Java-Specific Web Services Architecture
- Construct a Basic Website Using HTML and Cascading Style Sheets(CSS)
- Build Dynamic Web Pages with Client-Side Validation Using JavaScript
- Develop Server-Side Programs Using Servlets and JSP (Java Server Pages)

Course Outcomes:

23CSE29.CO1 Construct a basic website using HTML and CSS.

23CSE29.CO2 Build dynamic web pages with client-side validation using JavaScript.

23CSE29.CO3 Develop server-side programs using Servlets and JSP.

23CSE29.CO4 Understand PHP, XML, AJAX, and web services.

23CSE29.CO5 Construct a basic website using HTML and CSS.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE29.CO1	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X
23CSE29.CO2	X	X	X	X	X	-	-	-	X	X	X	X	X	X	X
23CSE29.CO3	X	X	X	X	X	-	-	-	X	X	X	X	X	X	X
23CSE29.CO4	X	X	-	X	X	-	-	-	X	X	X	X	X	X	X
23CSE29.CO5	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X

Unit-I BASICS, HTML 5, CSS 3, WEB 2.0 9

Understand clients, servers, and communication in web essentials. Learn about basic internet protocols, the world wide web, and HTTP. Explore HTML5 elements, tables, lists, images, semantic elements, drag and drop, audio, video controls, and CSS3 features like backgrounds, borders, colors, shadows, text effects, transformations, and animations.

Unit-II CLIENT-SIDE PROGRAMMING WITH JAVASCRIPT 9

Introduction to JavaScript and the DOM model._ Working with date and objects ._Regular expressions, exception handling, and validation._ Event handling and DHTML using JavaScript. _Introduction to JSON and its usage. _Writing function files and making HTTP requests.

Unit-III SERVER-SIDE PROGRAMMING WITH SERVLETS AND JSP 9

Java Servlet architecture and life cycle. _Form handling using GET and POST actions ._Session handling and cookies._ Introduction to Java Server Pages (JSP) and JSP Standard Tag Library (JSTL)._Creating HTML forms by embedding JSP code.

Unit-IV PHP AND XML 9

Introduction to PHP: Variables, program control, built-in functions, form validation, regular expressions, file handling, and cookies. _Basics of XML:Document Type Definition, XML Schema, DOM, presenting XML, parsers,validation, XSL, and XSLT transformation.

Unit-V INTRODUCTION TO AJAX AND WEB SERVICES 9

AJAX client-server architecture, XML Http Request object, callback methods. _Basics of web services: Creating, publishing, testing, and describing a web service (WSDL), consuming a web service, and SOAP.

Total Periods: 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, 5 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 Computer Science perspective	Pearson Education	2011

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23CSE30	CURRENT PRACTICES IN SOFTWARE ENGINEERING	L	T	P	C
		3	0	0	3

Course Objective:

- Remember the basic concept software Engineering and life cycle models
- Summarize the requirements elicitation
- Analyze the design interactive system
- Illustrate the quality assurance using testing
- Develop the different level so maintaining project

Course Outcomes:

23CSE30.CO1 Enumerate the software modeling for various real time problems.

23CSE30.CO2 Identify the elicitation technique and integrate the requirements.

23CSE30.CO3 Develop the modal and framework for real-time application.

23CSE30.CO4 Analyze the quality Of the software and verify the product.

23CSE30.CO5 Implement software project management for security systems.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE30.CO1	X	-	X	-	X	-	-	X	-	X	-	X	X	X	-
23CSE30.CO2	X	X	-	-	X	-	-	X	X	X	-	-	X	-	-
23CSE30.CO3	X	X	X	X	-	X	-	-	X	X	X	X	-	X	-
23CSE30.CO4	X	X	X	X	-	X	-	-	X	X	X	-	X	-	X
23CSE30.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 - ISO 9000 - 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 Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Roger S .Pressman	Software Engineering	Them c Graw Hill	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 JoyBeatty	Software Requirements	Microsoft Press	2013
2.	Robert Martins	Clean code –Agile Technology	Prentice hall	2008
3.	Rajib Mall	Fundamentals of Software Engineering	Them c Graw Hill	2009
4.	IanSommerville	Software Engineering	Addison-Wesley	2008
5.	Wiki books 2013	Introduction to Software Engineering	E-Book	2013

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23CSE31	COMPUTER GRAPHICS	L	T	P	C
		3	0	0	3

Course Objective:

- 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:

23CSE31.CO1 Apply algorithm to draw fundamental drawings(Line, Ellipse and Circle).

23CSE31.CO2 Apply algorithm for 2D images clipping and transformation.

23CSE31.CO3 Illustrate 3D images clipping and transformation operation.

23CSE31.CO4 Construct illumination models and color model applications.

23CSE31.CO5 Design animation applications.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE31.CO1	X	X	X	-	-	-	-	-	-	-	-	-	X	X	-
23CSE31.CO2	X	X	X	-	-	-	-	-	-	-	-	-	X	X	-
23CSE31.CO3	X	X	X	-	-	-	-	-	-	-	-	-	-	X	X
23CSE31.CO4	X	X	X	-	-	-	-	-	-	-	-	-	-	X	X
23CSE31.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 representation sandhomogeneous coordinates, composite transformations; Two dimensional viewing – viewing pipeline, viewing coordinate reference frame; widow-to-view port 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; Splinere presentations – Bezier curves and surfaces-B-Spline curves and surfaces. Transformation and Viewing: Three dimension algeometric 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- MY colour model- HSV colour model - HLS colour model; Colours election.

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 Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	JohnF.Hughes, Andries Van Dam, Morgan McGuire, DavidF. Sklar, James D.Foley, StevenK. Feiner and KurtAkeley	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 Mc Connell	Computer Graphics :Theory into Practice	Jones and Bartlett Publishers	2006
3.	Hill FS Jr	Computer Graphics	Maxwell Macmillan	1990

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23CSE32	DISTRIBUTED PROGRAMMING	L	T	P	C
		3	0	0	3

Course Objective:

- 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:

23CSE32.CO1 Demonstrate knowledge of the basic elements and concepts related to distributed system.

23CSE32.CO2 Apply the inter process communication paradigms in distributed environment.

23CSE32.CO3 Develop various operating system support of the distributed File systems.

23CSE32.CO4 Analyze the file system structure and Synchronization.

23CSE32.CO5 Implement concurrency control techniques for distributed transactions.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE32.CO1	-	X	-	-	X	-	-	X	-	-	X	-	X	-	-
23CSE32.CO2	X	-	X	X	-	-	X	-	-	-	-	-	-	X	-
23CSE32.CO3	-	-	X	-	-	X	X	-	-	X	-	-	-	-	X
23CSE32.CO4	-	-	-	-	-	X	-	--	X	-	-	X	X	-	-
23CSE32.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

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 Periods: 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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23CSE33	ENTERPRISE PROJECT DEVELOPMENT USING FOSS	L	T	P	C
		3	0	0	3

Course Objective:

- 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:

23CSE33.CO1 Use appropriate search algorithms for any AI problem.

23CSE33.CO2 Represent a problem using first order and predicate logic.

23CSE33.CO3 Provide the apt agent strategy to solve a given problem.

23CSE33.CO4 Design software agents to solve a problem.

23CSE33.CO5 Develop applications for NLP that use Artificial Intelligence.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE33.CO1	X	X	X	-	-	-	-	-	X	-	X	X	X	-	X
23CSE33.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	X
23CSE33.CO3	X	X	X	X	X	X	-	X	-	-	X	X	X	X	-
23CSE33.CO4	X	X	X	X	-	-	-	X	-	X	X	X	X	X	X
23CSE33.CO5	X	X	X	X	-	X	-	X	-	-	-	X	X	X	X

Unit-I GNU/LINUX ARCHITECTURE AND DEVELOPMENT TOOLS N 9

GNU/Linux Architecture, Architectural Breakdown of Major Kernel Components, Linux distributions, GNU Compiler Tool Chain, Building Software with GNU Make, Make file Constructs. Static Shared-Dynamic Libraries, Building packages with Auto make / Auto conf.

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, Path names 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.

