MUTHAYAMMAL ENGINEERING COLLEGE

An Autonomous Institution

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

Curriculum/Syllabus

Programme Code : IT

Programme Name : B.Tech-Information Technology

Regulation : 2023

MUTHAYAMMAL ENGINEERING COLLEGE

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

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

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Estd. 2000

Institution Vision & Mission

Institution Vision

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

Institution Mission

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

Chairman
Board of Studies
Department of Computer Science and Engineering
MUTHAYAMMAL ENGINEERING COLLEGE
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Rasipuram - 637 408, Namakkal Dist., Tamil Nadu.

Department Vision & Mission

Department Vision

- To produce the competent IT professionals to provide solutions for the future challenges in IT domain

Department Mission

- To impart knowledge in the state of art technologies in Information Technology
- To inculcate the analytical and logical skills in the field of Information Technology
- To prepare the graduates with ethical and moral values

Program Educational Objectives

PEO1 : Graduate will be able to practice as IT professionals in Multinational companies

PEO2 : Graduate will be able to adapt to the changes in the emerging technologies

PEO3 : Graduate will be able to excel as socially committed engineers

Program Specific Outcomes

PSO1 : Graduates should be able to identify and use statistical tools to solve the problems

PSO2 : Graduates should be able to develop appropriate Information Technology related solutions using Object Oriented Programming Languages

PSO3 : Graduates should be able to provide data analytics solution in Multidisciplinary problems

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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.Tech. – Information Technology

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
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.	23GES26	Digital Principles and System Design	GES	3	3	0	0	3
9.	23GES27	Digital Principles and System Design Laboratory	GES	3	3	0	0	3

IV. Professional Core (PC)								
1.	23ITC01	Data Structures	PC	3	3	0	0	3
2.	23ITC02	Database Management Systems	PC	3	3	0	0	3
3.	23ITC03	Database Management Systems Laboratory	PC	2	0	0	2	1
4.	23ITC04	Computer Networks	PC	3	3	0	0	3
5.	23ITC05	Computer Organization and Architecture	PC	3	3	0	0	3
6.	23ITC06	Software Engineering	PC	3	3	0	0	3
7.	23ITC07	Object Oriented Programming with JAVA	PC	3	0	0	3	3
8.	23ITC08	Object Oriented Programming with JAVA Laboratory	PC	2	0	0	2	1
9.	23ITC09	Operating Systems	PC	3	3	0	0	3
10.	23ITC10	Foundations of Data Science	PC	2	0	0	2	1
11.	23ITC11	Data Science using Python Laboratory	PC	3	3	0	0	3
12.	23ITC12	Theory of Computation	PC	3	3	0	0	3
13.	23ITC13	Design and Analysis of Algorithms	PC	3	3	0	0	3
14.	23ITC14	Machine Learning	PC	2	0	0	2	1
15.	23ITC15	Machine Learning Laboratory – Internship II	PC	3	3	0	0	3
16.	23ITC16	Mobile Communication	PC	3	3	0	0	3
17.	23ITC17	Mini Project – Soft Skill I	PC	3	0	0	2	1
18.	23ITC18	Principles of Compiler Design	PC	3	3	0	0	3
19.	23ITC19	Compiler Design Laboratory	PC	3	0	2	1	2
20.	23ITC20	Cloud Computing using AWS	PC	3	3	0	0	3
21.	23ITC21	Web Technology	PC	3	3	0	0	3
22.	23ITC22	Web Technology Laboratory	PC	3	0	0	2	1
23.	23ITC23	Block chain Technology	PC	3	3	0	0	3
24.	23ITC24	Block chain Technology – Internship III	PC	3	3	0	0	3
25.	23ITC25	Deep Learning	PC	3	3	0	0	3

26.	23ITC26	CCNA-Routing and Switching Essentials	PC	3	3	0	0	3
27.	23ITC27	Operating Systems Laboratory	PC	3	0	0	2	1
28.	23ITC28	Artificial Intelligence	PC	3	3	0	0	3
29.	23ITC29	Information Security	PC	3	3	0	0	3
30.	23ITC30	Web Development using Angular and Bootstrap	PC	3	3	0	0	3
31.	23ITC31	Data Science and Data Analytics	PC	3	3	0	0	3
32.	23ITC32	Data Analytics Laboratory	PC	3	0	0	2	1
33.	23ITC33	Node JS and React JS	PC	3	3	0	0	3
34.	23ITC34	Cloud Computing Laboratory	PC	2	0	0	2	1
V. Professional Elective (PE)								
1.	23ITE01	MERN Stack Development	PE	3	3	0	0	3
2.	23ITE02	MERN Stack Development Laboratory – Internship I	PE	3	3	0	0	3
3.	23ITE03	Internet of Things	PE	3	3	0	0	3
4.	23ITE04	Internet of Things Laboratory	PE	3	0	0	2	1
5.	23ITE05	Salesforce CRM and Platform	PE	3	3	0	0	3
6.	23ITE06	Sales force CRM and Platform Laboratory	PE	2	0	0	2	1
7.	23ITE07	Docker and Kubernetes	PE	3	3	0	0	3
8.	23ITE08	Software Project Management	PE	3	3	0	0	3
9.	23ITE09	Game Design Prototyping and Development	PE	3	3	0	0	3
10.	23ITE10	AWS Academy Cloud Developing	PE	3	3	0	0	3
11.	23ITE11	AWS Academy Cloud Developing Lab	PE	2	0	0	2	1
12.	23ITE12	AWS Academy Cloud Architecting	PE	3	3	0	0	3
13.	23ITE13	AWS Academy Cloud Architecting Lab	PE	2	0	0	2	1
14.	23ITE14	AWS Academy Cloud Foundations	PE	3	3	0	0	3
15.	23ITE15	AWS Academy Cloud Foundations Lab	PE	2	0	0	2	1
16.	23ITE16	Semantic Web	PE	3	3	0	0	3
17.	23ITE17	Network Programming and Management	PE	3	3	0	0	3
18.	23ITE18	Business Intelligence	PE	3	3	0	0	3
19.	23ITE19	Wireless Sensor Networks	PE	3	3	0	0	3
20.	23ITE20	Information Retrieval Techniques	PE	3	3	0	0	3
21.	23ITE21	Service Oriented Architecture	PE	3	3	0	0	3
22.	23ITE22	Agile Technology	PE	3	3	0	0	3
23.	23ITE23	Social Network Analysis	PE	3	3	0	0	3
24.	23ITE24	Game Programming	PE	3	3	0	0	3
25.	23ITE25	Natural Language Processing	PE	3	3	0	0	3
26.	23ITE26	Big data Analytics	PE	3	3	0	0	3
27.	23ITE27	Ad hoc and Sensor Networks	PE	3	3	0	0	3

28.	23ITE28	Management Information System	PE	3	3	0	0	3
29.	23ITE29	Software Quality Assurance	PE	3	3	0	0	3
30.	23ITE30	Bioinformatics	PE	3	3	0	0	3
31.	23ITE31	C# and .NET Framework	PE	3	3	0	0	3
32.	23ITE32	Open Stack Essentials	PE	3	3	0	0	3
33.	23ITE33	User Centric Design	PE	3	3	0	0	3
34.	23ITE34	Software Testing	PE	3	3	0	0	3
35.	23ITE35	Ethical Hacking and Cyber Security	PE	3	3	0	0	3
36.	23ITE36	Soft computing	PE	3	3	0	0	3
37.	23ITE37	Real Time Systems	PE	3	3	0	0	3
38.	23ITE38	High Speed Networks	PE	3	3	0	0	3
39.	23ITE39	Angular JS	PE	3	3	0	0	3
40.	23ITE31	C# and .NET Framework	PE	3	3	0	0	3
41.	23ITE40	Angular JS Laboratory	PE	2	0	0	2	1
42.	23ITE41	Digital and Social Media Marketing	PE	3	3	0	0	3
43.	23ITE42	Full Stack Development	PE	3	3	0	0	3
VI. Employability Enhancement Courses (EEC)								
1.	23ITP01	Project Work Phase I	EEC	10	0	0	10	3
2.	23ITP02	Project Work Phase II	EEC	20	0	0	20	12
3.	23ITP03	Comprehension	EEC	2	0	0	2	1
4.	23ITP04	Technical Seminar	EEC	4	0	4	0	2
5.	23ITP05	Entrepreneurship Development	EEC	3	3	0	0	3
6.	23ITP06	Professional Practices	EEC	6	0	0	6	3
7.	23ITP07	Data Structures Laboratory - Professional Skill II	EEC	2	0	0	2	1
8.	23ITP08	Advanced Web Development	EEC	3	3	0	0	3
9.	23ITP09	Mini Project - Mobile Application	EEC	2	0	0	2	1
10.	23ITP10	Indian Constitution	EEC	-	-	-	-	-
11.	23ITP11	Value Education	EEC	-	-	-	-	-
12.	23ITP12	Disaster Management	EEC	-	-	-	-	-
13.	23ITP13	Pedagogy Studies	EEC	-	-	-	-	-
14.	23ITP14	Stress Management by Yoga	EEC	-	-	-	-	-
15.	23ITP15	Indian Constitution	EEC	-	-	-	-	-
16.	23ITP16	Value Education	EEC	-	-	-	-	-
17.	23ITP17	Disaster Management	EEC	-	-	-	-	-
18.	23ITP18	Pedagogy Studies	EEC	-	-	-	-	-
19.	23ITP19	Stress Management by Yoga	EEC	-	-	-	-	-

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B.Tech. – Information Technology

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	3	0	0	3
2.	23BSS21	Algebra and Calculus	BS	4	3	1	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.	23GES02	Programming in C Laboratory	GES	2	0	0	2	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 - II	HS	3	3	0	0	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.	23GES03	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.	23GES05	Python Programming Laboratory – Professional Skill I	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.	23BSS25	Discrete Mathematics	BS	4	3	1	0	4
2.	23ITC01	Data Structures	PC	3	3	0	0	3
3.	23ITC02	Database Management Systems	PC	3	3	0	0	3
4.	23ITC04	Computer Networks	PC	3	3	0	0	3
5.	23ITC05	Computer Organization and Architecture	PC	3	3	0	0	3
6.	23ITC07	Object Oriented Programming with JAVA	PC	3	3	0	0	3
Practical								
7.	23ITP07	Data Structures Laboratory - Professional Skill II	PC	2	0	0	2	1
8.	23ITC03	Database Management Systems Laboratory	PC	2	0	0	2	1
9.	23ITC08	Object Oriented Programming with Java 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.	23BSS29	Probability and Random Processes	BS	4	3	1	0	4
2.	23GES26	Digital Principles and System Design	GES	3	3	0	0	3
3.	23ITC06	Software Engineering	PC	3	3	0	0	3
4.	23ITC09	Operating Systems	PC	3	3	0	0	3
5.	23ITC10	Foundation of Data Science	PC	3	3	0	0	3
6.	-	Elective - I	PE	3	3	0	0	3
Practical								
7.	23GES27	Digital Principles and System Design Laboratory	GES	2	0	0	2	1
8.	-	Elective - I Laboratory – Internship I	PE	2	0	0	2	1
9.	23ITC11	Data Science using Python Laboratory	PC	2	0	0	2	1
10.	-	Quantitative Aptitude		2	0	0	2	0
							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.	23ITC12	Theory of Computation	PC	3	3	0	0	3
2.	23ITC13	Design and Analysis of Algorithms	PC	3	3	0	0	3
3.	23ITC14	Machine Learning	PC	3	3	0	0	3
4.	-	Elective II	PE	3	3	0	0	3
5.	-	Elective III	PE	3	3	0	0	3
6.	-	Open Elective - I	OE	3	3	0	0	3
Practical								
7.	23ITC15	Machine Learning Laboratory – II	PC	2	0	0	2	1
8.	-	Elective II Lab	PE	2	0	0	2	1
9.	-	Elective III Lab	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.	23ITC16	Mobile Communication	PC	3	3	0	0	3
2.	23ITC18	Principles of Compiler Design	PC	3	3	0	0	3
3.	23ITC20	Cloud computing using AWS	PC	3	3	0	0	3
4.	23ITC21	Web Technology	PC	3	3	0	0	3
5.	-	Elective IV	PE	3	3	0	0	3
6.	-	Open Elective II	OE	3	3	0	0	3
Practical								
7.	23ITC17	Mini Project – Soft Skill I	PC	2	0	0	2	1
8.	23ITC19	Compiler Design Laboratory	PC	2	0	0	2	1
9.	23ITC22	Web Technology Laboratory	PC	2	0	0	2	1
							Total Credit	**21**

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Semester -VII

Sl.No.	Course Code	Course Title	Category	Contact Hours	Instruction Hours/Week/ Credit			
					L	T	P	C
Theory								
1.	23ITC23	Block chain Technology	PC	3	3	0	0	3
2.	23ITC25	Deep Learning	PC	3	3	0	0	3
3.	23ITC26	CCNA – Routing and Switching Essentials	PC	3	3	0	0	3
4.	-	Elective V	PE	3	3	0	0	3
5.	-	Elective VI	PE	3	3	0	0	3
6.	-	Open Elective III	OE	3	3	0	0	3
Practical								
7.	23ITP01	Project work – Phase I	EEC	10	0	0	10	3
8.	23ITC24	Block Chain Technology - Internship III	PC	1	1	0	0	1
							Total Credit	**22**

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Semester -VIII

Sl.No.	Course Code	Course Title	Category	Contact Hours	Instruction Hours/Week/ Credit			
					L	T	P	C
Practical								
1.	23ITP02	Project Work – Phase II	EEC	20	0	0	20	12
							Total Credit	**12**

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B.Tech. – Information Technology
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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	-	-	-	-	-	-	08	09
2.	BS	9	9	4	4	-	-	-	-	26	24
3.	GES	7	7	-	4	-	-	-	-	18	27
4.	PC	-	-	18	10	10	15	10	-	63	58
5.	PE	-	-	-	4	8	3	6	-	21	18
6.	OE	-	-	-	-	3	3	3	-	09	09
7.	EEC	-	-	-	-	-	-	3	12	15	15
8.	MC	-	-	-	-	-	-	-	-	-	-
9.	NPTEL	-	-	-	-	-	-	-	-	-	-
Total		**20**	**20**	**22**	**22**	**21**	**21**	**22**	**12**	**160**	**160**

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23ITC01	Data Structures	L	T	P	C
		3	0	0	3

Course Objective:

- To understand the basic concept of Abstract Data Types, Linear Data structures.
- To explain the behavior of data structures such as stacks, queues and trees.
- To choose the appropriate data structure for a specified application.
- To understand the basic Object Oriented Programming concepts.
- To understand Inheritance and polymorphism in C++.