Total Periods: 45

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

Reference Books:

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

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23CSE34	PARALLEL COMPUTING	L	T	P	C
		3	0	0	3

Course Objective:

- 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:

23CSE34.CO1 Summarize the issues in implementing parallelism and Communication.

23CSE34.CO2 Apply parallel computing architectures for any given problem.

23CSE34.CO3 Appraise the Network requirements for implementing Parallel Computing Environment.

23CSE34.CO4 Design applications by incorporating parallel computing architectures.

23CSE34.CO5 Develop Programs for message passing through the Interfaces.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE34.CO1	X	-	X	X	-	-	X	-	-	X	-	X	X	X	-
23CSE34.CO2	X	X	-	-	X	-	X	X	X	X	-	-	X	-	-
23CSE34.CO3	X	X	X	X	-	X	-	-	X	X	X	X	X	-	-
23CSE34.CO4	X	X	X	-	X	X	-	X	X	X	X	-	-	-	X
23CSE34.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.

Total Periods: 45

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 ardware/Software Approach	Morgan Kaufman 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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23CSE35	KERNEL PROGRAMMING	L	T	P	C
		3	0	0	3

Course Objective:

- 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:

23CSE35.CO1	Configure, build, and install the Linux kernel.
23CSE35.CO2	Describe the Linux kernel source code.
23CSE35.CO3	Explain the various functions of the Linux kernel, including file system, scheduler, and memory management.
23CSE35.CO4	Construct kernel modules for the Linux kernel.
23CSE35.CO5	Implement customized extensions to the Linux kernel.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE35.CO1	X	-	-	-	X	-	-	X	-	-	-	-	-	-	X
23CSE35.CO2	X	-	-	X	X	X	-	-	-	-	X	-	-	X	-
23CSE35.CO3	-	X	X	-	X	-	X	-	-	-	-	-	-	X	-
23CSE35.CO4	-	-	X	X	X	-	X	-	-	-	-	-	X	-	-
23CSE35.CO5	-	-	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, file system, Lab: adding a new system call Managing Memory: Address architecture, address space, Virtual memory, memory mapping, Paging, switching, caching Lab: doinga project on virtual memory Process, kernel thread, task let, 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-III KERNEL SERVICES 9

Fundamental Concepts - Execution of a Complete Instruction - Multiple Bus Organization - Hardwired Control - Micro programmed Control - Pipe lining - Basic Concepts - Data Hazards - Instruction Hazards - Influence on Instruction Sets - Data path and control considerations.

Unit-IV LINUX DEVICES AND NETWORKING 9

Linux device driver architecture, Device file system (dev fs), Hardware I/O, Lab: writing a new device driver, Linux File systems, Virtual file system (VFS),LVM and RAID, Journaling file system (JFS), Lab: writing a new file system, Multiplexing and de multiplexing, Linux TCP/IP Stack, Net filter 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.

Total Periods: 45

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	2000
2.	Addison Wesley	Kernel Projects for Linux By Gary Nutt	ISBN: 0-201-61243-7	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	2015
3.	Jonathan Corbet, Greg Kroah-Hartman, Alessandro Rubini	Linux Device Drivers	Springer	2014
4	Marcel Gagné, Addison Wesley	inux System Administration: A User's Guide	ISBN: 0-201-71934-7	2001
5	Alessandro Rubini & Jonathan Corbet	Linux Device Drivers	ISBN 0-596-00008-1	2001

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23CSE36	SOFT COMPUTING TECHNIQUES	L	T	P	C
		3	0	0	3

Course Objective:

- To introduce the concepts of fuzzy sets and fuzzy logic
- To make students familiar with neural networks
- To know about derivative-free optimization and supervised learning neural networks
- To understand about Unsupervised Learning Neural Networks
- To design Adaptive Neuro-Fuzzy Inference system and Coactive Neuro Fuzzy modelling

Course Outcomes:

23CSE36.CO1 Introduce the concepts of Fuzzy sets and fuzzy logic.

23CSE36.CO2 Illustrate types of Fuzzy Inference System and difference among them, review of.

23CSE36.CO3 Explain the concepts of derivative-free optimization and supervised learning.

23CSE36.CO4 Analyze Unsupervised Learning Neural Networks.

23CSE36.CO5 Discuss Adaptive Neuro -Fuzzy Inference system and Coactive.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE36.CO1	X	-	X	-	-	-	-	-	-	-	-	-	X	-	-
23CSE36.CO2	X	X	X	-	-	-	-	-	-	-	-	-	X	-	-
23CSE36.CO3	X	X	X	X	-	-	-	-	-	-	-	-	X	-	-
23CSE36.CO4	X	-	X	X	-	-	-	-	-	-	-	-	X	-	-
23CSE36.CO5	X	-	X	-	-	-	-	-	-	-	-	-	-	X	-

Unit-I INTRODUCTION TO SOFT COMPUTING & FUZZY LOGIC 9

Introduction to Neuro – Fuzzy and Soft Computing – Fuzzy Sets – Basic Definition and Terminology – Set-theoretic Operations – Member Function Formulation and Parameterization – Fuzzy Rules and Fuzzy Reasoning – Extension Principle and Fuzzy Relations .

Unit-II FUZZY MODELS 9

Fuzzy Inference Systems – Mamdani Fuzzy Models – Sugeno Fuzzy Models – Tsukamoto Fuzzy Models. Derivative-based Optimization – Descent Methods – The Method of Steepest Descent – Classical Newton's Method.

Unit-III DERIVATIVE-FREE OPTIMIZATION 9

Step Size Determination – Derivative-free Optimization – Genetic Algorithms – Simulated Annealing – Random Search – Downhill Simplex Search. Supervised Learning Neural Networks – Perceptrons - Adaline – Back ropagation Mutilayer Perceptrons.

Unit-IV UNSUPERVISED LEARNING NEURAL NETWORKS 9

Radial Basis Function Networks – Unsupervised Learning Neural Networks – Competitive Learning Networks – Kohonen Self-Organizing Networks – Learning Vector Quantization – Hebbian learning.

Unit-V ADAPTIVE NEURO-FUZZY INTERFERENCE SYSTEMS 9

Adaptive Neuro-Fuzzy Inference Systems – Architecture – Hybrid Learning Algorithm – Learning Methods that Cross- fertilize ANFIS and RBFN – Coactive Neuro Fuzzy Modeling – Framework Neuron Functions for Adaptive Networks – Neuro Fuzzy Spectrum.

Total Periods: 45

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	2007

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Timothy J.Ross	Fuzzy Logic with Engineering Applications	McGraw- Hill	1997
2.	David E. Goldberg	Genetic Algorithm in Search Optimization and Machine Learning	Addison Wesley, N.Y	1989
3.	S.Rajasekaran and G.A.Vijayalakshmi Pai	Neural Networks, Fuzzy Logic and Genetic Algorithm	Prentice-Hall of India Pvt. Ltd.,	2003

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23CSE37	STORAGE INFRASTRUCTURE MANAGEMENT	L	T	P	C
		3	0	0	3

Course Objective:

- 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:

23CSE37.CO1 Identify the performance of Key challenges in managing information.

23CSE37.CO2 Analyze the technologies in storage networks.

23CSE37.CO3 Implementing the advance storage networks and Virtualization.

23CSE37.CO4 Apply of replications and network infrastructure and replication.

23CSE37.CO5 Summarize the business techniques and analyze the risk in business continuity.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE37.CO1	-	-	X	-	-	X	-	-	-	-	-	X	-	X	-
23CSE37.CO2	-	X	-	-	x	X	-	-	-	X	x	-	X	x	-
23CSE37.CO3	-	-	X	-	-	X	-	-	X	-	-	X	-	-	X
23CSE37.CO4	X	X	-	X	-	-	X	-	-	X	-	-	X	-	-
23CSE37.CO5	X	-	-	-	-	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 STRATEGIES FOR INFRASTRUCTURE PROJECTS **9**

Risk Management Framework For Infrastructure Projects, Shaping The Planning Phase Of Infrastructure Projects To Mitigate Risks, Designing Sustainable Contracts, Sustainable Development Of Infrastructure, Innovative Design And Maintenance Of Infrastructure Facilities.

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 Periods: 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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23CSE38	TOTAL QUALITY MANAGEMENT	L	T	P	C
		3	0	0	3

Course Objective:

- 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:

23CSE38.CO1 Describe the Dimensions and Barriers regarding with Quality.

23CSE38.CO2 Illustrate the TQM Principles.

23CSE38.CO3 Demonstrate Tools utilization for Quality improvement.

23CSE38.CO4 Summarize the various types of Techniques are used to measure Quality.

23CSE38.CO5 Apply various Quality Systems and Auditing on implementation of TQM.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE38.CO1	X	-	X	X	-	-	X	-	-	X	-	X	X	X	-
23CSE38.CO2	X	X	-	-	X	-	X	X	X	X	-	-	X	-	-
23CSE38.CO3	X	X	X	X	-	X	-	-	X	X	X	X	X	-	-
23CSE38.CO4	X	X	X	-	X	X	-	X	X	X	X	-	-	-	X
23CSE38.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, and 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 PROBLEMS SOLVING AND QUALITY SYSTEMS **9**

Defining problem; Problem identification and solving process; QC tools. Concept of quality system standards: relevance and origin of ISO 9000; Benefits; Elements of ISO 9001, ISO 9002, ISO 9003. TS 16949.ISO-14001, OHSAS.

Total Periods: 45

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 Butter worth	Hcinemann 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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23CSE39	CLOUD INFRASTRUCTURE SERVICES	L	T	P	C
		3	0	0	3

Course Objective:

- 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:

23CSE39.CO1 Compare the strengths and limitations of cloud computing models.

23CSE39.CO2 Illustrate the fundamental concepts of cloud storage.

23CSE39.CO3 Address the core issues of cloud computing such as security, privacy and interoperability.

23CSE39.CO4 Deploy applications over commercial cloud computing infrastructures.

23CSE39.CO5 Analyze the billing of resources and disaster management.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE39.CO1	X	-	X	-	-	X	X	X	-	X	-	-	X	-	X
23CSE39.CO2	X	X	-	-	-	X	X	X	-	X	-	-	X	X	X
23CSE39.CO3	-	-	X	X	-	X	-	X	-	X	-	X	X	X	-
23CSE39.CO4	X	-	X	-	X	X	-	-	-	X	X	X	X	X	-
23CSE39.CO5	X	-	X	-	X	X	X	X	-	X	-	X	-	X	-

Unit-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-BasicUnderstanding APIs - AWS programming interfaces, Web services, AWS URL naming, Matching interfaces andservices, 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 VIRTUAL PRIVATE CLOUD 9

Private network at home-Subnet, CIDR, Netmask at a glance-Relation between a VPC Subnet and an Availability Zone Nat Gateway vs Internet Gateway-Elastic IP vs Static IP Creating a custom VPC.

Unit-V STORAGE 9

Different hard disk types-Understand Block size, IOPS and Throughput Introduction to Elastic Block Store - EBS Snapshots- EBS Volume Types-Attach multiple EBS volumes to an instance Demonstrate LVM with multi EBS volumes

Total Periods: 45

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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23CSE40	GRAPHICS AND MULDIMEDIA	L	T	P	C
		3	0	0	3

Course Objective:

- 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:

23CSE40.CO1 Develop algorithms to draw fundamental drawings.

23CSE40.CO2 Construct real-time rendering 3D graphics.

23CSE40.CO3 Design multimedia Application.

23CSE40.CO4 Compress the Multimedia file system.

23CSE40.CO5 Integrate Hypermedia components using multimedia message standards.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE40.CO1	X	X	X	-	-	-	-	-	-	-	-	-	X	X	-
23CSE40.CO2	-	X	X	-	-	-	-	X	-	-	-	-	-	X	X
23CSE40.CO3	-	X	X	-	-	-	-	X	-	-	-	-	-	X	X
23CSE40.CO4	X	X	X	-	-	-	-	-	-	-	-	-	-	X	X
23CSE40.CO5	-	X	X	X	-	-	-	-	-	-	-	-	-	X	X

Unit-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 Periods: 45

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 Desig	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 ractice	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 Application	Prentice- Hall of India	1998

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23CSE41	GRAPHICS AND MULTIMEDIA LABORATORY	L	T	P	C
		0	0	2	1

Course Objective:

- 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:

23CSE41.CO1	Illustrate Bresenham's algorithms for line, circle and ellipse drawing.
23CSE41.CO2	Design an algorithm for 2D trsnsformations on translation, rotation, scaling, refelction, sharing and 2D clipping.
23CSE41.CO3	Formulate an algorithm for 3D transformations on translation, rotation, scaling.
23CSE41.CO4	Implement text compression, image compression and animation.
23CSE41.CO5	Apply various color model and editing operation on image.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE41.CO1	X	X	X	-	-	-	-	-	-	-	-	-	X	X	-
23CSE41.CO2	-	X	X	-	-	-	-	X	-	-	-	-	-	X	X
23CSE41.CO3	-	X	X	-	-	-	-	X	-	-	-	-	-	X	X
23CSE41.CO4	X	X	X	-	-	-	-	-	-	-	-	-	X	X	-
23CSE41.CO5	-	X	X	X	-	-	-	-	-	-	-	-	-	X	X

Sl.No.	List of Experiments
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 Periods: 30

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23CSE42	SOFTWARE QUALITY ASSURANCE	L	T	P	C
		3	0	3	3

Course Objective:

- 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:

23CSE42.CO1 Analyze Software quality factors and components.

23CSE42.CO2 Utilize the concepts in SQA Components and software development life cycle.

23CSE42.CO3 Apply the training and certification to check the audit.

23CSE42.CO4 Evaluate the quality of software product.

23CSE42.CO5 Demonstrate their capability to adopt quality standards.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE42.CO1	-	X	-	-	X	-	-	X	-	-	X	-	X	-	-
23CSE42.CO2	X	-	X	X	-	-	X	-	-	-	-	-	-	X	-
23CSE42.CO3	-	-	X	-	-	X	X	-	-	X	-	-	-	-	X
23CSE42.CO4	-	-	-	-	-	X	-	--	X	-	-	X	X	-	-
23CSE42.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 Periods: 45

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- Menachem	Software Quality: Producing Practical Consistent Software	International Thomson Computer Press	1997

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23CSE43	SCALING AND CONNECTING NETWORKS	L	T	P	C
		3	0	0	3

Course Objective:

- 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
- Illustrate the features of OSPF protocols

Course Outcomes:

23CSE43.CO1 Identify and design the new models for VLAN.

23CSE43.CO2 Develop various Routing Algorithm.

23CSE43.CO3 Compare the operations of dynamic Routing Protocol.

23CSE43.CO4 Analyze the different models for Network dynamics.

23CSE43.CO5 Configure Shortest Route using OSPF.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE43.CO1	X	X	X	X	-	X	-	-	X	X	-	X	-	X	X
23CSE43.CO2	X	X	X	X	-	-	-	X	X	X	-	-	X	X	X
23CSE43.CO3	X	X	X	X	-	X	-	-	X	X	-	X	-	X	X
23CSE43.CO4	X	X	X	X	-	X	-	-	X	X	X	X	-	X	X
23CSE43.CO5	X	X	X	X	X	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 forIPv4,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

Total Periods: 45

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 orais Cordeiro	Adhoc and Sensor Networks –Theory and Applications	World Scientific publication	2008

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23CSE44	OPEN STACK ESSENTIALS	L	T	P	C
		3	0	0	3

Course Objective:

- 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:

23CSE44.CO1 Installing Pack stack and generating an answer file.

23CSE44.CO2 Develop Glance as a Registry of images.

23CSE44.CO3 Construct Web Interface External Network Setup.

23CSE44.CO4 Determine Object file management in the web interface.