Course Outcomes:

21ITC01.CO1 Ability to identify the appropriate data structure for given problem

21ITC01.CO2 Able to solve the problems using stack and queues

21ITC01.CO3 Able to implement the application of Tree data structure

21ITC01.CO4 Able to understand the application of Graph and hashing techniques

21ITC01.CO5 Ability to solve the problems using various searching and sorting techniques

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITC01.CO1	X	X	X	X	X	-	-	X	-	-	-	X	X	X	X
21ITC01.CO2	X	X	X	X	X	X	-	-	-	-	X	X	X	X	X
21ITC01.CO3	X	X	X	X	X	-	-	-	-	X	-	X	X	X	X
21ITC01.CO4	X	X	X	X	X	-	X	X	X	-	-	X	X	X	X
21ITC01.CO5	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X

Unit-I Introduction And List **9**

Definition, ADT, Types of Data Structures- Linear & Non Linear Data Structures. Array: Representation of arrays, structure and Pointers, Applications of arrays, structure and Pointer, Dynamic Memory Allocation Functions and Recursion function. Linked List: Definition, Types of List, Singly Linked List operations, Doubly Linked list operation, Circular linked list operation, Applications of linked list.

Unit-II Stack and Queue **9**

Stack: Stack-Definitions & Concepts, array and Linked implementation of Stack Operations on Stacks, Applications of Stacks, Polish Expression, Reverse Polish Expression And Their Compilation, Recursion, and Tower of Hanoi. Queue: Representation Of Queue, array and Linked implementation of Queue Operations on Queue, Circular Queue, Priority Queue, Array representation of Priority Queue, Double Ended Queue, Applications of Queue.

Unit-III Tree and Binary Search Tree **9**

Trees: Basic terminologies of trees – Node, Root, Parent, Child, Link, Sibling, Level, Height, Depth, Leaf, Degree; Binary tree – Full Binary tree, Complete Binary tree; Representation of binary tree – Linear representation, linked representation, Advantages and Disadvantages of both representations; Binary tree traversal – In order, Preorder, Post order traversals; Operations on Binary tree - creation, insertion of left and right child; Tree representation of an arithmetic expression, in order, Preorder and Post order expressions from expression tree. Binary Search Tree – Definition, Creation of Binary search tree for a given set of values; Searching for an item – Minimum, Maximum or any given value; Applications of Binary search tree. Max Heap-Definition, Insertion into a Max Heap, Deletion from a Max Heap.

Unit-IV Graphs **9**

Definition – Graph terminologies – Directed and Undirected graph, Weighted graph, Adjacent Vertices, Self loop, Parallel edges, Path, Cycle, in degree, out degree; complete graph, Connected graph; Representation of graph – Set representation – Adjacency matrix representation – Linked representation – Comparison of representations. Breadth First Search, Depth First Search, Spanning Trees, Shortest path, Minimal spanning tree and Hamiltonian circuit.

Unit-V Hashing, Searching and Sorting 9

Hashing: Introduction, Hash table, Hash function, Collision, Collision resolution – separate chaining, open addressing; Rehashing – Extendible hashing. Searching: Definition – Algorithm and Example for sequential search and binary search. Sorting: Definition – Algorithm and Example for selection sort, bubble sort, insertion sort, quick sort, merge sort, radix sort and Heap Sort.

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	E.Horowitz, S.Sahni Susan Anderson-reed	Fundamentals of Data structures in C,	Universities Press.	2008
2.	Mark Allen Weiss	Data structure and Algorithm Analysis in C	Pearson India	2012

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	R. F. Gilberg, B. A. Forouzan	Data Structures	Thomson India	2005
2.	R.Kruse, C.L.Tondo and B.Leung,	Data structures and Program Design in C	Prentice-Hall	2006
3.	A.M.Tanenbaum, Y. Langsam, M.J.Augenstein	Data Structures using C and C++	PHI Learning	2015
4.	R. Krishnamoorthy	Data Structures Using C	Tata McGrawHill Education	2008
5.	E Balagurusamy	Data Structures Using C	Tata McGraw - Hill Education	2013

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23ITC02	Database Management Systems	L	T	P	C
		3	0	0	3

Course Objective:

- Analyze database requirements and determine the entities involved in the system and their relationships.
- Formulate solutions to a broad range of query and data update problems using SQL.
- Understand the basic issues of transaction processing and concurrency control.
- Explain and implement the fundamental concepts of a relational database system.
- Understand the database security and access techniques

Course Outcomes:

23ITC02.CO1 Design ER diagrams for new databases and apply for database applications.

23ITC02.CO2 Implement a database schema for a given problem-domain.

23ITC02.CO3 Normalize a database with non-loss decomposition.

23ITC02.CO4 Apply concurrency control techniques for database transactions.

23ITC02.CO5 Implement different database access techniques

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITC02.CO1	X	X	X	X	X	-	-	-	-	-	X	X	X	X	X
23ITC02.CO2	X	X	X	X	-	-	-	-	-	-	X	X	-	X	-
23ITC02.CO3	X	X	X	X	-	-	-	X	-	-	X	X	X	-	X
23ITC02.CO4	X	X	X	X	X	-	-	-	-	-	X	X	-	X	-
23ITC02.CO5	X	X	X	-	X	-	-	-	-	-	X	X	X	-	X

Unit-I Introduction To DBMS **9**

Database System Applications-Purpose of Database Systems -View of data- Database Languages - Database System Architecture - Data models - Entity-Relationship model - Extended E-R Features - Introduction to relational databases- Keys - Integrity Constraints - Relational Algebra - Fundamental Operations - Additional Operations-Domain Relational Calculus - Tuple Relational Calculus.

Unit-II SQL & Query Optimization **9**

SQL Standards - Data types - Basic Structure of SQL Queries - DDL-DML-DCL-TCL - Views- Advanced SQL - Embedded SQL - Static Vs Dynamic SQL - Query Processing - Query Optimization- Heuristic and Cost based Query Optimization.

Unit-III Relational Database Design And Transactions **9**

Functional Dependencies - Codd's Rule - Normalization - Non-loss decomposition- 1NF to 5NF - Domain Key Normal Form – De normalization - Transaction Concepts - ACID Properties – Serializability- Concurrency Control - Locking Mechanisms - Two Phase Commit Protocol - Dead lock.

Unit-IV System Architecture **9**

Overview of Physical Storage Media - RAID - Tertiary storage - File Organization - Organization of Records in Files - Indexing and Hashing - Ordered Indices - B+ Tree Index Files - B Tree Index Files - Static Hashing - Dynamic Hashing - Distributed Databases - Distributed Data Storage – Distributed Transactions

Unit-V Database Security **9**

Database Security - Data Classification - Threats and risks - Database Access Control - Types of Privileges - Security of Statistical Databases Parallel Databases- Spatial and Multimedia Databases - Mobile and Web databases- Object Oriented Databases- XML Databases

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Abraham Silberschatz, Henry F. Korth	Database System Concepts	Tata cGraw-Hill	2013
2.	Ramez Elmasri Shamkant	Fundamentals of Database Systems	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	Database Systems: The Complete book	Pearson Education	2013
3.	Shefali Naik	Concepts of Database ManagementSystems	Pearson Education	2013
4.	G.K.Gupta	Database Management Systems	Tata McGraw Hill	2011
5.	Rob Cornell	Database Systems Design and	Cengage Learning	2011

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23ITC03	Database Management Systems Laboratory	L	T	P	C
		0	0	2	1

Course Objective:

- Learn to create and use a database
- Be familiarized with a query language
- Have hands on experience on DDL Commands
- Have a good understanding of DML Commands and DCL commands
- Familiarize advanced SQL queries

Course Outcomes:

23ITC03.CO1	Design and implement a database schema for a given problem-domain
23ITC03.CO2	Populate and query a database
23ITC03.CO3	Create and maintain tables using PL/SQL.
23ITC03.CO4	Implement functions and triggers using sql.
23ITC03.CO5	Create a Software using VB as front end and SQL as backend.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITC03.CO1	X	X	X	X	X	-	-	-	-	-	X	X	X	X	X
23ITC03.CO2	X	X	X	X	X	-	-	-	-	-	X	X	X	X	X
23ITC03.CO3	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITC03.CO4	X	X	X	X	X	-	-	-	-	-	X	X	X	X	X
23ITC03.CO5	X	X	X	X	X	-	-	-	-	-	X	X	X	X	X

Sl.No.	List of Experiments
1.	Implementation of Data Definition Language commands in RDBMS
2.	Implementation of Data Manipulation Language commands in RDBMS
3.	Apply Integrity constraints and Domain constraints for a Database
4.	Creation of Views, Nested Queries and Join Queries
5.	Study of PL/SQL blocks
6.	High level programming language extensions (Control structures and Procedures)
7.	Implementation of Functions
8.	Implementation of Triggers
9.	Implementation of High-level language extension with Cursors.
10.	Design and Implementation of Banking System
11.	Design and Implementation of Payroll Processing System

Total Periods: 30

23ITC04	Computer Networks	L	T	P	C
		3	0	0	3

Course Objective:

- Understanding the basic concepts of computer networking
- Describe the MAC protocols
- Appraise the switching concepts and Routing Techniques
- Distinguish about UDP & TCP
- Formulate the Application Layer

Course Outcomes:

23ITC04.CO1	Analyze the types of network topologies, layers and protocols.
23ITC04.CO2	Evaluate sub netting and routing algorithms for finding optimal paths in networks
23ITC04.CO3	Solve problems related to flow control, error control and congestion control in data transmission.
23ITC04.CO4	Assess the impact of wired and wireless networks in the context of network protocols Like DNS, SMTP, HTTP, and FTP.
23ITC04.CO5	Apply ethical principles and standards for developing network-based solutions.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITC04.CO1	X	X	X	X	X	-	-	-	-	-	X	X	X	X	X
23ITC04.CO2	X	X	X	X	X	-	-	-	-	-	X	X	X	X	X
23ITC04.CO3	X	X	X	X	X	-	-	-	-	-	X	X	X	X	X
23ITC04.CO4	X	X	X	X	X	-	-	-	-	-	X	X	X	X	X
23ITC04.CO5	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X

Unit-I Introduction and Physical Layer **9**

Network hardware, Network software, Reference models - OSI, TCP/IP; Example networks – Internet; Wireless LANs - 802.11. Physical Layer - Guided transmission media, Wireless transmission, Switching - Circuit switches, Packet switching.

Unit-II Data Link Layer and Medium Access Control Sublayer **9**

Data Link Layer: Data link layer design issues, Error detection and correction - CRC, Hamming codes; Elementary data link protocols, Sliding window protocols.

Medium Access Control Sub layer: ALOHA, Carrier sense multiple access protocols, Collision free protocols, Ethernet, Data link layer switching - Repeaters, Hubs, Bridges, Switches, Routers, Gateways.

Unit-III Network Layer **9**

Network layer design issues, Routing algorithms - Shortest path algorithm, Flooding, Distance vector routing, Link state routing, Hierarchical routing, Broadcast routing, Multicast routing, Any cast routing; Congestion control algorithms, Network layer in the internet – The IP version 4 protocol, IP addresses, IP version 6, Internet control protocols, OSPF, BGP

Unit-IV Transport Layer **9**

UDP – Segment header, Remote procedure call, Real-time transport protocols; TCP – service model, Protocol, Segment header, Connection establishment, Connection release, Sliding window, Timer management, Congestion control

Unit-V Application Layer **9**

Domain Name System (DNS) - Name space, Domain resource records, Name servers; Electronic mail – Architecture and services, User agent, Message formats, Message transfer, Final delivery; The World Wide Web – Architectural overview, HTTP, FTP

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	. Andrew S. Tanenbaumand David J. Wetherall, ,	Computer Networks	Pearson	2015
2.	1. Behrouz A. Forouzan, ,	Data Communications and Networking	McGraw Hill	2013

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	James F. Kurose andKeith W. Ross	Computer Networking: A Top-DownApproach,	Pearson	2017
2.	Larry L. Peterson, Bruce S. Davie	Computer Networks: A SystemsApproach	Morgan Kaufmann	2003
3.	Jie Wang	Computer Networks	Prentice Hall	2002

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23ITC05	Computer Organization And Architecture	L	T	P	C
		3	0	0	3

Course Objective:

- To understand the basic hardware and software issues of computer organization
- To understand the arithmetic and logic unit and implementation of fixed point and floating-point arithmetic operations
- To provide the concept of pipelining and hazards
- To familiarize the students with memory system including virtual memories and cache memories
- To exposé the students with I/O devices and standard I/O interfaces

Course Outcomes:

23ITC05.CO1	Analyze the abstraction of various components of a computer.
23ITC05.CO2	Design arithmetic and logical unit.
23ITC05.CO3	Analyze pipelined control units.
23ITC05.CO4	Evaluate the performance of memory systems.
23ITC05.CO5	Understanding the I/O devices and interfaces

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITC05.CO1	X	X	X	X	X	-	-	X	X	-	X	X	X	X	X
23ITC05.CO2	X	X	X	X	X	-	-	-	-	-	-	X	X	X	X
23ITC05.CO3	X	X	X	X	X	-	-	-	-	-	-	X	X	X	X
23ITC05.CO4	X	X	X	X	X	X	-	X	-	-	-	X	X	X	X
23ITC05.CO5	X	X	X	X	X	-	-	-	-	-	-	X	X	X	X

Unit-I Introduction **9**

Introduction-Technologies for building Processors and Memory-Performance-The Power Wall-Operations of the Computer Hardware-Operands Signed and Unsigned numbers, Representing Instructions, Logical Operations, Instructions for Making Decisions

Unit-II Arithmetic Operations **9**

MIPS Addressing for 32-Bit Immediate and Addresses-Parallelism and Instructions: Synchronization, Translating and Starting a Program, Addition and Subtraction, Multiplication, Division, Floating Point, Parallelism and Computer Arithmetic: Subword Parallelism, Streaming SIMD Extensions

Unit-III Pipelining And Hazards **9**

Building a Data path-A Simple Implementation Scheme-Overview of Pipelining-Pipelined Data path-Data Hazards: Control Hazards, Exceptions-Parallelism via Instructions-Instruction Level Parallelism and Matrix Multiply Hardware Design language

Unit-IV Memory System **9**

Memory Technologies-Basics of Caches-Measuring and Improving Cache Performance-Memory hierarchy-VirtualMemory-Secondary storage-Redundant Arrays of Inexpensive Disks-Implementing Cache Controllers

Unit-V Input and Output Organization **9**

Accessing I/O Devices-Interrupts-Interrupt Hardware-Enabling and Disabling Interrupts-Handling Multiple Devices- Controlling Device Requests-Exceptions-Direct Memory Access-Buses -Standard I/O Inter faces – PCI Bus, SCSI Bus, USB

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	David A. Patterson andJohn L.Hennessey	Computer Organization and design	Morgan auffman / lsevier	2014
2.	V.Carl Hamacher, Zvonko G. Varanesic and Safat G. Zaky	Computer Organization and Embedded Systems	McGraw-Hill Inc	2012

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Smruti RanjanSarangi	Computer Organization and Architecture	Tata McGraw Hill	2015
2.	William Stallings	Computer Organization and Architecture	Pearson Education	2010
3.	Vincent P. Heuring,Harry F. Jordan	Computer System Architecture	Pearson Education	2011

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23ITC06	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:

23ITC06.CO1 Apply the concepts of life cycle models to choose the appropriate model.