23CSE44.CO5 Implement interactive Scaling control and Networking Services.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE44.CO1	X	X	-	-	X	-	X	-	-	-	-	-	X	-	-
23CSE44.CO2	-	-	X	-	-	-	X	X	-	-	X	-	-	X	-
23CSE44.CO3	-	-	X	-	X	-	-	-	X	X	-	-	-	-	X
23CSE44.CO4	-	X	-	X	-	X	-	-	X	-	-	X	-	X	-
23CSE44.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.

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Dan Radez	Open Stack Essentials, SecondEdition	Packt Publishing	2015
2.	James Denton	Learning Open Stack Networking, 3rd 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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23CSE45	SOFTWARE DEFINED NETWORKS	L	T	P	C
		3	0	0	3

Course Objective:

- 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:

23CSE45.CO1 Interpret basic principles of python programming.

23CSE45.CO2 Write clear and effective python code.

23CSE45.CO3 Create applications using python programming.

23CSE45.CO4 Access database using python programming.

23CSE45.CO5 Develop web applications using python programming.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE45.CO1	X	-	X	X	-	-	X	-	-	X	-	X	X	X	-
23CSE45.CO2	X	X	-	-	X	-	X	X	X	X	-	-	X	-	-
23CSE45.CO3	X	X	X	X	-	X	-	-	X	X	X	X	X	-	-
23CSE45.CO4	X	X	X	-	X	X	-	X	X	X	X	-	-	-	X
23CSE45.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 - SDN - Genesis of SDN - SDN Working

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

Total Periods: 45

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 Beginners	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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23CSE46	DOCKER AND KUBERNETES	L	T	P	C
		3	0	0	3

Course Objective:

- 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 state full and stateless apps on the cluster

Course Outcomes:

23CSE46.CO1 Installing & creating an account with docker Hub.

23CSE46.CO2 Summarize the interactive Scaling control and Networking Services using docker.

23CSE46.CO3 Expose the Build Comprehensive Hands-on with Kubernetes Components .

23CSE46.CO4 Organize Kubernetes Cluster installation on Virtual box, AWS & Google Cloud Platforms.

23CSE46.CO5 Develop interactive app outside the cluster and to auto scale apps.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE46.CO1	X	-	X	X	-	-	X	-	-	X	-	X	X	X	-
23CSE46.CO2	X	X	-	-	X	-	X	X	X	X	-	-	X	-	-
23CSE46.CO3	X	X	X	X	-	X	-	-	X	X	X	X	X	-	-
23CSE46.CO4	X	X	X	-	X	X	-	X	X	X	X	-	-	-	X
23CSE46.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 multi host 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-Core OS 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, Core OS Linux- Kubernetes docker containers-Nodes-Cluster- Service-pod-Replicationcontroller-label-selector-name-namespace-volume-Service proxy-listing service-listing nodes- Kubernetes Cluster-Scaling-Testing-word press with kubernetes cluste**r.**

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Deepak Vohra	Kubernetes Micro services with Docker	A press	2016
2.	Neependra Khare	Docker Cookbook	Packet Publishing	2015

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Deepak Vohra	Kubernetes Management Design Patterns	A press	2017
2.	Ed Robinson	Kubernetes on AWS	Packet Publishing	2018
3.	Karl Matthias, Sean P. Kane	Docker: Up and Running	Reilly Media	2015

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23CSE47	USER CENTRIC DESIGN	L	T	P	C
		3	0	0	3

Course Objective:

- 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:

23CSE47.CO1	Evaluate an appreciation for the theory and sensibilities of user-centered design.
23CSE47.CO2	Illustrate skills in the use and application of a variety of design methods, specifically applicable to user- centered design.
23CSE47.CO3	Utilize individual and collaborative skills in design-based problem solving.
23CSE47.CO4	Develop UCD is an Iterative process.
23CSE47.CO5	Analyze Multidisciplinary Design Teams for User Centered Design.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE47.CO1	-	X	-	-	X	-	-	X	-	-	X	-	X	-	-
23CSE47.CO2	X	-	X	X	-	-	X	-	-	-	-	-	-	X	-
23CSE47.CO3	-	-	X	-	-	X	X	-	-	X	-	-	-	-	X
23CSE47.CO4	-	-	-	-	-	X	-	--	X	-	-	X	X	-	-
23CSE47.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

.

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 Periods: 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 KateCrane	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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23CSE48	NODEJS AND REACT.JS	L	T	P	C
		3	0	0	3

Course Objective:

- 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:

23CSE48CO1 Examine the fundamental structure of Node.js platform.

23CSE48.CO2 Apply packages of NodeJS to work with Data, Files, Http Requests and Responses.

23CSE48.CO3 Interpret the concepts of streams and file systems.

23CSE48.CO4 Develop the web content using node.js and RESTful api.

23CSE48.CO5 Create interactive user interfaces with react components.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE48CO1	X	-	-	X	X	X	X	-	-	-	-	X	X	X	-
23CSE48.CO2	X	-	X	-	X	-	X	-	X	X	X	X	X	X	-
23CSE48.CO3	X	-	X	X	X	-	-	-	X	X	X	X	X	-	-
23CSE48.CO4	X	X	X	X	X	X	-	-	X	X	X	X	X	X	X
23CSE48.CO5	X	X	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 Console- Node.js Errors - Node.jsDNS - Node.js Net - Node.js Events: Event Loop - Event Emitter - Debugger

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 Modules: Built-in Module - utility Module - Web Module - Node.js html form handling - Node.js Database Connectivity - Node.js Restful API

Unit-V INTRODUCTION TO REACT.JS 9

The environment of React.js - Benefits and Features - constructor - props – components – state – lifecycle - router - map - hooks – events – forms – CSS.

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	AzatMardan	Practical Node. Js Building 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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23CSE49	AGILE METHODOLOGY	L	T	P	C
		3	0	0	3

Course Objective:

- 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:

23CSE49CO1	Realize the importance of interacting with business stakeholders in determining the requirements for a software system.
23CSE49.CO2	Perform iterative software development processes: how to plan them, how to execute them.
23CSE49.CO3	Develop techniques and tools for improving team collaboration and software quality.
23CSE49.CO4	Analyse Software process improvement as an ongoing task for development teams.
23CSE49.CO5	Show how agile approaches can be scaled up to the enterprise level.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE49CO1	X	-	X	-	X	-	-	X	-	X	-	X	X	X	-
23CSE49.CO2	X	X	-	-	X	-	-	X	X	X	-	-	X	-	-
23CSE49.CO3	X	X	X	X	-	X	-	-	X	X	X	X	-	X	-
23CSE49.CO4	X	X	X	X	-	X	-	-	X	X	X	-	X	-	X
23CSE49.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 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.

Total Periods: 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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23CSE50	TEXT MINING	L	T	P	C
		3	0	0	3

Course Objective:

- 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:

23CSE50CO1 Design text extraction techniques.

23CSE50.CO2 Design clustering techniques for text.

23CSE50.CO3 Design classification techniques for text

23CSE50.CO4 Practice visualization methodologies using tools.

23CSE50.CO5 Practice feature extraction using tools

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE50CO1	X	-	X	X	-	-	X	-	-	X	-	X	X	X	-
23CSE50.CO2	X	X	-	-	X	-	X	X	X	X	-	-	X	-	-
23CSE50.CO3	X	X	X	X	-	X	-	-	X	X	X	X	X	-	-
23CSE50.CO4	X	X	X	-	X	X	-	X	X	X	X	-	-	-	X
23CSE50.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

Total Periods: 45

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	2012

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23CSE51	ANGULAR JS	L	T	P	C
		3	0	0	3

Course Objective:

- 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:

23CSE51.CO1 Recall the concepts of HTML and JavaScript and express the features of AngularJS.

23CSE51.CO2 Rephrase the purpose of binding and template and the various effects of elements and events.

23CSE51.CO3 Construct various scopes, controllers and features of directives.

23CSE51.CO4 Identify the several services and its works and Design the applications using AJAX.

23CSE51.CO5 Comprehend the concepts of animation services and the various actions of provision.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE51.CO1	X	X	-	-	X	-	-	-	-	X	-	X	-	-	-
23CSE51.CO2	X	-	X	-	X	-	-	X	-	-	X	-	-	-	-
23CSE51.CO3	X	-	X	X	-	-	X	-	-	-	-	-	-	X	-
23CSE51.CO4	X	-	X	-	X	-	-	-	-	X	X	-	-	-	X
23CSE51.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 Periods: 45

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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23CSE52	DEEP LEARNING	L	T	P	C
		3	0	0	3

Course Objective:

- 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:

23CSE52.CO1 Understand the role of Deep learning in Machine Learning Applications.

23CSE52.CO2 To get familiar with the use of TensorFlow/Keras in Deep Learning Applications.

23CSE52.CO3 To design and implement Deep Learning Applications.

23CSE52.CO4 Critically Analyse Different Deep Learning Models in Image Related Projects.

23CSE52.CO5 To design and implement Convolutional Neural Networks

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE52.CO1	X	-	-	X	X	-	X	X	-	-	X	-	X	-	-
23CSE52.CO2	X	-	X	X	-	-	X	-	-	-	X	-	-	X	-
23CSE52.CO3	X	-	X	-	-	X	X	-	-	X	X	-	-	-	X
23CSE52.CO4	X	X	-	-	-	X	-	-	X	-	X	X	X	X	-
23CSE52.CO5	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 Periods: 45

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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23CSE53	FOG COMPUTING	L	T	P	C
		3	0	0	3

Course Objective:

- 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:

23CSE53.CO1 Explore the fundamentals and management in fog computing.

23CSE53.CO2 Use the design of fog architecture.

23CSE53.CO3 Design new services with fog computing.

23CSE53.CO4 Explore Fog on security, multimedia and smart data.

23CSE53.CO5 Model the fog computing scenario.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE53.CO1	X	-	-	X	X	-	X	X	-	-	X	-	X	-	-
23CSE53.CO2	X	-	X	X	-	-	X	-	-	-	X	-	-	X	-
23CSE53.CO3	X	-	X	-	-	X	X	-	-	X	X	-	-	-	X
23CSE53.CO4	X	X	-	-	-	X	-	-	X	-	X	X	X	X	-
23CSE53.CO5	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 Generation with LSTMs.

Total Periods: 45

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	2018

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23CSE54	J2EE TECHNOLOGIES	L	T	P	C
		3	0	0	3

Course Objective:

- 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:

23CSE54.CO1 Develop web-based applications using Java servlet / JSP.

23CSE54.CO2 Work with different enterprise java beans.

23CSE54.CO3 Select suitable technique for message transmission / reception.

23CSE54.CO4 Develop GUI-based applications using JSF.

23CSE54.CO5 Deploy SOAP-based / REST-based web services.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE54.CO1	X	-	-	-	X	-	-	X	-	-	-	-	-	-	X
23CSE54.CO2	X	-	-	X	X	X	-	-	-	-	X	-	-	X	-
23CSE54.CO3	-	-	X	-	X	-	X	-	-	-	-	-	-	X	-
23CSE54.CO4	-	X	X	X	X	-	X	-	-	-	-	-	X	-	-
23CSE54.CO5	-	-	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.

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 Periods: 45

Text Books:

Sl.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:

Sl.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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23CSE55	ADVANCED JAVA PROGRAMMING	L	T	P	C
		3	0	0	3

Course Objective:

- To explore Java Language and Fundamentals
- To know the object oriented concepts and functional style data processing
- To understand the java libraries and know effective programming with streams
- To familiar the enhanced java features
- To study system based application using AWT and Swing

Course Outcomes:

23CSE55.CO1 Understand Java Language and Fundamentals.

23CSE55.CO2 Examine object oriented concepts and functional style data processing.

23CSE55.CO3 Develop java libraries and know effective programming with streams.

23CSE55.CO4 Apply the enhanced java features.

23CSE55.CO5 Create a system based application using AWT and Swing.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE55.CO1	X	X	-	X	X	-	-	-	-	-	-	X	-	X	-
23CSE55.CO2	X	-	X	X	X	-	X	X	-	-	X	-	-	-	-
23CSE55.CO3	X	-	X	X	X	-	-	-	X	-	X	-	-	X	-
23CSE55.CO4	X	-	X	X	X	-	X	-	-	-	X	-	-	-	X
23CSE55.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- Java8,9,10, and 11: what's happening?-Passing code with behavior parameterization.

Unit-II OOPS AND FUNCTIONAL-STYLE DATAPROCESSING 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 ANDLAMBDAS 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 Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	E.Balagurusamy	Programming with JAVA	McGraw Hill	2023
2.	Uttam K.Roy	Advanced JAVA Programming	Oxford University	2015
3.	Raoul-Gabriel Urma, MarioFusco,AlanMycroft,	Modern Java in Action: Lambdas, streams, functional and reactive programming	Manning	2018

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Raoul-GabrielUrma,Mario FuscoandAlanMycroft	Java 8inAction	Dreamtech	2014
2.	B.Prasanalakshmi	Advanced JAVA Programming	CBS Publishers	2015

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23CSE56	PARALLEL AND DISTRIBUTED COMPUTING	L	T	P	C
		3	0	0	3

Course Objective:

- To explore the features and fundamentals of parallel computing paradigms
- To know the Parallel Algorithmic Models
- To understand the performance of parallel systems and parallel programming
- To familiar the design principles in distributed systems and the architectures for distributed systems
- To techniques fault tolerance and recovery in distributed systems and algorithms

Course Outcomes:

23CSE56.CO1	Understand the features and fundamentals of parallel computing paradigms.
23CSE56.CO2	Understand the Parallel Algorithmic Models.
23CSE56.CO3	Learn the performance of parallel systems and parallel programming.
23CSE56.CO4	Demonstrate the design principles in distributed systems and the architectures for distributed systems.
23CSE56.CO5	Analyze fault tolerance and recovery in distributed systems and algorithms.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE56.CO1	X	X	-	X	X	-	-	-	-	-	-	X	-	X	-
23CSE56.CO2	X	-	X	X	X	-	X	X	-	-	X	-	-	-	-
23CSE56.CO3	X	-	X	X	X	-	-	-	X	-	X	-	-	X	-
23CSE56.CO4	X	-	X	X	X	-	X	-	-	-	X	-	-	-	X
23CSE56.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 of Parallel 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.

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 Periods: 45

Text Books:

Sl.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:

Sl.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	Distributed Computing – Principles and Applications	2011

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23CSE57	INFORMATION SECURITY	L	T	P	C
		3	0	0	3

Course Objective:

- To explore the basics of information security
- To explore the legal, ethical and professional issues in information security
- To learn the various aspects in data security
- To study various standards in the Information Security System
- To learn implementation of security techniques

Course Outcomes:

23CSE57.CO1 Discuss the basics of information security.

23CSE57.CO2 Illustrate the legal, ethical and professional issues in information security.

23CSE57.CO3 Demonstrate the various aspects in data security.

23CSE57.CO4 Explain various standards in the Information Security System.

23CSE57.CO5 Design and implementation of security techniques.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE57.CO1	X	X	X	-	-	-	-	-	X	-	X	X	-	X	-
23CSE57.CO2	X	X	X	X	X	X	-	-	-	-	X	X	-	X	-
23CSE57.CO3	X	X	X	X	X	-	-	X	-	X	X	X	-	X	-
23CSE57.CO4	X	X	X	X	-	-	-	X	-	X	X	X	-	X	-
23CSE57.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 Periods: 45

Text Books:

Sl.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.	Vikas Publishing House	Cryptography and Network Security	Tata McGraw Hill Ltd	2013

Reference Books:

Sl.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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23CSE58	SOFT COMPUTING	L	T	P	C
		3	0	0	3

Course Objective:

- Provide students with a thorough grasp of neural networks, encompassing both principles and practical applications
- Introduce foundational fuzzy logic concepts and showcase their real-world relevance across diverse scenarios
- Familiarize students with tree-based classification and regression methods, alongside various data clustering techniques
- Develop an understanding of evolutionary algorithms, covering genetic algorithms, genetic programming, evolutionary strategies, and differential evolution
- Offer a comprehensive overview of the principles and foundations underlying fuzzy logic, neural networks, and evolutionary algorithms

Course Outcomes:

23CSE58.CO1	Comprehend the fundamental principles and mathematical underpinnings of artificial neural networks (ANNs), drawing from their biological origins and historical evolution.
23CSE58.CO2	Grasp the principles and theoretical framework of fuzzy logic, encompassing concepts like fuzzy sets, membership functions, logical operators, and rules.
23CSE58.CO3	Acquire insights into the principles and algorithms governing tree-based techniques, including decision trees, random forests, and gradient boosting machines.
23CSE58.CO4	Develop an understanding of both neural networks and fuzzy logic, covering their underlying principles and theoretical foundations.
23CSE58.CO5	Understanding the mathematical foundations and theoretical aspects of evolutionary computation, including population dynamics, selection mechanisms and convergence analysis.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE58.CO1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
23CSE58.CO2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
23CSE58.CO3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
23CSE58.CO4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
23CSE58.CO5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Unit-I FOUNDATIONS OF NEURAL NETWORKS 9

Basic Concepts – Single Layer Perception – Multilayer Perception – Supervised and Unsupervised Learning – Back Propagation networks – Kohnen's self-organizing networks – Hop field networks – Distance measures.