23ITC06.CO2 Analysis the requirements and design the software.

23ITC06.CO3 Construct a design for a real-world problem.

23ITC06.CO4 Design and develop test cases.

23ITC06.CO5 Work with version control and work on configuration and release management plans

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITC06.CO1	X	X	X	X	-	-	X	-	-	-	X	-	X	X	X
23ITC06.CO2	X	X	X	X	X	-	X	-	X	X	X	X	X	X	X
23ITC06.CO3	X	X	X	X	X	X	X	-	X	-	X	-	X	X	X
23ITC06.CO4	X	X	X	X	-	X	X	-	-	-	-	X	X	X	X
23ITC06.CO5	X	X	X	X	X	-	-	X	X	-	X	-	X	X	X

Unit-I Software Process And Project Management 9

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

Unit-II Requirements Analysis And Specification 9

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

Unit-III Software Design 9

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

Unit-IV Testing And Implementation 9

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

Unit-V Project Management 9

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

Total 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 – AnEmpirical Approach	Lambert Academic Publishing, Germany,	Dec 2012 (ISBN: 978-3-659-19538-9)

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23ITC07	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:

23ITC08.CO1 Understand Java programs using OOP principles

23ITC08.CO2 Apply Java programs with the concepts inheritance and interfaces

23ITC08.CO3 Construct Java applications using exceptions and I/O streams

23ITC08.CO4 Develop Java applications with threads and generics classes

23ITC08.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
23ITC07.CO1	X	-	-	X	-	-	-	-	-	X	-	X	X	-	-
23ITC07.CO2	X	X	X	X	X	-	-	-	X	X	X	X	-	-	X
23ITC07.CO3	X	-	X	X	-	X	-	-	X	X	X	X	X	-	-
23ITC07.CO4	X	-	X	X	X	-	-	-	-	-	X	X	X	-	-
23ITC07.CO5	X	X	X	-	X	-	-	-	X	X	X	X	-	X	X

Unit-I Introduction to OOP and Java Fundamentals 9

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

Unit-II Inheritance and Interfaces 9

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

Unit-III Exception Handling And I/O 9

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

Unit-IV Multithreading and Generic Programming 9

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

Unit-V Event Driven Programming 9

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

Total 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 MicrosoftC++	Pearson Education	1991
5.	Vaskaran Sarcar	Interactive Object-Oriented Programming in Java: Learn and Test Your Programming Skills	Apress	2016

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23ITC08	Object Oriented Programming with Java Laboratory	L	T	P	C
		0	0`	2	1

Course Objective:

- Understand the basic Object Oriented Programming concepts.
- Develop solutions to problems by using of Data Abstraction, Encapsulation and Inheritance.
- Ability to implement one or more patterns involving realization of an abstract interface.
- Utilization of polymorphism in the solution of problems which can take advantage of dynamic dispatching.
- To comprehend the art of programming, the structure and the meaning of basic Java programs

Course Outcomes:

23ITC08.CO1	Apply syntactic constructs of JAVA to solve logic based problems
23ITC08.CO2	Develop application programs using object oriented programming features
23ITC08.CO3	Solve real time problems using interfaces, packages, Exception Handling, Collection framework and Multithreading
23ITC08.CO4	Develop GUI Applications using Swings, Event handling mechanisms.
23ITC08.CO5	Work independently and in team to solve problems with effective communication.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITC08.CO1	X	X	X	X	-	-	-	-	-	X	-	X	X	X	X
23ITC08.CO2	X	X	X	X	X	-	-	-	X	X	X	X	X	X	X
23ITC08.CO3	X	X	X	X	-	X	-	-	X	X	X	X	X	X	X
23ITC08.CO4	X	X	X	X	X	-	-	-	-	-	X	X	X	X	X
23ITC08.CO5	X	X	X	X	X	-	-	-	X	X	X	X	X	X	X

Sl.No.	List of Experiments
1.	**COMMAND-LINE ARGUMENTS:** Demonstrate the following programs using command line arguments: a) Write a program that computes the sum of all its integer arguments. b) Write a program to input n integers and perform sorting between them.
2.	RECURSIVE FUNCTIONS AND OVERLOADING: a) The Fibonacci sequence is defined by the following rule. The first 2 values in the sequence are 0, 1. Every subsequent value is the sum of the 2 values preceding it. Write a Java program that uses both recursive and non-recursive functions to print the nth value of the Fibonacci sequence? b) Write and test overloaded methods to find sum of three integers, sum of three double values and sum of four integers. c) Write a program to define a class student with name, registration number and marks for three subjects as instance variables and describe a constructor to initialize them. Also define a method display to print all the values.
3.	DATA TYPES (ARRAYS AND STRINGS): a) Write a program to print the element of an array that has occurred highest number of times. b) Write a program to count tokens- number of words and characters in a string.
4.	SCANNER AND ABSTRACT CLASSES: a) Write a program that displays a menu with options 1. Add 2. Sub. Based on the options chosen, read 2 numbers and perform the relevant operation. After performing the operation, the program

should ask the user if he wants to continue. If the user presses y or Y, then the program should continue displaying the menu else the program should terminate. [Use Scanner class].

b) Write a program to create an abstract class named Shape that contains an empty method named numberOfSides ( ). Provide three classes named Trapezoid, Triangle and Hexagon such that each one of the classes extends the class Shape. Each one of the classes contains only the method numberOfSides( ) that shows the number of sides in the given geometrical figures

5. PACKAGES AND INTERFACES:

a) Write a program that imports the User-defined package P1 and access the member variables and methods of classes that contained in the package P1.

b) Write a program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception. Display the exception in a message dialog box.

6. A University awards some grace marks to students who participate in the Inter University games. Therefore, total marks awarded = Exam_ Marks +Sports_ Grace_ Marks. If total marks scored are greaterthan maximum marks, then the final marks awarded will be equal to the maximum marks. An Object Oriented based implementation will contain a class called Results, which extends a class called Exam, which itself extends a class called Student. It will also contain an interface called Sports, which is implemented by the Results class. The Results class will be responsible for computing the final marks scored by the students. Write a Java program along with an interactive driver class.

7. EXCEPTION HANDLING:

a) Write a program to handle Arithmetic Exception, Array Out Of Bounds Exception using try and multiple catch statements.

b) Write a java program to throw a user defined exception called Negative, if the entered input is a negative number.

8. MULTI-THREADING:

a) Write a Java program that creates three threads. First thread displays – Good Morning for every one second, the second thread displays - Hello for every two seconds and the third thread displays - Welcomefor every three seconds.

b) Write a Java program that correctly implements producer consumer problem using the concept of inter-thread communication.

c) Write a java program to implement multithreading using lambda expression.

9. HASHSET (COLLECTION FRAMEWORK):

Write a program create a class ―Book‖ with name, id, author, publisher and quantity as instance variables and a constructor to initialize them. Create a HashSet object of type Book and three Book instances b1, b2 and b3. Add these instances into HashSet and display them

10. EVENT HANDLING:

a) Write a java program that simulates a traffic light. The program lets the user select one of three lights:red, yellow, or green. When a radio button is selected, the light is turned on, and only one light can be onat a time No light is on when the program starts.

b) Write a java program that handles all mouse and key events and shows the event name at the center ofthe window when mouse event is fired (Use Adapter classes).

Total Periods: 30

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23ITC09	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:

23ITC09.CO1	Recall the basic architectural components involved in design an operating system.
23ITC09.CO2	Recognize the various scheduling algorithms for different types of operating system.
23ITC09.CO3	Construct resource management techniques and handling Deadlock issues.
23ITC09.CO4	Investigate to change the disk structure and access the files.
23ITC09.CO5	Integrate the different operating systems.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO 12	PSO1	PSO2	PSO3
23ITC09.CO1	X	X	X	X	-	-	X	-	-	X	-	X	X	-	X
23ITC09.CO2	X	-		X	X	-		X	X	X	X	X	-	-	X
23ITC09.CO3	X	X	X	X	-	X	X	-	X	X	X	X	X	-	-
23ITC09.CO4	X	-	X	X	X	-		X	-	-	X	X	X	-	-
23ITC09.CO5	X	X	X	-	X	-	X	-	X	X	X	X	-	X	X

Unit-I Operating Systems Overview **9**

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

Unit-II Threads and Scheduling Algorithms **9**

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

Unit-III Memory Management **9**

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 Approach	Tata Mc-graw HillPublishing 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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23ITC10	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:

23ITC10.CO1 Define the data science process

23ITC10.CO1 Understand different types of data description for data science process

23ITC10.CO1 Gain knowledge on relationships between data

23ITC10.CO1 Use the Python Libraries for Data Wrangling

23ITC10.CO1 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
23ITC10.CO1	X	X	X	X	X	-	-	-	X	X	X	X	X	X	X
23ITC10.CO2	X	X	-	X	X	-	-	-	X	X	X	X	X	X	X
23ITC10.CO3	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X
23ITC10.CO4	X	X	X	X	X	-	-	-	X	X	X	X	X	X	X
23ITC10.CO5	X	X	X	X	X	-	-	-	X	X	X	X	X	X	X

Unit-I Introduction **9**

Data Science: Benefits and uses – facets of data - Data Science Process: Overview – Defining research goals – 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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23ITC11	Data Science Using Python 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:

23ITC11.CO1	Demonstrate the Python Libraries for Data Science
23ITC11.CO2	Select the Statistical and Probability measures for Data Science
23ITC11.CO3	Design a Benchmark datasets based on analytics
23ITC11.CO4	Illustrate the correlation and regression analytics on datasets
23ITC11.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
23ITC11.CO1	X	-	X	-	X	X	-	-	-	-	-	X	-	X	-
23ITC11.CO2	-	X	-	-	X	X	-	-	-	X	X	-	X	X	-
23ITC11.CO3	-	-	X	-	-	X	-	-	X	-	-	X	-	-	X
23ITC11.CO4	X	X	-	X	-	-	X	-	-	X	-	-	X	-	-
23ITC11.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 plot d. Histograms e. Three dimensional plotting
7.	Visualizing Geographic Data with Basemap

Total Periods: 30

23ITC12	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:

23ITC12.CO1 Design Finite Automata using its theoretical concept.

23ITC12.CO2 Convert Regular expressions to FA and minimize Automata.

23ITC12.CO3 Simplify CFG to CNF and GNF

23ITC12.CO4 Design PDA for the Given Grammar.

23ITC12.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
23ITC12.CO1	X	X	X	-	-	-	-	-	-		-		X	X	-
23ITC12.CO2	X	X	-	-	X	-	-	-	-	-	-	-	X	X	-
23ITC12.CO3	X	X	X	-	-	-	-	-	-	-	-	-	-	X	X
23ITC12.CO4	X	X	X	-	-	-	-	-	-	-	-	-	-	X	X
23ITC12.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 and 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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23ITC13	Design and Analysis of Algorithms	L	T	P	C
		3	0	0	3

Course Objective:

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

Course Outcomes:

23ITC13.CO1 Identify algorithm design methodology to solve problems.

23ITC13.CO2 Analyze the algorithm efficiency by means of mathematical Notations

23ITC13.CO3 Empathize the limitation of Computations

23ITC13.CO4 Design algorithms for network flows

23ITC13.CO5 Differentiate algorithm design techniques of P and NP classes of problems

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITC13.CO1	X	X	X	X	X	X	-	X	X	-	-	X	X	X	X
23ITC13.CO2	X	X	X	X	X	-	-	X	X	X	-	-	X	X	X
23ITC13.CO3	X	X	X	X	-	X	-	-	X	X	-	X	X	X	X
23ITC13.CO4	X	X	X	X	X	X	-	X	X	X	-	X	X	X	X
23ITC13.CO5	X	X	X	X	X	X	-	X	X	-	-	X	X	X	X

Unit-I Introduction **9**

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

Unit-II Backtracking **9**

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

Unit-III Greedy Method **9**

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

Unit-IV Dynamic Programming **9**

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

Unit-V Branch And Bound and Np-Hard, Np-Complete Problems **9**

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

Total Periods: 45

Text Books:

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

Reference Books:

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

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23ITC14	Machine Learning	L	T	P	C
		3	0	0	3

Course Objective:

- To understand the basics of Machine Learning (ML)
- To understand the methods of Machine Learning
- To know about the implementation aspects of machine learning
- To understand the concepts of Data Analytics and Machine Learning
- To understand and implement usecases of ML

Course Outcomes:

23ITC14.CO1 Understand the basics of ML

23ITC14.CO2 Explain various Machine Learning methods

23ITC14.CO3 Demonstrate various ML techniques using standard packages.