Unit-II FUZZY LOGIC FUNDAMENTALS AND REAL-WORLD APPLICATIONS 9

FUZZY sets, properties, Membership functions Fuzzy operations, Applications.

Unit-III EXPLORING TREE-BASED METHODS AND DATA CLUSTERING TECHNIQUES 9

Classification and Regression Trees – Data Clustering Algorithms – Rule based Structure identification.

Unit-IV NEURO-FUZZY SYSTEMS 9

Fusion of neural networks- and fuzzy logic -Fuzzy Inference Systems (ANFIS), -prediction, and optimization- Lastly - future trends and challenges- emphasizing the growing importance of neuro-fuzzy approaches in AI and engineering.

Unit-V EVOLUTIONARY COMPUTING 9

Evolutionary Computation – Survival of the Fittest – Fitness Computation – Crossover – Mutation – Reproduction – Rank space Method. Case Studies: Applications of soft computing.

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Laurence Fausett	Fundamentals of Neural Networks	Seventh Edition, Dorling Kindersley (India) P. Ltd	2015
2.	Satish Kumar	Neural Networks – A Classroom Approach	Tata McGraw-Hill,	2014
3.	Timothy J.Rose	Fuzzy Logic with Engineering Applications	Third Edition, John Wiley,	2015
4.	J.S.R Jang,C.T Sun and E.Mizutani	Neuro-Fuzzy and Soft Computing	Second Edition, Prentice Hall of India,	2005
5.	D.E.Goldberg	Genetic Algorithms in search, optimization and Machine learning	Second Edition, Addison Wesley,	2007

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23CSE59	SPEECH RECOGNITION	L	T	P	C
		3	0	0	3

Course Objective:

- To learn about speech signals and speech production process
- To know the functions of front end signals
- To deduct the distortions of Speech Signals
- To implement the Hidden Markov models in Speech Recognition
- To Recognize the speech using Learning models

Course Outcomes:

23CSE59.CO1	Understand speech recognition principles, methods, models and implementation.
23CSE59.CO2	Apply speech recognition principles &methods to characterize the speech signal and to recognize the speech.
23CSE59.CO3	Apply the Pattern Comparison Techniques and Hidden Markov Models to recognise the speech.
23CSE59.CO4	Analyse the speech recognition methods, pattern comparison techniques and Hidden Markov Models.
23CSE59.CO5	Learn the applications of Speech Processing and Recognition.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE59.CO1	X	-	-	-	-	-	-	X	X	X	-	X	-	-	X
23CSE59.CO2	X	-	-	-	-	-	-	X	X	X	-	X	-	-	X
23CSE59.CO3	X	-	-	-	-	-	-	X	X	X	-	-	-	-	X
23CSE59.CO4	-	X	-	-	-	-	-	X	X	X	-	-	-	-	-
23CSE59.CO5	X	X	-	-	-	-	-	X	X	X	-	-	-	-	X

Unit-I SPEECH SIGNAL 9

The Speech Signal: Fundamentals of Speech recognition, the process of speech production and perception in human beings, the speech production process, representing speech in time and frequency domains, speech sounds and features.

Unit-II SIGNAL PROCESSING AND ANALYSIS METHODS FOR SPEECH RECOGNITION 9

Spectral analysis models, The Bank-of-filters front-end processor, Linear predictive coding model for Speech recognition, Vector quantization.

Unit-III PATTERN COMPARISON TECHNIQUES 9

Introduction, Speech detection, Distortion measures -Mathematical considerations, Distortion measures - Perceptual considerations, Spectral distortion measures.

Unit-IV THEORY AND IMPLEMENTATION OF HIDDEN MARKOV MODELS 9

Introduction, Discrete time Markov processes, Extensions to Hidden Markov models, Three basic problems for HMMs, Types of HMMs, Continuous observation densities in HMMs, comparison of HMMs, Implementation issues for HMMs, HMM system for isolated word recognition.

Unit-V LARGE VOCABULARY CONTINUOUS SPEECH RECOGNITION 9

Introduction, Sub word speech units, sub word unit models based on HMMs, Training of sub word units, Language models for Large vocabulary speech recognition, Statistical language modelling, Perplexity of the language model, Overall recognition system based on sub word units.

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Lawrence Rabiner and Biing-Hwang Juang	Fundamentals of Speech Recognition	Pearson Education	2007

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Lawrence Rabiner, Biing- Hwang Juang, B. Yegnanarayana	Fundamentals of Speech Recognition,	Pearson Education	2009
2.	Claudio Becchetti and Lucio Prina Ricotti	Speech Recognition,	John Wiley and Sons	1999
3.	Frederick Jelinek, Statistical Methods of Speech Recognition	Cryptography and Network Security	MIT Press, Cambridge, MA; London,	1997

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23CSE60	PYTHON FOR DATA SCIENCE	L	T	P	C
		3	0	0	3

Course Objective:

- To explore the fundamentals of Data Science
- To illustrate the basics of Numpy for computations
- To learn use of pandas for various data manipulations.
- To apply various functions to clean and wrangling the data.
- To study the experiment visualizations with Matplotlib Library

Course Outcomes:

23CSE60.CO1 Understand the fundamental concepts of data science and python programming.

23CSE60.CO2 Discriminate Numpy operations for computations.

23CSE60.CO3 Make use of pandas for various data manipulations.

23CSE60.CO4 Predict the data to clean or wrangling.

23CSE60.CO5 Experiment visualizations with Matplotlib Library

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE60.CO1	X	X	-	-	X	X	-	X	X	-	X	-	X	X	-
23CSE60.CO2	X	X	X	X	X	X	-	X	-	X	X	X	X	X	X
23CSE60.CO3	X	X	-	X	-	X	-	X	X	X	X	-	X	-	X
23CSE60.CO4	X	X	X	X	X	-	X	X	-	X	X	X	-	X	X
23CSE60.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 availablefor Data Science -Data Exploration, Feature Engineering. Introduction to python – Python Libraries, Installation and setup procedure, Python language basics.

Unit-II INTRODUCTION TO NUMPY **9**

NumPy Basics : NumPy ndarray, creation, Indexing and slicing, transposing arrays and swapping; Universal functions – fast element-wise array functions; Array-oriented programming with Arrays – Expressing conditional logic as array operations, Mathematical and statistical methods, methods for Boolean arrays, sorting, unique and other set logic, File Input and Output with arrays; Linear algebra; Pseuorandom number generation.

Unit-III DATA MANIPULATION WITH PANDAS **9**

Introduction to Panda data structures – series, Dataframe, Index objects; Essential functionality – Reindexing, dropping, Indexing, selection, filtering, Arithmetic and data alignment, function application and mapping, sorting and ranking, Axis indexes and duplicate labels; Summarizing and computing descriptive labels – Correlation and covariance, Unique values, value counts and membership.