23ITC14.CO4 Explore knowledge on Machine learning and Data Analytics

23ITC14.CO5 Apply ML to various real time examples

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITC14.CO1	X	X	X	X	X	X	X	-	X	-	X	X	X	X	X
23ITC14.CO2	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X
23ITC14.CO3	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X
23ITC14.CO4	X	X	X	X	X	X	X	-	-	X	X	X	X	X	X
23ITC14.CO5	X	X	X	X	X	X	X	-	-	-	X	X	X	X	X

Unit-I Machine Learning Basics **9**

Introduction to Machine Learning (ML) - Essential concepts of ML – Types of learning – Machine learning methods based on Time – Dimensionality – Linearity and Non linearity – Early trends in Machine learning – Data Understanding Representation and visualization

Unit-II Machine Learning Methods **9**

Linear methods – Regression -Classification –Perceptron and Neural networks – Decision trees – Support vector machines – Probabilistic models ––Unsupervised learning – Featurization

Unit-III Machine Learning in Practice **9**

Ranking – Recommendation System - Designing and Tuning model pipelines- Performance measurement – Azure Machine Learning – Open-source Machine Learning libraries – Amazon's Machine Learning Tool Kit: Sagemaker

Unit-IV Machine Learning and Data Analytics **9**

Machine Learning for Predictive Data Analytics – Data to Insights to Decisions – Data Exploration – Information based Learning – Similarity based learning – Probability based learning – Error based learning – Evaluation – The art of Machine learning to Predictive Data Analytics

Unit-V Applications of Machine Learning **9**

Image Recognition – Speech Recognition – Email spam and Malware Filtering – Online fraud detection – Medical Diagnosis

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Ameet V Joshi	Machine Learning and Artificial Intelligence	Springer Publications	2020
2.	John D. Kelleher, Brain Mac Namee, Aoife D' Arcy	Fundamentals of Machine learning for Predictive Data Analytics, Algorithms, Worked Examples and case studies	MIT press	2015

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Christopher M. Bishop	Pattern Recognition and Machine Learning	Springer Publications	2011
2.	Stuart Jonathan Russell, Peter Norvig, John Canny	Artificial Intelligence: A Modern Approach	Prentice Hall	2020
3.	John Paul Muller, Luca Massaron	Machine Learning Dummies	Wiley Publications	2021

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23ITC15	Machine Learning Laboratory – Internship II	L	T	P	C
		3	0	0	3

Course Objective:

- To get practical knowledge on implementing machine learning algorithms in real time problem for getting solutions
- To implement supervised learning and their applications
- To understand unsupervised learning like clustering and EM algorithms
- To understand the theoretical and practical aspects of probabilistic graphical models
- To get practical knowledge on implementing machine learning algorithms in real time problem for getting solutions

Course Outcomes:

23ITC15.CO1 Understand the implementation procedures for the machine learning algorithms.

23ITC15.CO2 Design Java/Python programs for various Learning algorithms.

23ITC15.CO3 Apply appropriate Machine Learning algorithms to data sets

23ITC15.CO4 Identify and apply Machine Learning algorithms to solve real world problems.

23ITC15.CO5 Understand the implementation procedures for the machine learning algorithms.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITC15.CO1	X	X	X	X	X	X	X	-	X	-	X	X	X	X	X
23ITC15.CO2	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X
23ITC15.CO3	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X
23ITC15.CO4	X	X	X	X	X	X	X	-	-	X	X	X	X	X	X
23ITC15.CO5	X	X	X	X	X	X	X	-	-	-	X	X	X	X	X

Sl.No.	List of Experiments
1.	Implement the concept of decision trees with suitable data set from real world problem and classify the data set to produce new sample.
2.	Detecting Spam mails using Support vector machine
3.	Implement facial recognition application with artificial neural network
4.	Study and implement amazon toolkit: Sagemaker
5.	Implement character recognition using Multilayer Perceptron
6.	Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.
7.	Implement sentiment analysis using random forest optimization algorithm
8.	Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the
9.	Choose best machine learning algorithm to implement online fraud detection
10.	Mini-project: students work in team on any socially relevant problem that needs a machine learning based solution, and evaluate the model performance.

Total Periods: 30

23ITC16	Mobile Communication	L	T	P	C
		3	0	0	3

Course Objective:

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

Course Outcomes:

23ITC16.CO1 State the basics of mobile telecommunication system

23ITC16.CO2 Illustrate the generations of telecommunication systems in wireless network

23ITC16.CO3 Understand the architectures, the challenges and the Solutions of Wireless Communication

23ITC16.CO4 Identify solution for each functionality at each layer

23ITC16.CO5 Analyze the functionality of Transport and Application layer

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITC16.CO1	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITC16.CO2	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITC16.CO3	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITC16.CO4	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITC16.CO5	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X

Unit-I Wireless Communication Fundamentals **9**

Introduction – Wireless transmission – Frequencies for Radio transmission – Signals – Antennas – Signal Propagation – Multiplexing – Modulations – Spread spectrum – MAC – SDMA – FDMA – TDMA – CDMA

Unit-II Telecommunication Networks **9**

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

Unit-III Wireless Lan **9**

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

Unit-IV Mobile Network Layer **9**

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

Unit-V Transport and Application Layers **9**

Traditional TCP : Congestion control- Slow start- Fast Re-transmission - Classical TCP Improvements – Indirect TCP- Mobile TCP- Snooping TCP- Fast Retransmit/Fast Recovery- Selective retransmission- Wireless Application Protocol

Total Periods: 45

Text Books:

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

Reference Books:

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

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23ITC17	Mini Project – Soft Skill I	L	T	P	C
		3	0	0	3

Course Objective:

- To Plan an experimental design to solve Engineering problems
- To develop an attitude of team work and independent working on real time problems
- To Analyze and process the experimental information
- To evaluate, interpret and justify the experimental results
- To develop a dissertation report

Course Outcomes:

23ITC17.CO1	Plan an experimental design to solve engineering / societal problems using modern tools
23ITC17.CO2	Develop lifelong learning to keep abreast of latest technologies
23ITC17.CO3	Analyze and implement the design to provide sustainable solutions.
23ITC17.CO4	Evaluate and interpret the experimental results and analyze the impact on society and environment.
23ITC17.CO5	Implement and test 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
23ITC17.CO1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
23ITC17.CO2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
23ITC17.CO3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
23ITC17.CO4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
23ITC17.CO5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

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.

The Workable project.

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.

Appendix a. Tools used b. References c. Base papers

Total Periods: 45

23ITC18	Principles of Compiler Design	L	T	P	C
		3	0	0	3

Course Objective:

- To learn the basic concepts of Automata theory.
- To know the basic concepts of compilers.
- To learn the functions of Lexical Analyzer and Syntax Analyzer.
- To understand the process of Intermediate Code Generation.
- To understand the concepts of Code Generation and Code Optimization

Course Outcomes:

23ITC18.CO1 Design a lexical analyzer for compiler.

23ITC18.CO2 Implement a parser such as a bottom– up SLR parser without using YACC.

23ITC18.CO3 Implement semantic rules into a parser.

23ITC18.CO4 Implement intermediate code generator for compiler design.

23ITC18.CO5 Implement code generator and code optimizer

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITC18.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	X
23ITC18.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	X
23ITC18.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	X
23ITC18.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	X
23ITC18.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	X

Unit-I INTRODUCTION TO AUTOMATA AND COMPILER 9

Basic Machines Finite Automata (FA) - Deterministic Finite Automata (DFA) – Nondeterministic Finite Automata (NFA) – Finite Automata with Epsilon transitions-Finite State Automata and Regular Expressions. Compilers – Phases of a compiler – Cousins of the Compiler– Compiler construction tools – Lexical Analysis – Role of LexiAnalyzer – Input Buffering – Tokens Specification.

Unit-II LEXICAL ANALYSIS 9

Recognition machine - A typical lexical analyzer generator - Parsing - Top Down parsing – Recursive Descent Parsing – Predictive Parsing. Syntax

Unit-III ANALYSIS 9

Analysis: Role of the parser – Context-Free Grammars — Bottom-up parsing – Shift Reduce Parsing – Operator Precedent Parsing – LR Parsers – SLR Parser – Canonical LR Parser – LALR Parser.

Unit-IV INTERMEDIATECODE GENERATION 9

Intermediate languages – Declarations – Assignment Statements – Boolean Expressions – Case Statements – Back patching – Procedure calls. Code Optimization and Code generation

Unit-V CODE OPTIMIZATION 9

Introduction to code optimization - Principal Sources of Optimization – Optimization of basic Blocks – DAG representation of Basic Blocks – Peephole Optimization - code generation- Issues in design of code generator – The target machine - A simple Code generator

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,Jeffrey D. Ullman,	Compilers: Principles, Techniques and Tools,	Pearson	2012
2.	Y.N.Srikant, PritiShankar,	The Compiler Design Handbook: Optimizationsand Machine Code Generation	CRC Press	2007

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	GruneD, VanReeuwijk K,Bal H.E, Jacobs C.J.H,Langendoen K,	Modern CompilerDesign	Springer	2012
2.	David Galles	Modern Compiler Design	Pearson	2007

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23ITC19	Compiler Design Laboratory	L	T	P	C
		0	0	2	1

Course Objective:

- To learn the basic concepts of Automata theory.
- To know the basic concepts of compilers.
- To learn the functions of Lexical Analyzer and Syntax Analyzer.
- To understand the process of Intermediate Code Generation.
- To understand the concepts of Code Generation and Code Optimization

Course Outcomes:

23ITC19.CO1 Ability to design and implement lexical analyzer using C and LEX tool.

23ITC19.CO2 Ability to design and implement parsers using C, YACC and LEX tools.

23ITC19.CO3 Ability to design and implement compilers.

23ITC19.CO4 Implement intermediate code generator for compiler design.

23ITC19.CO5 Implement code generator and code optimizer.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITC19.CO1	X	X	X	X	X	-	-	-	-	-	X	X	X	X	X
23ITC19.CO2	X	X	X	X	X	-	-	-	-	-	X	X	X	X	X
23ITC19.CO3	X	X	X	X	X	-	-	-	-	-	X	X	X	X	X
23ITC19.CO4	X	X	X	X	X	-	X	-	X	-	X	X	X	X	X
23ITC19.CO5	X	X	X	X	X	-	X	-	-	-	X	X	X	X	X

Sl.No.	List of Experiments
1.	Implementation of lexical analyzer in C.
2.	Implementation of lexical analyzer using LEX tool.
3.	Implementation of the recursive descent parser for an expression grammar that generates arithmetic expressions with digits, + and *.
4.	Implementation of a parser for the same grammar as given in problem using YACC and LEX.
5.	Write semantic rules to the YACC program in problem and implement a calculator that takes an expression with digits, + and * and computes and prints its value.
6.	Implementation of the front end of a compiler that generates the three address code for a simple language with: one data type integer, arithmetic operators, relational operators, variable declaration statement, one conditional construct, one iterative construct and assignment statement.
7.	Implementation of back end of a compiler using C.
8.	Stack implementation of LR parser using C.

Total Periods: 30

23ITC20	Cloud Computing using Aws	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:

23ITC20.CO1	Construct three cloud deployment models, and Overview of AWS Global infrastructure.
23ITC20.CO2	Implement the different AWS compute services.
23ITC20.CO3	Create virtual firewalls with security groups.
23ITC20.CO4	Construct the availability of different alternative database solutions.
23ITC20.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
23ITC20.CO1	X	X	X	X	X	-	-	-	X	-	X	X	X	X	X
23ITC20.CO2	X	X	X	X	X	-	-	-	-	-	X	X	X	X	X
23ITC20.CO3	X	X	X	X	X	-	-	-	-	-	X	X	X	X	X
23ITC20.CO4	X	X	X	X	X	-	-	-	-	-	X	X	X	X	X
23ITC20.CO5	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X

Unit-I Cloud Concepts **9**

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

Unit-II Aws Core Services **9**

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

Unit-III Cloud Security **9**

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

Unit-IV Cloud Architecting **9**

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

Unit-V Cloud Support **9**

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

Total Periods: 45

Text 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.	Rajkumar Buyya, Christian Vecchiola, S Thamarai Selvi	Mastering Cloud Computing	Tata McGraw Hill	2010

Reference Books:

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

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23ITC21	Web Technology	L	T	P	C
		3	0	0	3

Course Objective:

- To Demonstrate knowledge on web page design elements, dynamic content and database connection
- To Analyze user requirements to develop web applications.
- To Design client-server applications using web technologies.
- To Demonstrate problem solving skills to develop enterprise web applications.
- To Apply HTML, CSS, JavaScript, JQuery, Bootstrap and PHP technologies for device independent web application development.

Course Outcomes:

23ITC21.CO1	Demonstrate knowledge on web page design elements, dynamic content and database connection
23ITC21.CO2	Analyze user requirements to develop web applications.
23ITC21.CO3	Design client-server applications using web technologies.
23ITC21.CO4	Demonstrate problem solving skills to develop enterprise web applications.
23ITC21.CO5	Apply HTML, CSS, JavaScript, JQuery, Bootstrap and PHP technologies for device independent web application development.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITC21.CO1	X	X	X	X	X	-	-	X	X	-	X	X	X	X	X
23ITC21.CO2	X	X	X	X	X	-	-	-	-	-	-	X	X	X	X
23ITC21.CO3	X	X	X	X	X	-	-	-	-	-	-	X	X	X	X
23ITC21.CO4	X	X	X	X	X	X	-	X	-	-	-	X	X	X	X
23ITC21.CO5	X	X	X	X	X	-	-	-	-	-	-	X	X	X	X

Unit-I HTML **9**

Introduction: Fundamentals of HTML, Working with Text, Organizing Text in HTML, Working with Links and URLs, Creating Tables, Working with Images, Canvas, Forms, Frames and Multimedia.

HTML5: Introduction, HTML5 Document Structure, Creating Editable Content, Checking Spelling Mistakes, Exploring Custom Data Attributes, Client-Side Storage, Drag and Drop Feature, Offline Web Applications, Web Communications, Cross-Document Messaging and Desktop Notifications.

Unit-II CSS and Javascript **9**

CSS: Introduction, CSS Selectors, Inserting CSS in an HTML document, Backgrounds, Fonts, and Text Styles, Creating Boxes, Displaying, Positioning and Floating Elements, Features of CSS3, Media Queries.

JavaScript: Overview of JavaScript, JavaScript Functions, Events, Image Maps and Animations, JavaScript Objects, Working with Browser and Document Objects, JQuery- Introduction, JQuery Selectors, Events, Methods to access HTML elements and attributes, Introduction to AJAX.

Unit-III Bootstrap **9**

Getting Started with Bootstrap, Creating Responsive Layouts Using Bootstrap CSS - Basic HTML structure for Bootstrap, Responsive classes, Rendering images, The grid system, Constructing data entry forms, Packaged Components in Bootstrap - The page header, Glyphicons, The navigation bar, Badges, Alerts, Toolbars and button groups, Panels.

Unit-IV Introduction to PHP **9**

Introduction, Data Types, Variables, Constants, Expressions, String Interpolation, Control Structures, Functions, Arrays, Embedding PHP Code in Web Pages, Object Oriented PHP.

Unit-V PHP Web Forms and MySQL **9**

PHP Web forms:PHP and Web Forms, Sending Form Data to a Server, Working with Cookies and Session Handlers PHP with MySQL: Interacting with the Database, Prepared Statement, Database Transactions.

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Kogent	Learning Solutions Inc, HTML 5Black Book: Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP and JQuery	Dreamtech Press	2011
2.	W. Jason Gilmore	Beginning PHP and MySQL	APress	2011

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Snig Bahumik	Bootstrap Essentials	PACKT Publishing	2015
2.	Thomas A. Powell,	The Complete Reference: HTML andCSS	Tata McGraw Hill	2010
3.	Andrea Tarr	PHP and MySQL,	Willy India	2012

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23ITC22	Web Technology Laboratory	L	T	P	C
		0	0	2	1

Course Objective:

- To Demonstrate knowledge on web page design elements, dynamic content and database connection
- To Analyze user requirements to develop web applications.
- To Design client-server applications using web technologies.
- To Demonstrate problem solving skills to develop enterprise web applications.
- To Apply HTML, CSS, JavaScript, JQuery, Bootstrap and PHP technologies for device independent web application development.

Course Outcomes:

23ITC22.CO1	Demonstrate knowledge on web page design elements, dynamic content and database connection.
23ITC22.CO2	Analyze user requirements to develop web applications
23ITC22.CO3	Design client-server applications using web technologies
23ITC22.CO4	Demonstrate problem solving skills to develop enterprise web applications
23ITC22.CO5	Apply HTML, CSS, JavaScript, JQuery, Bootstrap and PHP technologies for device independent web application development

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITC22.CO1	X	X	X	X	-	-	X	-	-	-	X	-	X	X	X
23ITC22.CO2	X	X	X	X	X	-	X	-	X	X	X	X	X	X	X
23ITC22.CO3	X	X	X	X	X	X	X	-	X	-	X	-	X	X	X
23ITC22.CO4	X	X	X	X	-	X	X	-	-	-	-	X	X	X	X
23ITC22.CO5	X	X	X	X	X	-	-	X	X	-	X	-	X	X	X

Sl.No.	List of Experiments
1.	Design the following static web pages of an online book store web application. a. Home Page: b. Catalogue Page: The catalogue page should display the following details of available books. i. Snap shot of cover page ii. Title of the text book iii. Author name iv. Publisher v. Price vi. More details link. c. Registration Page: Design the Registration page with the following fields and navigate it with create an account link. i. First Name ii. Last Name iii. Gender iv. Date of Birth v. Username vi. Password vii. Confirm Password viii. Address ix. Postal Code x. Mobile No. xi. Email-Id
2.	Design a web page to store username and password information using the local storage concept. Design a web page to store employee information including Name, Emp. Id, Department, Salary and Address on a clients machine using a real SQL database.
3.	Apply the following styles to all web pages of online book store web application. a. Fonts and Styles: font-family, font-style, font-weight and font-size b. Backgrounds and colors: color, background-color, background-image and background-repeat c. Text: text-decoration, text-transformation, text-align and text-indentation, text-align

d. Borders: border, border-width, border-color and border-style
e. Styles for links: A: link, A: visited, A:active, A:hover
f. Selectors, Classes, Layers and Positioning elements.

4. Write a JavaScript/JQuery code to validate the following fields of the Registration web page.
a. First Name/Last Name - should contain only alphabets and the length should not be less than 8characters.
b. Username - It should contain combination of alphabets, numbers and underscore. It should not allowspaces and special symbols.
c. Password - It should not less than 8 characters in length and it contains one uppercase letter and onespecial symbol.
d. Date of Birth - It should allow only valid date; otherwise display a message stating that entered date isinvalid. Ex. 29 Feb. 2009 is an invalid date.
e. Postal Code: It must allow only 6 digit valid number.
f. Mobile No. - It should allow only numbers and total number of digits should be equal to 10.
e-mail id - It should allow the mail id with the following format: Ex. mailid@domainname.com

5. Design a web page with the following features using HTML5, JavaScript and JQuery
a. Displaying of images with Custom animated effects
b. Playing of selected video from the list of videos
c. Showing the animated text in increasing and decreasing font size
d. Changing the size of the area in a web page using DIV tag Hiding and Showing elements in a web page.

6. Design a web page with the following features using Bootstrap and Media Query.
a. Components
b. Responsive tables
c. Responsive images and videos
d. Toolbars, Buttons and Lists

7. a. Deploy and navigate web pages of online book store using WAMP/XAMPP web server.
b. Write a PHP program to read user name and favorite color from the HTML form. Display the name ofthe user in green color and sets user favorite color as a background for the web page.

8. Write a PHP code to read the username and password entered in the Login form of the online book store and authenticate with the values available in cookies. If user enters a valid username and password, welcome the user by username otherwise display a message stating that, entered details are invalid

9. Write a PHP code to read user details entered through the registration web page and store the same intoMySQL database.

10. Write a PHP code for storing books details like Name of the book, author, publisher, edition, price, etc into MySQL database. Embed a PHP code in catalogue page of the online book store to extract books details from the database.

Total Periods: 30

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23ITC23	Blockchain Technology	L	T	P	C
		3	0	0	3

Course Objective:

- To Understand the emerging abstract models for Blockchain Technology.
- Analyze the mechanism of digital money and Cryptography
- Summaries the necessary bitcoin and cryptocurrency background.
- Apply the function of initial coin offerings
- Implement the Applications of Block chain

Course Outcomes:

23ITC23.CO1	Understand the use cases in Block Chain
23ITC23.CO2	Demonstrate the digital transaction in same and different bank.
23ITC23.CO3	Implement the Bitcoin transactions.
23ITC23.CO4	Summarizes the functions of bitcoin and make use of it to solve problems
23ITC23.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
23ITC23.CO1	X	X	X	X	-	-	-	-	-	X	-	X	X	X	X
23ITC23.CO2	X	X	X	X	X	-	-	-	X	X	X	X	X	X	X
23ITC23.CO3	X	X	X	X	-	X	-	-	X	X	X	X	X	X	X
23ITC23.CO4	X	X	X	X	X	-	-	-	-	-	X	X	X	X	X
23ITC23.CO5	X	X	X	X	X	-	-	-	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- different 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'sGuide to Building Blockchain Solutions	Apress	2018
2.	Antony lewis	The Basics of Bitcoins andBlockchains	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, AndrewMiller, 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 onsecurity and Privacy	2015

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23ITC24	Blockchain Technology - Internship III	L	T	P	C
		0	0	2	1

Course Objective:

- Understanding Block chain Fundamentals and creating basic blocks.
- Able to Develop Block chain Applications in a structured manner
- Ability to create own crypto currency and get familiarity with future currencies.
- Able to Evaluate and Analyze Block chain Systems

Course Outcomes:

23ITC24.CO1 Knowledge of Blockchain Concepts and creating basic blocks.

23ITC24.CO2 Proficiency in Blockchain Development.

23ITC24.CO3 Ability to Design and Implement Blockchain Applications.

23ITC24.CO4 Evaluation and Analysis of Blockchain Systems.

23ITC24.CO5 Knowledge of crypto currency and creating a basic form of it.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITC24.CO1	X	X	X	X	X	X	-	X	X	-	-	X	X	X	X
23ITC24.CO2	X	X	X	X	X	-	-	X	X	X	-	-	X	X	X
23ITC24.CO3	X	X	X	X	-	X	-	-	X	X	-	X	X	X	X
23ITC24.CO4	X	X	X	X	X	X	-	X	X	X	-	X	X	X	X
23ITC24.CO5	X	X	X	X	X	X	-	X	X	-	-	X	X	X	X

Sl.No.	List of Experiments
1.	Creating Merkle tree
2.	Creation of Block
3.	Block chain Implementation Programming code
4.	Creating ERC20 token
5.	Java code to implement blockchain in Merkle Trees
6.	Java Code to implement Mining using block chain
7.	Java Code to implement peer-to-peer using block chain
8.	Creating a Crypto-currency Wallet

Total Periods: 30

23ITC25	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:

23ITC25 .CO1 Understand the role of Deep learning in Machine Learning Applications.

23ITC25 .CO1 To get familiar with the use of TensorFlow/Keras in Deep Learning Applications

23ITC25 .CO1 To design and implement Deep Learning Applications.

23ITC25 .CO1 Critically Analyse Different Deep Learning Models in Image Related Projects.

23ITC25 .CO1 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
23ITC25.CO1	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITC25.CO2	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITC25.CO3	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITC25.CO4	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITC25.CO5	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X

Unit-I BASICS OF NEURAL NETWORKS 9

Basic concept of Neurons – Perceptron Algorithm – Feed Forward and Back Propagation Networks

Unit-II INTRODUCTION TO DEEP LEARNING 9

Feed Forward Neural Networks – Gradient Descent – Back Propagation Algorithm – Vanishing Gradient problem – Mitigation – RelU Heuristics for Avoiding Bad Local Minima – Heuristics for Faster Training – Nestors Accelerated Gradient Descent – Regularization – Dropout

Unit-III CONVOLUTIONAL NEURAL NETWORKS 9

CNN Architectures – Convolution – Pooling Layers – Transfer Learning – Image Classification using Transfer Learning

Unit-IV MORE DEEP LEARNING ARCHITECTURES 9

LSTM, GRU, Encoder/Decoder Architectures – Autoencoders – Standard- Sparse – Denoising – Contractive- Variational Autoencoders – Adversarial Generative Networks – Autoencoder and DBM

Unit-V APPLICATIONS OF DEEP LEARNING 9

Image Segmentation – Object Detection – Automatic Image Captioning – Image generation with Generative Adversarial Networks – Video to Text with LSTM Models – Attention Models for Computer Vision – Case Study: Named Entity Recognition – Opinion Mining using Recurrent Neural Networks – Parsing and Sentiment Analysis using Recursive Neural Networks – Sentence Classification using Convolutional Neural Networks – Dialogue Generation with LSTMs.

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Ian Good Fellow, Yoshua Bengio, AaronCourville	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 inVisual Computing	CRC Press	2018
3.	Navin Kumar Manaswi	Deep Learning with ApplicationsUsing Python	Apress	2018
4.	Joshua F. Wiley	R Deep Learning Essentials	Packt Publications	2016

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23ITC26	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:

23ITC26.CO1	Describe the purpose, nature, and operations of a router; describe the purpose and nature of routing tables
23ITC26.CO2	Describe the purpose and procedure of configuring static routes.
23ITC26.CO3	Develop Inter-VLAN Routing and static routing based applications
23ITC26.CO4	Design and implement a classless IP addressing scheme for a given network
23ITC26.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
23ITC26.CO1	X	X	X	X	X	-	-	X	X	-	X	X	X	X	X
23ITC26.CO2	X	X	X	X	X	-	-	-	-	-	-	X	X	X	X
23ITC26.CO3	X	X	X	X	X	-	-	-	-	-	-	X	X	X	X
23ITC26.CO4	X	X	X	X	X	X	-	X	-	-	-	X	X	X	X
23ITC26.CO5	X	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-TroubleshootVLANs 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 ConfigurationConfigure 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 ServerConfigure 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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23ITC27	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:

23ITC27.CO1	Enumerate to develop application programs using system calls in Unix.
23ITC27.CO2	Estimate inter processes communication between two processes.
23ITC27.CO3	Develop and solve synchronization problems.
23ITC27.CO4	Analyze to simulate operating system concepts such as scheduling, deadlock management, file management, and memory management.
23ITC27.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
23ITC27.CO1	X	X	X	X	-	-	X	-	-	X	-	X	X	X	X
23ITC27.CO2	X	X	X	X	X	-		X	X	X	X	X	X	X	X
23ITC27.CO3	X	X	X	X	-	X	X	-	X	X	X	X	X	X	X
23ITC27.CO4	X	X	X	X	X	-		X	-	-	X	X	X	X	X
23ITC27.CO5	X	X	X	X	X	-	X	-	X	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

Total Periods: 30

23ITC28	Artificial Intelligence	L	T	P	C
		3	0	0	3

Course Objective:

- To learn the concepts of computational intelligence for solving problems
- To Understand about knowledge representation and decisions making
- To introduce the concepts of machine learning and Neural Networks
- To Initiate the Perception of Genetic Algorithms.
- To understand the knowledge about Expert Systems

Course Outcomes:

23ITC28.CO1	Apply different searching strategies for problem solving
23ITC28.CO2	Represent planning problems and find the sequence of actions to achieve goals by using knowledgerepresentation.
23ITC28.CO3	Comprehends the various machine learning techniques.
23ITC28.CO4	Demonstrate different techniques to represent Genetic Algorithms
23ITC28.CO5	Develop the expert system 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
23ITC28.CO1	X	X	X	X	X	-	-	-	-	-	X	X	X	X	X
23ITC28.CO2	X	X	X	X	X	-	-	-	-	-	X	X	X	X	X
23ITC28.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	X
23ITC28.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	X
23ITC28.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	X

Unit-I INTRODUCTION TO AI AND PRODUCTION SYSTEMS 9

Introduction to AI-Problem formulation, Problem Definition -Production systems, Control strategies, Search strategies. Problem characteristics, Production system characteristics -Specialized production system- Problem solving methods - Problem graphs, Matching, Indexing and Heuristic functions -Hill Climbing-Depth first and Breath first, Constraints satisfaction - Related algorithms, Measure of performance and analysis of search algorithms.