Unit-IV DATA CLEANING AND DATA WRANGLING **9**

Data cleaning - Handling missing data, data transformation, String manipulation; Data wrangling – Hierarchical indexing, reordering and sorting levels, summary statistics by level, indexing dataframes; combining and merging datasets; Reshaping and pivoting

Unit-V VISUALIZATION WITH MATPLOTLIB **9**

Introduction to matplotlib API – Figures and subplots, colors, markers, lables, legends, annotations and drawing on a subplot, saving plots to a file; Plotting with pandas and seaborn – Line plots, bar plots, histograms, scatter plot, facet grids and categorical data; Python visualization tools.

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Wes McKinney	Python for data analysis	O'Reilly Publishers	2018
2.	John Mueller and Luca Massaron	Python for Data Science for Dummies	Wiley	2015

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Jake VanderPlas	Python Data Science Handbook	O'Reilly Publishers	2016

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23CSE61	BIO-INSPIRED COMPUTING	L	T	P	C
		3	0	0	3

Course Objective:

- To explore the bio inspired computing fundamentals
- To explore the apply the behavior of ant in solving large sized computational problems
- To learn the Compare different Ant Colony Optimization algorithmic models
- To study the Compare different Artificial Bee Colony Optimization algorithmic models
- To learn the application use case

Course Outcomes:

23CSE61CO1	Explain about bio inspired computing fundamentals.
23CSE61.CO2	Apply the behavior of ant in solving large sized computational problems.
23CSE61.CO3	Compare different Ant Colony Optimization algorithmic models.
23CSE61.CO4	Compare different Artificial Bee Colony Optimization algorithmic models.
23CSE61.CO5	Explain different bio inspired computing algorithms.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE61CO1	X	X	X	-	-	-	-	-	X	-	X	X	X	X	-
23CSE61.CO2	X	X	X	X	X	X	-	-	-	-	X	X	X	X	X
23CSE61.CO3	X	X	X	X	X	-	-	X		X	X	X	X	-	X
23CSE61.CO4	X	X	X	X	-	-	-	X	-	X	X	X	X	X	X
23CSE61.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.

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

Total Periods: 45

Text Books:

Sl.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:

Sl.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.	Simon O. HaykinThird	Neural Networks and Learning Machines	Prentice Hall	2017

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23CSE62	VIDEO ANALYTICS	L	T	P	C
		3	0	0	3

Course Objective:

- To explore the concepts and techniques used in multimedia basics and standard coding techniques
- To explore the numeric problems related to motion estimation
- To learn the work with surveillance videos for analytics
- To study the design of optimization algorithms for better analytics and recognition of objects in a scene
- To learn the various video analytics for different case studies

Course Outcomes:

23CSE62.CO1	Articulate the concepts and techniques used in multimedia basics and standard coding techniques.
23CSE62.CO2	Derive numeric problems related to motion estimation.
23CSE62.CO3	Work with surveillance videos for analytics.
23CSE62.CO4	Design of optimization algorithms for better analytics and recognition of objects in a scene.
23CSE62.CO5	Apply the various video analytics for different case studies

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE62.CO1	X	X	X	-	-	-	-	-	X	-	X	X	X	X	-
23CSE62.CO2	X	X	X	X	X	X	-	-	-	-	X	X	X	X	X
23CSE62.CO3	X	X	X	X	X	-	-	X		X	X	X	X	-	X
23CSE62.CO4	X	X	X	X	-	-	-	X	-	X	X	X	X	X	X
23CSE62.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 Periods: 45

Text Books:

Sl.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:

Sl.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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23CSE63	WEB FRAMEWORKS	L	T	P	C
		3	0	0	3

Course Objective:

- To explore the fundamentals of website development, such as HTML5, XHTML, CSS
- To explore the interactive web page styles using JavaScript and CSS and handling web page events
- To learn the work with Server Side Frameworks
- To study the design of make use of ORM Frameworks, Hibernate
- To learn the various expertise with Angular JS and its application

Course Outcomes:

23CSE63.CO1	Understand and master the fundamentals of website development, such as HTML5, XHTML, CSS.
23CSE63.CO2	Create and design interactive web page styles using JavaScript and CSS and handling web page events.
23CSE63.CO3	Experiment with Server Side Frameworks.
23CSE63.CO4	Make use of ORM Frameworks, Hibernate.
23CSE63.CO5	Expertise with Angular JS and its application.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE63.CO1	X	X	-	X	X	-	-	-	-	-	-	X	-	X	-
23CSE63.CO2	X	-	X	X	X	-	X	X	-	-	X	-	-	-	-
23CSE63.CO3	X	-	X	X	X	-	-	-	X	-	X	-	-	X	-
23CSE63.CO4	X	-	X	X	X	-	X	-	-	-	X	-	-	-	X
23CSE63.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.

Unit-V ANGULAR JS 9

Introduction to AngularJS -MVC Architecture - Conceptual Overview - Setting up the Environment - First Application - Understanding ng attributes

Total Periods: 45

Text Books:

Sl.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:

Sl.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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23CSE64	QUANTUM COMPUTING	L	T	P	C
		3	0	0	3

Course Objective:

- To explore the basics of Quantum Computing
- To explore the fundamental concepts of Quantum mechanics
- To learn the circuits, applications and algorithms of Quantum Computing
- To study the physical realization of Quantum computers
- To learn the fundamentals of quantum information

Course Outcomes:

23CSE64.CO1	Understand the basics of Quantum Computing.
23CSE64.CO2	Describe the fundamental concepts of Quantum mechanics.
23CSE64.CO3	Explore the circuits, applications and algorithms of Quantum Computing.
23CSE64.CO4	Conceptualize the physical realization of Quantum computers.
23CSE64.CO5	Explore the fundamentals of quantum information.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE64.CO1	X	X	X	-	-	-	-	-	X	-	X	X	X	X	-
23CSE64.CO2	X	X	X	X	X	X	-	-	-	-	X	X	X	X	X
23CSE64.CO3	X	X	X	X	X	-	-	X		X	X	X	X	-	X
23CSE64.CO4	X	X	X	X	-	-	-	X	-	X	X	X	X	X	X
23CSE64.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.

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

Total Periods: 45

Text Books:

Sl.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:

Sl.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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23CSE65	NETWORK PROGRAMMING AND MANAGEMENT	L	T	P	C
		3	0	0	3

Course Objective:

- To explore the implement client/server communications using TCP Sockets
- To explore the usage of socket options for handling various sockets in programming
- To learn the work with handling of raw sockets
- To study the functionalities of SNMP and MIB structure
- To learn the various tools available to manage a network

Course Outcomes:

23CSE65.CO1 Implement client/server communications using TCP Sockets.

23CSE65.CO2 Describe the usage of socket options for handling various sockets in programming.

23CSE65.CO3 Understand handling of raw sockets. .

23CSE65.CO4 Explain functionalities of SNMP and MIB structure.

23CSE65.CO5 Experiment with various tools available to manage a network.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE65.CO1	X	-	X	-	-	X	-	-	-	-	-	X	-	X	-
23CSE65.CO2	-	X	-	-	X	X	-	-	-	X	X	-	X	X	-
23CSE65.CO3	-	-	X	-	-	X	-	-	X	-	-	X	-	-	X
23CSE65.CO4	X	X	-	X	-	-	X	-	-	X	-	-	X	-	-
23CSE65.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

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 Periods: 45

Text Books:

Sl.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:

Sl.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	2008
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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23CSE66	INFORMATION RETRIEVAL SYSTEMS	L	T	P	C
		3	0	0	3

Course Objective:

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

Course Outcomes:

23CSE66.CO1	Understand the basics of Information Retrieval.
23CSE66.CO2	Learn various modelling techniques to retrieve data.
23CSE66.CO3	Apply appropriate method of classification or clustering.
23CSE66.CO4	Design and implement innovative features in a search engine.
23CSE66.CO5	Design and implement a recommender system.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSE66.CO1	X	X	X	-	-	-	-	-	X	-	X	X	X	X	-
23CSE66.CO2	X	X	X	X	X	X	-	-	-	-	X	X	X	X	X
23CSE66.CO3	X	X	X	X	X	-	-	X		X	X	X	X	-	X
23CSE66.CO4	X	X	X	X	-	-	-	X	-	X	X	X	X	X	X
23CSE66.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 Retr6eval - The IR System – The Software Architecture of the IR System – The Retrieval and Ranking Processes – The6Web – The e-Publishing Era – How the web changed Search – Practical Issues on the Web – How People Search – Serch 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

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 Periods: 45

Text Books:

Sl.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:

Sl.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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23CSP04	PROJECT WORK PHASE - I	L	T	P	C
		0	0	6	3

Course Objective:

- 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:

23CSP04.CO1 Understand the technical concepts of project area.

23CSP04.CO2 Identify the problem and formulation.

23CSP04.CO3 Design the problem statement.

23CSP04.CO4 Formulate the algorithms by using the design.

23CSP04.CO5 Develop the module.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSP04.CO1	X	X	X	-	X	X	-	-	-	X	-	X	X	-	X
23CSP04.CO2	X	X	-	-	X	-	-	X	-	-	X	-	-	X	-
23CSP04.CO3	X	X	-	X	-	X	-	-	-	-	X	X	-	-	X
23CSP04.CO4	X	-	X	-	-	-	X	-	X	-	-	-	X	X	-
23CSP04.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 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)

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EVALUATION GUIDELINES

1. A panel of examiner will evaluate the viability of project / project scope.
2. The panel will also verify that all the suggestions/comments in the review document are taken care and accordingly allot the term work marks.
3. 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.

Total Periods: 90

23CSP05	PROJECT WORK - PHASE II	L	T	P	C
		0	0	15	12

Course Objective:

- Plan an experimental design to solve Engineering problems
- Develop an attitude of team work and independent working on real time problems
- Analyze and process the experimental information
- Evaluate, interpret and justify the experimental results
- Develop a dissertation report

Course Outcomes:

23CSP05.CO1 Design an experiment to solve engineering / societal problems using modern tools.

23CSP05.CO2 Develop lifelong learning to keep abreast of latest technologies.

23CSP05.CO3 Implement the workflow to provide sustainable solutions.

23CSP05.CO4 Interpret the experimental results and the impact on society and environment.

23CSP05.CO5 Investigate the application for the real time problems.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSP05.CO1	X	X	X	X	X	-	-	-	X	-	-	-	X	X	X
23CSP05.CO2	X	X	X	-	X	X	-	X		-	X	X	X	X	-
23CSP05.CO3	X	X	X	X	X	-	-	-	X	-	X	-	X	-	X
23CSP05.CO4	X	X	X	X	-	X	X	X	-	X	X	X	X		-
23CSP05.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
3. System design details (UML diagrams)
4. System implementation – code documentation – dataflow diagrams/ algorithm, protocols used
5. Test result and procedure
6. Conclusions
7. Appendix
    a. Tools used
    b. References
    c. Papers published/certificates

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Total Periods: 180

23CSP06	COMPREHENSION	L	T	P	C
		0	0	4	2

Course Objective:

- 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:

23CSP06.CO1	Write a paragraph with a topic sentence, support, and concluding sentence.
23CSP06.CO2	Produce coherent and unified paragraphs with adequate support and detail of the topic.
23CSP06.CO3	Write an effective introduction thesis statement that addresses the writing prompt and conclusion.
23CSP06.CO4	Produce appropriate vocabulary and correct word forms.
23CSP06.CO5	Produce accurate grammatical structures for the paragraph writing.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSP06.CO1	X	-	-	-	X	X	X	X	X	X	-	X	-	X	-
23CSP06.CO2	X	-	-	-	-	X	-	X	X	X	-	X	-	-	X
23CSP06.CO3	X	X	X	X	X	X	-	-	X	X	X	X	-	X	-
23CSP06.CO4	X	-	-	-	-	X	-	-	X	X	X	X	X	-	X
23CSP06.CO5	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 Periods: 60

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23CSP07	TECHNICAL SEMINAR	L	T	P	C
		0	4	0	2

Course Objective:

- 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:

23CSP07.CO1 Develop a skill for work in actual working environment.

23CSP07.CO2 Utilize available technical resources in efficient manner.

23CSP07.CO3 Write technical documents and give oral presentations related to the work completed.

23CSP07.CO4 Prepare a presentation in latest trends in Information Technology.

23CSP07.CO5 Implement the presentation in latest trends in Information Technology.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSP07.CO1	X	-	X	-	-	X	X	-	-	-	-	-	X	-	-
23CSP07.CO2	-	-	X	-	X	-	-	X	X	X	-	-	-	-	X
23CSP07.CO3	X	-	X	-	X	-	-	-	-	X	X	-	-	X	-
23CSP07.CO4	-	-	X	X	X	-	-	-	X	-	X	-	X	X	-
23CSP07.CO5	X	-	X	-	X	X	-	-	X	-	-	X	X	X	X

SEMINAR TOPIC

Seminar topic should relate to the Information Technology, Some of the seminar topics are listed below:

1. FreeNet
2. Linear Programming in Cloud
3. Blackberry Technology
4. Biometric Security Systems
5. Credit Card Fraud Detection
6. Vehicle Management System
7. Smartshader Technology
8. Digital Piracy
9. Google Glass
10. Data Recover
11. Cyber and Social Terrorism
12. Space Mouse
13. Pill Camera
14. Ambient Intelligence
15. Mind Reading Computer
16. Honeypots
17. Security through Obscurity
18. Electronic Banking
19. Gi-Fi

SCHEME OF EVALUATION

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 incharge.
- A Viva voce comprising comprehensive questions based on the presentation

Total Periods: 60

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23CSP08	ENTREPRENEURSHIP DEVELOPMENT	L	T	P	C
		3	0	0	3

Course Objective:

- 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 designed to bring about improvement in the performance of the industry

Course Outcomes:

23CSP08.CO1	Identifying real problems and a solutions people want Pitching solutions, such as products and services.
23CSP08.CO2	Developing and managing early stage software.
23CSP08.CO3	Achieve high degree of productivity in a small team via agile, high quality practices and team organization approaches.
23CSP08.CO4	Create a production software development environment.
23CSP08.CO5	Achieve customer satisfaction in the development of IT products and services.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23CSP08.CO1	X	-	X	X	-	-	-	-	-	X	-	X	X	X	-
23CSP08.CO2	X	X	-	-	X	-	-	X	X	X	-	-	X	-	-
23CSP08.CO3	X	X	X	X	-	X	-	-	X	X	X	X	X	X	-
23CSP08.CO4	X	X	X	X	-	X	-	-	X	X	X	-	X	-	X
23CSP08.CO5	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.

Total Periods: 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	Entrepreneurship Development	PHI Learning Pvt. Ltd	2016
2.	K Ramachandran	Entrepreneurship Development	Tata McGraw-Hill	2009
3.	Abhishek Nirjar	Entrepreneurship Development	CBS Publishers	2014
4.	S. Anil Kumar	Entrepreneurship Development	New Age International	2008
5.	Fang Zhao	Information Technology Entrepreneurship and Innovation	O'Reilly	2008

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23CSP09	PROFESSIONAL PRACTICES	L	T	P	C
		0	0	6	3

Course Objective:

- 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 one should respond
- To have learned what are considered professional behavior in the IT field
- To have learned about the current IT practices

Course Outcomes:

23CSP09.CO1	Describe the various issues/factors an information technology professional.
23CSP09.CO2	Describe professional behavior in the information technology.
23CSP09.CO3	Recognize what are the current issues in IT and the emerging technology.
23CSP09.CO4	Write properly formatted and organized technical reports.
23CSP09.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
23CSP09.CO1	X	-	X	X	-	X	-	-	-	X	-	X	-	X	-
23CSP09.CO2	X	X	-	-	-	-	-	X	X	X	-	-	X	X	X
23CSP09.CO3	X	-	X	X	-	X	X	-	X	X	X	X	-	X	X
23CSP09.CO4	X	X	X	X	-	X	-	-	X	X	X	-	X	-	X
23CSP09.CO5	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 Information Technology 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 communities and 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
E. Quality issues
F. Current issues

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Schultz, Robert A	Contemporary Issues in Ethics 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

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