Unit-II REPRESENTATION OF KNOWLEDGE 9

Game playing - Knowledge representation, Knowledge representation using Predicate logic, Introduction to predicate calculus, Resolution, Use of predicate calculus, Knowledge representation using other logic- Structured representation of knowledge

Unit-III MACHINE LEARNING 9

Machine Learning-Supervised learning-un Supervised learning-Reinforcement Learning-Learning by Inductive Logic Programming-Computational Learning Theory-Neural Nets-Artificial Neural Nets-Topology of AI-Learning using Neural Nets-Back Propagation Training Algorithm- Multi-Layered ADALINE Models- Hopfield Neural Net-Associative Memory-Fuzzy Neural Nets- Self Organizing Neural Net-Adaptive Resonance Theory

Unit-IV GENETIC ALGORITHMS 9

Genetic Algorithms-Hollands Observation-Fundamental Theorem of Genetic Algorithms-Markov Model for Convergence Analysis-Applications of Optimization problem, Intelligent Systems-Genetic Programming- Fuzzy Neural Nets-Cognitive Maps-Stability Analysis-Control Command by Cognitive Map-Visual perception- Case Study.

Unit-V EXPERT SYSTEMS **9**

Expert systems - Architecture of expert systems, Roles of expert systems - Knowledge Acquisition –Meta knowledge, Heuristics. Typical expert systems - MYCIN, DART, XOON, Expert systems shells.

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Elaine Rich, KevinKnight, Shivashankar.B.Nair	Artificial Intelligence	Tata Mc Graw Hill	2011
2.	Amit Konar	Artificial Intelligence	CRC,Press	2009

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Russell, Peter Norvig	Artificial Intelligence – AModern Approach	Prentice Hall of India	2009
2.	Dan W. Patterson	Introduction to AI and ES	Pearson Education	2007
3.	AndriesP.Engelbrecht,	Computational Intelligence: A Introduction	John Wiley & Sons	2007
4.	Eugene Charniak,Drew McDermott	Introduction to Artificial Intelligence	Pearson Education	2006
5.	Nils.J.Nilsson	Artificial Intelligence: A new synthesis	Elsevier	2003

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23ITC29	Information Security	L	T	P	C
		3	0	0	3

Course Objective:

- To understand the basics of information security
- To describe the legal, ethical and professional issues in information security
- To estimate the level of security risk faced by an organization and the counter measures to handle the risk
- To understand the logical design and security models
- To implement the physical design and implementation of information security

Course Outcomes:

23ITC29.CO1 Explore the basic concept of information security models.

23ITC29.CO2 2. Analyze the need for security issues.

23ITC29.CO3 3. Use the security policies for information security.

23ITC29.CO4 4. Design logical structure of the information systems.

23ITC29.CO5 5. Implement physical structure of information security system by using security tools

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITC29.CO1	X	X	X	X	X	-	-	X	-	-	-	X	X	X	X
23ITC29.CO2	X	X	X	X	X	X	-	-	-	-	X	X	X	X	X
23ITC29.CO3	X	X	X	X	X	-	-	-	-	X	-	X	X	X	X
23ITC29.CO4	X	X	X	X	X	-	X	X	X	-	-	X	X	X	X
23ITC29.CO5	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X

Unit-I Introduction **9**

Introduction to Information Security: History- Aspects of Security- NSTISSC Security Model, Components of 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

Unit-III Security Practice **9**

Vulnerability Analysis-Auditing-Anatomy of an Auditing System-Design of Auditing Systems-Auditing Mechanisms-Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk.

Unit-IV Logical Design **9**

Blueprint for Security, Information Security Policy, Standards and Practices, ISO 17799/BS 7799, NIST Models, VISA International Security Model, Design of Security Architecture, Planning for Continuity

Unit-V Physical Design And Implementation **9**

Security Technology, IDS, Honey Pots, Honey Nets, and Padded Cell Systems, Scanning and Analysis Tools,Access Control Devices, Implementing Information Security, Project Management for Information Security,Technical Topics of Implementation, Nontechnical Aspects of Implementation

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	Thomson (Cengage) Indian	2016
2.	Mark Rhodes-Ousley	Information Security: The Complete Reference	Pearson/PHI	2013

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Stuart McClure, Joel Scrambray, George Kurtz	Hacking Exposed	Tata McGraw-Hill	2003
2.	Micki Krause, Harold F. Tipton	Handbook of Information Security Management	CRC Press LLC	2004
3.	Charles Pfleeger,Shari Lawrence Pfleeger,Devin N Paul	Security in Coding	Pearson Education	2007
4.	Wenbo Mao	Modern Cryptography Theory and Practice	Pearson Education	2004
5.	Matt Bishop	Computer Security: Art and Science	Pearson Education	2003

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23ITC30	Web Development Using Angular and Bootstrap	L	T	P	C
		3	0	0	3

Course Objective:

- To Apply the HTML5, CSS3 and Bootstrap concepts in front-end development of modern web applications
- To Design Web applications using Bootstrap
- To Create and deploy scalable web-based system using Angular JS.
- To Implement Directives and Controllers for front-end development
- To Demonstrate knowledge on the usage of Keys and Values Create Forms, validate and use Filters.

Course Outcomes:

23ITC30.CO1	Apply the HTML5, CSS3 and Bootstrap concepts in front-end development of modern web applications
23ITC30.CO2	Design Web applications using Bootstrap
23ITC30.CO3	Create and deploy scalable web-based system using Angular JS.
23ITC30.CO4	Implement Directives and Controllers for front-end development
23ITC30.CO5	Demonstrate knowledge on the usage of Keys and Values Create Forms, validate and use Filters.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITC30.CO1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
23ITC30.CO2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
23ITC30.CO3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
23ITC30.CO4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
23ITC30.CO5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Unit-I HTML5 & CSS3 **9**

HTML5 – Introduction, Elements, Tags, Lists, Tables, Images, Forms - Form Elements & Attributes, Hidden Fields, Semantic Elements, Media Elements, Canvas, SVG, Drag & Drop, Geolocation, WebStorage, Special Tags, Formatting Tags. CSS – Introduction, Styling, Box Model, Padding & Dimension, Transforms, Transitions, Animations, Multiple columns, User Interface.

Unit-II BOOTSTRAP **9**

Bootstrap: Overview, Environment setup, Precompiled Bootstrap, Source Code, Grid System,Bootstrap CSS Overview, Typography, Code, Tables, Forms, Helper Classes,Responsive Utilities,Glyphicons, Dropdowns, Navigation Elements, Breadcrumb, Pagination, Badges, Progress bars Plugins - Overview: Transition Plugin, Model Plugin, Dropdown Plugin, Scrollspy Plugin, Tab Plugin, Tooltip Plugin, Popover Plugin, Alert Plugin, Button Plugin, Collapse Plugin, Carousel Plugin, Affix Plugin

Unit-III INTRODUCTION TO ANGULAR JS **9**

Introduction: Features , Angular JSModel, View-Controller; Expression, Directives and Controllers; Angular JS Modules, Arrays, Working with ng-model, Working with Forms, Form Validation, Error Handling with Forms, Nested Forms with ng-form, Other Form Controls.

Unit-IV DIRECTIVES & BUILDING DATABASES **9**

Filters: Using Filters in Controllers and Services; Angular JS Services, Internal Angular JSServices, Custom Angular JS Services, Directives, Alternatives to Custom Directives, Understanding the Basic options, Interacting with Server, HTTP Services, Building Database, FrontEnd and BackEnd

Unit-V JSON AND MoNGoDB **9**

JSON and MongoDB, Adopting a Non-relational Approach, Opting for Performance vs. Features Running the Database Anywhere, Generating or Creating a Key, Using Keys and Values, Implementing Collections

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Shyam Seshadri,Brad Green,	AngularJS: Up and Running: Enhanced Productivity with Structured Web Apps	Apress, O'Reilly Media	2014
2.	Jon Duckett	Web Design with HTML, CSS,JavaScript and jQuery Set	Paperback	2014

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Kristina Chodorowand Michael Dirolf	Mongo DB – The Definitive Guide	O'Reilly Media	2010
2.	Jake Spurlock	Responsive Web Development –Bootstrap	O'Reilly Media	2013

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23ITC31	Data Science and Data Analytics	L	T	P	C
		3	0	0	3

Course Objective:

- To Use Analytical Architecture and its life cycle in Data Analytics
- To Analyze and Visualize the Data Analytics Methods using R.
- To Apply Advanced Analytical Methods for Text Analysis and Time –Series Analysis
- To Develop Analytical Report for given Analytical problems
- To Analyze and Design Data Analytics Application on Societal Issues.

Course Outcomes:

23ITC31.CO1 Use Analytical Architecture and its life cycle in Data Analytics

23ITC31.CO2 Analyze and Visualize the Data Analytics Methods using R.

23ITC31.CO3 Apply Advanced Analytical Methods for Text Analysis and Time –Series Analysis

23ITC31.CO4 Develop Analytical Report for given Analytical problems

23ITC31.CO5 Analyze and Design Data Analytics Application on Societal Issues.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITC31.CO1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
23ITC31.CO2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
23ITC31.CO3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
23ITC31.CO4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
23ITC31.CO5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Unit-I Introduction to Data Analytics and R **9**

Practice in Analytics: BI versus Data Science, Current Analytical Architecture, Emerging Big Data Ecosystem and a New Approach to Analytics. Data Analytics Life Cycle: Key Roles for a Successful Analytics Project Background and Overview of Data Analytics Lifecycle Phases - Discovery Phase, Data Preparation Phase, Model Planning, Model Building, Communicate Results, Operationalize. Introduction to R:R Graphical User Interfaces, Data Import and Export, Attribute and Data Types, Descriptive Statistics.

Unit-II Basic Data Analytical Methods **9**

Exploratory Data Analysis: Visualization Before Analysis, Dirty Data, Visualizing a Single Variable, Examining Multiple Variables, Data Exploration Versus Presentation. Statistical Methods for Evaluation: Hypothesis Testing, Difference of Means, Wilcoxon Rank-Sum Test, Type I and Type II Errors, Power and Sample Size, ANOVA, Decision Trees in R, Naïve Bayes in R

Unit-III Advanced Analytical Technology and Methods **9**

Time Series Analysis: Overview of Time Series Analysis, Box-Jenkins Methodology, ARIMA Model, Autocorrelation Function (ACF),Autoregressive Models, Moving Average Models , ARMA and ARIMA Models ,Building and Evaluating an ARIMA Model, Reasons to Choose and Cautions.

Text Analysis: Text Analysis Steps, A Text Analysis Example, Collecting Raw Text, Representing Text, Term Frequency—Inverse Document Frequency (TFIDF), Categorizing Documents by Topics, Determining Sentiments, Gaining Insights.

Unit-IV Analytical Data Report and Visulaization **9**

Communicating and Operationalizing an Analytics Project, Creating the Final Deliverables: Developing Core Material for Multiple Audiences, Project Goals, Main Findings, Approach, Model Description, Key Points Supported with Data, Model Details Recommendations, Additional Tips on Final Presentation, Providing Technical Specifications and Code,Data Visualization

Unit-V Data Analytics Applications **9**

Text and Web: Data Acquisition, Feature Extraction, Tokenization, Stemming, Conversion to Structured Data, Sentiment Analysis, Web Mining. Recommender Systems: Feedback, Recommendation Tasks, Recommendation Techniques, Final Remarks. Social Network Analysis: Representing Social Networks, Basic Properties of Nodes, Basic and Structural Properties of Networks.

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	EMC EducationServices	Data Science and Big DataAnalytics – Discovering, Analyzing, Visualizing and Presenting Data	John Wiley and Sons	2015
2.	João Moreira, Andre Carvalho, André Carlos Ponce de Leon FerreiraCarvalho, Tomás Horvath	A General Introduction to DataAnalytics	John Wiley and Sons	2019

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Anil Maheshwari	Data Analytics Made Accessible	Lake Union Publishing	2017
2.	Richard Dorsey	Data Analytics: Become a Master inData Analytics	Create Space Independent Publishing Platform	2017

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23ITC32	Data Analytics Laboratory	L	T	P	C
		0	0	2	1

Course Objective:

- To Use Analytical Architecture and its life cycle in Data Analytics
- To Analyze and Visualize the Data Analytics Methods using R.
- To Apply Advanced Analytical Methods for Text Analysis and Time –Series Analysis
- To Develop Analytical Report for given Analytical problems
- To Analyze and Design Data Analytics Application on Societal Issues.

Course Outcomes:

23ITC32.CO1	Demonstrate knowledge on Prediction Modeling, Regression Techniques and visualization, Build a Decision Tress classification using different packages and prediction, Clustering Techniques, Association rules Mining, Time series Analysis and Text Mining using R tool.
23ITC32.CO2	Apply Classification, clustering and Regression algorithms for Data Analysis
23ITC32.CO3	Develop solution for Text Analysis and Time Series Analysis problems
23ITC32.CO4	Analyze and Visualize data using R programming
23ITC32.CO5	Work independently or in teams to solve problems with effective communication.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITC32.CO1	X	X	X	X	-	-	X	-	-	-	X	-	X	X	X
23ITC32.CO2	X	X	X	X	X	-	X	-	X	X	X	X	X	X	X
23ITC32.CO3	X	X	X	X	X	X	X	-	X	-	X	-	X	X	X
23ITC32.CO4	X	X	X	X	-	X	X	-	-	-	-	X	X	X	X
23ITC32.CO5	X	X	X	X	X	-	-	X	X	-	X	-	X	X	X

Sl.No.	List of Experiments
1.	Introduction to R Studio, Basic operations and import and export of data using R Tool.
2.	Implement Data Exploration and Visualization on different Datasets to explore multiple and Individual Variables.
3.	Build a Decision Tree using party and rpart packages.
4.	Build a predictive model using random Forest Package.
5.	Implement Linear and logistic Regression on Datasets to predict the probability.
6.	Implement K-Means, K-Medoids, Hierarchical and Density-based Clustering techniques.
7.	Implement Time Series Analysis using Classification and clustering Techniques.
8.	Implement Apriori Algorithm in Association Rule Mining.
9.	Implement Text Mining on Twitter data using twitteR package

Total Periods: 30

23ITC33	Node JS 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:

23ITC33.CO1 Examine the fundamental structure of Node.js platform

23ITC33.CO1 Affirm the concepts of NPM

23ITC33.CO1 Interpret the concepts of streams and file systems

23ITC33.CO1 Develop the web content using node.js

23ITC33.CO1 Annotate the various features of React js

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITC33.CO1	X	X	X	X	-	-	-	-	-	X	-	X	X	X	X
23ITC33.CO2	X	X	X	X	X	-	-	-	X	X	X	X	X	X	X
23ITC33.CO3	X	X	X	X	-	X	-	-	X	X	X	X	X	X	X
23ITC33.CO4	X	X	X	X	X	-	-	-	-	-	X	X	X	X	X
23ITC33.CO5	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 Errors - Node.js DNS - Node.js Net

Unit-III Streams and File Systems **9**

Node.js Creating Buffers - Node.js Streams - Node.js Piping Streams - Node.js Chaining Streams - Node.js File systems

Unit-IV Web Development **9**

Node.js Web Module - Node.js html form handling - Node.js Database Connectivity

Unit-V Introduction to React.JS **9**

The environment of React.js - Benefits and Features – components – state – lifecycle – events – forms – CSS

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	AzatMardan	Practical Node. jsBuilding Real-World Scalable Web Apps,	APRESS Publication	2018

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Alex Young, BradleyMeck, Mike Cantelon	Node.js in Action	Manning Publications	2017
2.	Alex banks & Eve Porcello	Learning React	O'Reilly Publications	2017

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23ITC34	Cloud Computing Laboratory	L	T	P	C
		0	0	2	1

Course Objective:

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

Course Outcomes:

23ITC34.CO1	Describe three cloud deployment models, and Overview of AWS Global infrastructure.
23ITC34.CO2	Understand the different AWS core services.
23ITC34.CO3	Formulate virtual firewalls with security groups.
23ITC34.CO4	Review the availability differences of alternative database solutions.
23ITC34.CO5	Summarize the 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
23ITC34.CO1	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITC34.CO2	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITC34.CO3	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITC34.CO4	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITC34.CO5	X	X	X	X	X	-	-	X	-	-	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.	Sandbox.
8.	Use GAE launcher to launch the web applications.
9.	Simulate a Cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim.
10.	Install Hadoop single node cluster and run simple applications like wordcount

Total Periods: 45

23ITE01	MERN Stack Development	L	T	P	C
		3	0	0	3

Course Objective:

- To understand the various components of Web development
- To learn features and applications with Java Script and React
- To develop applications with MongoDB
- To develop application with Node.js.
- To understand the role of Express in web applications

Course Outcomes:

23ITE01.CO1 Understand the basics and various stacks available for web application development

23ITE01.CO2 Understand React and Rest API.

23ITE01.CO3 Develop applications with MongoDB

23ITE01.CO4 Use Node.js for application development

23ITE01.CO5 Develop applications on Express and Node

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITE01.CO1	X	X	X	X	X	-	-	X	X	-	X	X	X	X	X
23ITE01.CO2	X	X	X	X	X	-	-	-	-	-	-	X	X	X	X
23ITE01.CO3	X	X	X	X	X	-	-	-	-	-	-	X	X	X	X
23ITE01.CO4	X	X	X	X	X	X	-	X	-	-	-	X	X	X	X
23ITE01.CO5	X	X	X	X	X	-	-	-	-	-	-	X	X	X	X

Unit-I Basics of Web Development **9**

Understanding the Basic Web Development -Browser – Webserver - Backend Services. HTML Structures – List – Table – Images – Anchor Tag - Forms – DOM. Basics of CSS – CSS Properties – CSS Flex and Grids.

Unit-II Java script and React **9**

Introduction to JavaScript - Basic React applications – React Components – React State – Express REST APIs - Modularization and Web pack - Routing with React Router – Server-side rendering

Unit-III Mongo Db **9**

Understanding NoSQL and MongoDB – Building MongoDB Environment – User accounts – Access control – Administering databases –Managing collections.

Unit-IV Node JS **9**

Basics of Node JS – Installation – Working with Node packages – Using Node packageManager – Creating a simple Node.js application – Using Events – Listeners –Timers - Callbacks – Handling Data I/O – Implementing HTTP services in Node.js

Unit-V Express **9**

Implementing Express in Node.js - Configuring routes - Using Request and Response Objects. Connecting to MongoDB from Node.js – Simple applications.

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Brad Dayley, Brendan Dayley, Caleb Dayley	Node.js, MongoDB and Angular Web Development	Addison-Wesley	2018
2.	Vasan Subramanian	Pro MERN Stack, Full Stack Web App Development with Mongo, Express, React, and Node	Apress	2019

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Chris Northwood	The Full Stack Developer: Your Essential Guide to the Everyday Skills Expected of a Modern Full Stack Web Developer	Apress	2018
2.	KirupaChinnathambi	Learning React: A Hands-On Guide to Building Web Applications Using React and Redux	Addison-Wesley Professional	2018

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23ITE02	MERN Stack Development Laboratory- INTERNSHIP I	L	T	P	C
		0	0	2	1

Course Objective:

To develop full stack applications with clear understanding of user interface, business logic and data storage.

- To design and develop user interface screens for a given scenario
- To develop the functionalities as web components as per the requirements
- To implement the database according to the functional requirements
- To integrate the user interface with the functionalities and data storage.

Course Outcomes:

23ITE02.CO1	Design full stack applications with clear understanding of user interface, business logic and data storage.
23ITE02.CO2	Design and develop user interface screens
23ITE02.CO3	Implement the functional requirements using appropriate tool
23ITE02.CO4	Design and develop database based on the requirements
23ITE02.CO5	Integrate all the necessary components of the application

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITE02.CO1	X	X	X	X	-	-	X	-	-	-	X	-	X	X	X
23ITE02.CO2	X	X	X	X	X	-	X	-	X	X	X	X	X	X	X
23ITE02.CO3	X	X	X	X	X	X	X	-	X	-	X	-	X	X	X
23ITE02.CO4	X	X	X	X	-	X	X	-	-	-	-	X	X	X	X
23ITE02.CO5	X	X	X	X	X	-	-	X	X	-	X	-	X	X	X

Sl.No.	List of Experiments
1.	Develop a portfolio website for yourself which gives details about you for a potential recruiter.
2.	Create a web application to manage the TO-DO list of users, where users can login and manage their to-do items
3.	Create a simple micro blogging application (like twitter) that allows people to post their content which can be viewed by people who follow them.
4.	Create a food delivery website where users can order food from a particular restaurant listed in the website.
5.	Develop a classifieds web application to buy and sell used products.
6.	Develop a leave management system for an organization where users can apply different types of leaves such as casual leave and medical leave. They also can view the available number of days.
7.	Develop a simple dashboard for project management where the statuses of various tasks are available. New tasks can be added and the status of existing tasks can be changed among Pending, InProgress or Completed.
8.	Develop an online survey application where a collection of questions is available and users are asked to answer any random 5 questions.

Total Periods: 30

23ITE03	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 real time scenario

Course Outcomes:

23ITC03.CO1 Explain the underlying architectures and models in IoT.

23ITC03.CO2 Analyze various protocols for IoT at the different layers for IoT

23ITC03.CO3 Apply the web of things and cloud of things Models

23ITC03.CO4 Develop different models for network dynamics

23ITC03.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
23ITE03.CO1	X	X	X	X	X	-	-	-	-	-	X	X	X	X	X
23ITE03.CO2	X	X	X	X	X	-	-	-	-	-	X	X	X	X	X
23ITE03.CO3	X	X	X	X	X	-	-	-	-	-	X	X	X	X	X
23ITE03.CO4	X	X	X	X	X	-	-	-	-	-	X	X	X	X	X
23ITE03.CO5	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 Protocols **9**

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

Unit-III Web of Things **9**

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

Unit-IV IoT Business Models **9**

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

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, Synchronizations 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 Internetof Things	Cisco Press	2017
2.	Arshdeep Bahga,Vijay Madisetti	Internet of Things	A hands-on approach, Universities press	2015

Reference Books:

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

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23ITE04	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 real time scenario

Course Outcomes:

23ITE04.CO1	Demonstrate hands-on experience on IoT.
23ITE04.CO2	Use Sensors, Arduino microcontroller and Raspberry Pi microprocessor for the development of IoT applications.
23ITE04.CO3	Analyze the user requirements for the development of IoT applications
23ITE04.CO4	Develop IoT applications to solve societal problems using cloud environment.
23ITE04.CO5	Work independently or in teams to solve problems with effective communication

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITE04.CO1	X	X	X	X	-	-	-	-	-	X	-	X	X	X	X
23ITE04.CO2	X	X	X	X	X	-	-	-	X	X	X	X	X	X	X
23ITE04.CO3	X	X	X	X	-	X	-	-	X	X	X	X	X	X	X
23ITE04.CO4	X	X	X	X	X	-	-	-	-	-	X	X	X	X	X
23ITE04.CO5	X	X	X	X	X	-	-	-	X	X	X	X	X	X	X

Sl.No.	List of Experiments
1.	Write 8051 Assembly Language experiments using simulator.
2.	Test data transfer between registers and memory.
3.	Perform ALU operations.
4.	Using interrupts generate waveforms and test Timers.
5.	Write assembly language experiments using Kit to test interfaces and interrupts using Traffic Generator, DAC, ADC,Stepper Motor (2).
6.	Write Basic and arithmetic Programs Using Embedded C.
7.	Write Embedded C program to test interrupt and timers.
8.	Develop Real time applications – clock generation, wave form generation, counter using embedded C.
9.	Explore ARM/PIC based controllers using Embedded C. Explore different communication methods with IoT devices
10.	Develop simple application – testing infrared sensor – IoT Applications – using Aurdino.
11.	Develop simple application – testing temperature, light sensor – IOT Application using open platform/Raspberry Pi.
12.	Deploy IOT applications using platforms such as Bluemix.

Total Periods: 30

23ITE05	Salesforce CRM and Platform	L	T	P	C
		3	0	0	3

Course Objective:

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

Course Outcomes:

23ITE05.CO1	The students will be able to understand the basics of Salesforce platform
23ITE05.CO2	Summaries the Leverage configurable aspects of Salesforce for business process automation
23ITE05.CO3	Develop Apex Programming and Visual force
23ITE05.CO4	Access Apex program with SOQL & DML
23ITE05.CO5	Organize the Testing and Execution of triggers in Apex

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITE05.CO1	X	X	X	X	X	X	-	X	X	-	-	X	X	X	X
23ITE05.CO2	X	X	X	X	X	-	-	X	X	X	-	-	X	X	X
23ITE05.CO3	X	X	X	X	-	X	-	-	X	X	-	X	X	X	X
23ITE05.CO4	X	X	X	X	X	X	-	X	X	X	-	X	X	X	X
23ITE05.CO5	X	X	X	X	X	X	-	X	X	-	-	X	X	X	X

Unit-I Introduction to Salesforce **9**

Sales force Overview - Architecture – Environment - Sales Cloud - Service Cloud - Navigating Setup Sales forceObjects - 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. Sales force 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 – Sales force 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

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Paul Goodey	Salesforce CRM - The Definitive Admin Handbook	PACKT enterprises, Kindle edition	2016
2.	Matt Kaufmann and Michael Wicherski	Learning Apex Programming	PACKT enterprises, Kindle edition	2015

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	David Taber	Salesforce.com Secrets of Success: Best Practices for Growth and Profitability	Prentice Hall	2013
2.	Keir Bowden	Visualforce Development Cookbook	PACKT enterprises, Kindle edition	2016

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23ITE06	Salesforce CRM and Platform Laboratory	L	T	P	C
		0	0	2	1

Course Objective:

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

Course Outcomes:

23ITE06.CO1	Understand the basics of Sales force platform
23ITE06.CO2	Leverage configurable aspects of Sales force for business process automation
23ITE06.CO3	Understand Apex Programming and Visual force
23ITE06.CO4	Develop Apex program with SOQL & DML
23ITE06.CO5	Testing and Execution of triggers in Apex

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITE06.CO1	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITE06.CO2	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITE06.CO3	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITE06.CO4	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITE06.CO5	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X

Sl.No.	List of Experiments
1.	Sales force Basics
2.	Sales force 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.	Build a Conference Management Application
11.	Development an Account Geolocation Application
12.	Transform SQL Queries to SOQL Queries

Total Periods: 30

23ITE07	Docker and Kubernetes	L	T	P	C
		3	0	0	3

Course Objective:

- To Understand Kubernetes Architecture
- To Know the Principles of cluster And Image Management
- To Define Network And data Management using containers
- To Develop a Docker Essentials
- To deploy stateful and stateless apps on the cluster

Course Outcomes:

23ITE07.CO1	Installing & creating an account with docker Hub
23ITE07.CO2	Develop interactive Scaling control and Networking Services using docker
23ITE07.CO3	Expose the Build Comprehensive Hands-on with Kubernetes Components
23ITE07.CO4	Kubernetes Cluster installation on Virtualbox, AWS & Google Cloud Platforms
23ITE07.CO5	Develop interactive app outside the cluster and to autoscale apps

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITE07.CO1	X	X	X	X	X	-	-	X	X	-	X	X	X	X	X
23ITE07.CO2	X	X	X	X	X	-	-	-	-	-	-	X	X	X	X
23ITE07.CO3	X	X	X	X	X	-	-	-	-	-	-	X	X	X	X
23ITE07.CO4	X	X	X	X	X	X	-	X	-	-	-	X	X	X	X
23ITE07.CO5	X	X	X	X	X	-	-	-	-	-	-	X	X	X	X

Unit-I Introduction **9**

Introduction to Docker-requirements –Docker containers-listing-searching-pulling for an image-Starting containers-listing containers-stopping containers, deleting containers-setting and getting privileged access inside a container- run container images in Kubernetes-injecting new process to a running container-labelling filtering containers

Unit-II Network and Data Management for Containers **9**

Introduction-Accessing containers from outside-Managing data in containers-linking two or more containers-LAMP-application by linking containers-networking of multihost containers with Flannel-Assigning IPv6 addresses to containers.

Unit-III DOCKER PERFORMANCE AND ORCHESTRATION **9**

Introduction-Benchmarking CPU performance, Benchmarking disk performance, Benchmarking network performance- Performance monitoring .Orchestration-Introduction-Applications with docker compose-cluster with docker Swarm-CoreOS for docker Orchestration-docker in project atomic.

Unit-IV INTRODUCTION TO KUBERNETES **9**

Introduction- Kubernetes Architecture- Components of kubernetes cluster -cluster management - Deploy Kubernetes- deploy Kubernetes on AWS and Google cloud platforms- Pods and Deployments -Kubernetes Master- master nodes

Unit-V KUBERNETES USING DOCKER **9**

Kubernetes Management Design Patterns with Docker, CoreOS Linux- Kubernetes docker containers-Nodes-Cluster-Service-pod-Replication controller-label-selector-name-namespace-volume-Service proxy-listing service- listing nodes- Kubernetes Cluster-Scaling-Testing-wordpress with kubernetes cluster.

Total Periods: 45

Text 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	John Wiley and Sons	2015
2.	Deepak Vohra	Kubernetes Microservices with Docker	Apress	2016
3.	Neependra Khare	Docker Cookbook	Packt Publishing	2015

Reference Books:

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

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23ITE08	Software Project Management	L	T	P	C
		3	0	0	3

Course Objective:

- To highlight different techniques for software cost estimation
- To plan and monitor projects for the risk management
- To explore the process of monitoring and controlling
- To manage people and organization of teams
- To estimate the cost associated with a project

Course Outcomes:

23ITE08.CO1	Able to practice the process of project management and its application in delivering successful projects
23ITE08.CO2	Evaluate the risks and hazards in the project management
23ITE08.CO3	Apply cost monitoring and control strategies for software projects
23ITE08.CO4	Identify desirable characteristics of effective project managers and manage the organizational behavior of people working in teams
23ITE08.CO5	Evaluate a project to develop the scope of work, provide accurate cost estimates and to plan thevarious activities

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITE08.CO1	X	X	X	X	-	-	X	-	-	-	X	-	X	X	X
23ITE08.CO2	X	X	X	X	X	-	X	-	X	X	X	X	X	X	X
23ITE08.CO3	X	X	X	X	X	X	X	-	X	-	X	-	X	X	X
23ITE08.CO4	X	X	X	X	-	X	X	-	-	-	-	X	X	X	X
23ITE08.CO5	X	X	X	X	X	-	-	X	X	-	X	-	X	X	X

Unit-I Introduction and Project Evaluation 9

Project Definition – Importance of Software Project Management – Contract Management – Activities covered bySoftware Project Management – Setting objectives – Stakeholders - Management Control – Overview of Project

Planning – Stepwise Project Planning – Project evaluation - Strategic Assessment – Technical Assessment – CostBenefit 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 ProjectManagement	Tata McGraw Hill	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 inPractice	Pearson Education	2010

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23ITE09	Game Design Prototyping and Development	L	T	P	C
		3	0	0	3

Course Objective:

- To Understand Game Design Principles
- To Develop Prototyping Skills
- To Construct Master Unity and C# Programming.
- Examine Integrate Art and Sound
- Demonstrate Apply Testing and Iteration Techniques

Course Outcomes:

23ITE09.CO1 Recognize the design principles of gaming application.

23ITE09.CO2 Implement the use of gaming tools in application design automation

23ITE09.CO3 Construct an architectural design using the development process

23ITE09.CO4 Examine the prototype for an existing application

23ITE09.CO5 Demonstrate audio and visual effects in a game

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITE09.CO1	X	X	X	X	X	-	-	X	X	-	X	X	X	X	X
23ITE09.CO2	X	X	X	X	X	-	-	-	-	-	-	X	X	X	X
23ITE09.CO3	X	X	X	X	X	-	-	-	-	-	-	X	X	X	X
23ITE09.CO4	X	X	X	X	X	X	-	X	-	-	-	X	X	X	X
23ITE09.CO5	X	X	X	X	X	-	-	-	-	-	-	X	X	X	X

Unit-I Elements of Gaming **9**

4 C's of game design- Game design atoms- Elements of chance, strategic skill and Twitch skill- Level design- Puzzle design- Design considerations for Massively Multiplayer Online Games (MMOG) - Gaming tools.

Unit-II Game Architecture **9**

Current Development methods- Initial Design- Building block- Initial architecture design Development process

Unit-III Game Design and Prototyping **9**

Game analysis framework- The tetra Layer- Design goals- Paper prototyping- Game testing- Math and Game balance - Game prototype: Apple picker.

Unit-IV Gaming with Pygame **9**

Introducing pygame- Understanding events- Creating visuals- Making things move Creating AI for games.

Unit-V Gaming in Three Dimension **9**

Understanding 3D space- Working with OpenGL- Creating sound effects- Working with textures and Models- Setting the scene with OpenGL

Total Periods: 45

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Jeremy Gibson Bond	Introduction to Game Design, Prototyping, and Development	Addison-Wesley Professional	2022
2.	Jeremy Gibson Bond	Introduction to Game Design, Prototyping, and Development: From Concept to Playable Game with Unity and C#, 2nd Edition	Addison-Wesley Professional	2017

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		L	T	P	C
23ITE10	**AWS Academy Cloud Developing**	**3**	**0**	**0**	**3**

Course Objective:

- Recall cloud computing services and models.
- Configure AWS Identity and Access Management for programmatic access.
- To Develop containers with AWS Lambda
- Assess solutions with Amazon API Gateway.
- Identify best practice for building secure applications and deploying applications.

Course Outcomes:

23ITE10.CO1	Create on AWS.
23ITE10.CO2	Develop AWS Identity and Access Management for programmatic access.
23ITE10.CO3	Implement Container with AWS Lambda.
23ITE10.CO4	Organize solutions with Amazon API Gateway.
23ITE10.CO5	Build 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
23ITE10.CO1	X	X	X	X	-	-	-	-	-	X	-	X	X	X	X
23ITE10.CO2	X	X	X	X	X	-	-	-	X	X	X	X	X	X	X
23ITE10.CO3	X	X	X	X	-	X	-	-	X	X	X	X	X	X	X
23ITE10.CO4	X	X	X	X	X	-	-	-	-	-	X	X	X	X	X
23ITE10.CO5	X	X	X	X	X	-	-	-	X	X	X	X	X	X	X

Unit-I Introduction to Developing on AWS **9**

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

Unit-II Developing Storage Solutions with Amazon S3 **9**

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

Unit-III Introduction to Containers with AWS Lambda **9**

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

Unit-IV Developing Solutions with Amazon API Gateway 9

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

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Nassim Khaled, BibinPattel, Affan Siddiqui	Digital Twin Development and Deployment on the Cloud: Developing Cloud-Friendly Dynamic Models Using Simulink®/SimscapeTM and Amazon AWS	Academic Press	2020

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23ITE11	Aws Academy Cloud Developing Lab	L	T	P	C
		0	0	2	1

Course Objective:

- Recall cloud computing services and models.
- Configure AWS Identity and Access Management for programmatic access.
- To Develop containers with AWS Lambda
- Assess solutions with Amazon API Gateway.
- Identify best practice for building secure applications and deploying applications.

Course Outcomes:

23ITE11CO1	Create on AWS.
23ITE11.CO2	Develop AWS Identity and Access Management for programmatic access.
23ITE11.CO3	Implement Container with AWS Lambda.
23ITE11.CO4	Organize solutions with Amazon API Gateway.
23ITE11.CO5	Build 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
23ITE11.CO1	X	X	X	X	X	X	-	X	X	-	-	X	X	X	X
23ITE11.CO2	X	X	X	X	X	-	-	X	X	X	-	-	X	X	X
23ITE11.CO3	X	X	X	X	-	X	-	-	X	X	-	X	X	X	X
23ITE11.CO4	X	X	X	X	X	X	-	X	X	X	-	X	X	X	X
23ITE11.CO5	X	X	X	X	X	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)

Total Periods: 30

23ITE12	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:

23ITE12.CO1	Implement IT related work and access Amazon Web Services
23ITE12.CO2	Develop code
23ITE12.CO3	Construct real time database application using current techniques
23ITE12.CO4	Populate Cloud based architectures
23ITE12.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
23ITE12.CO1	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITE12.CO2	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITE12.CO3	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITE12.CO4	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITE12.CO5	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X

Unit-I Welcome to AWS Academy Cloud Architecting 9

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

Unit-II Designing for High Availability II and Infrastructure 9

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

Unit-III Designing 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 Well-Architected Pillars : Security, Reliability, Performance Efficiency 9

Security - Principles of the Security Pillar, Preventing Common Security Exploits, Securing Data in Cloud Front, 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	**Well-Architected Pillars : Cost Optimization, Troubleshooting, Design Patterns And Sample Architectures**	**9**

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

Total Periods: 45

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23ITE13	AWS Academy Cloud Architecting Lab	L	T	P	C
		0	0	2	1

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:

23ITE13.CO1	Implement IT related work and access Amazon Web Services
23ITE13.CO2	Develop code
23ITE13.CO3	Construct real time database application using current techniques
23ITE13.CO4	Populate Cloud based architectures
23ITE13.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
23ITE13.CO1	X	X	X	X	X	-	-	X	X	-	X	X	X	X	X
23ITE13.CO2	X	X	X	X	X	-	-	-	-	-	-	X	X	X	X
23ITE13.CO3	X	X	X	X	X	-	-	-	-	-	-	X	X	X	X
23ITE13.CO4	X	X	X	X	X	X	-	X	-	-	-	X	X	X	X
23ITE13.CO5	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 Lambda
3.	Automating Infrastructure Deployment with AWS Cloud Formation
4.	Decoupling Infrastructure
5.	Implementing a Serverless Architecture with AWS Managed Services
6.	Introduction to Amazon CloudFront
7.	Multi-Region Failover With Amazon Route 53
8.	Sandbox

Total Periods: 30

23ITE14	AWS Academy Cloud Foundations	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:

23ITE14.CO1	Construct three cloud deployment models, and Overview of AWS Global infrastructure.
23ITE14.CO2	Implement the different AWS compute services.
23ITE14.CO3	Create virtual firewalls with security groups.
23ITE14.CO4	Construct the availability of different alternative database solutions.
23ITE14.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
23ITE14.CO1	X	X	X	X	-	-	X	-	-	-	X	-	X	X	X
23ITE14.CO2	X	X	X	X	X	-	X	-	X	X	X	X	X	X	X
23ITE14.CO3	X	X	X	X	X	X	X	-	X	-	X	-	X	X	X
23ITE14.CO4	X	X	X	X	-	X	X	-	-	-	-	X	X	X	X
23ITE14.CO5	X	X	X	X	X	-	-	X	X	-	X	-	X	X	X

Unit-I Cloud Concepts **9**

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

Unit-II AWS Core Services **9**

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

Unit-III Cloud Security **9**

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

Unit-IV Cloud Architecting **9**

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

Unit-V Cloud Support **9**

Introduction to AWS Organizations, AWS Cost Explorer, Overview of AWS Technical Support Plans and Costs

Total Periods: 45

23ITE15	AWS Academy Cloud Foundation Lab	L	T	P	C
		0	0	2	1

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:

23ITE15.CO1	Construct three cloud deployment models, and Overview of AWS Global infrastructure.
23ITE15.CO2	Implement the different AWS compute services.
23ITE15.CO3	Create virtual firewalls with security groups.
23ITE15.CO4	Construct the availability of different alternative database solutions.
23ITE15.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
23ITE15.CO1	X	X	X	X	-	-	-	-	-	X	-	X	X	X	X
23ITE15.CO2	X	X	X	X	X	-	-	-	X	X	X	X	X	X	X
23ITE15.CO3	X	X	X	X	-	X	-	-	X	X	X	X	X	X	X
23ITE15.CO4	X	X	X	X	X	-	-	-	-	-	X	X	X	X	X
23ITE15.CO5	X	X	X	X	X	-	-	-	X	X	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.	Sandbox

Total Periods: 30

23ITE16	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 Social Network Analysis and semantic web

Course Outcomes:

23ITE16.CO1	Understand the concept structure of the semantic web technology and how this technology revolutionizes the World Wide Web.
23ITE16.CO2	Understand the concepts of Web Science, semantics of knowledge and resource, ontology.
23ITE16.CO3	Describe logic semantics and inference with OWL.
23ITE16.CO4	Use ontology engineering approaches in semantic applications
23ITE16.CO5	To perform social network k analysis for different applications

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITE16.CO1	X	X	X	X	X	X	-	X	X	-	-	X	X	X	X
23ITE16.CO2	X	X	X	X	X	-	-	X	X	X	-	-	X	X	X
23ITE16.CO3	X	X	X	X	-	X	-	-	X	X	-	X	X	X	X
23ITE16.CO4	X	X	X	X	X	X	-	X	X	X	-	X	X	X	X
23ITE16.CO5	X	X	X	X	X	X	-	X	X	-	-	X	X	X	X

Unit-I Web Intelligence **9**

Thinking and Intelligent Web Applications, The Information Age, The World Wide Web, Limitations of Today's Web, The Next Generation Web, Machine Intelligence, Artificial Intelligence, Ontology, Inference engines,Software Agents, Berners-Lee www, Semantic Road Map, Logic on the semantic Web

Unit-II Knowledge Representation for the Semantic Web **9**

Ontologies and their role in the semantic web,Ontologies Languages for the Semantic Web –Resource Description Framework(RDF) / RDF Schema, Ontology Web Language(OWL), UML, XML/XML Schema..

Unit-III Ontology Engineering **9**

Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping, Logic, Rule and Inference Engines.

Unit-IV Semantic Web Applications, Services and Technology **9**

Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base ,XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods

Unit-V Semantic Patterns and Tools, Challenges and Opportunities **9**

Patterns in Software Design, Pattern Frame, Semantic Patterns, Semantic Tools, Semantic Web Services Tools, Semantic Doubts, Semantic Opportunities and Challenges

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 inter science	2008
2.	Tou and Gonzales	Pattern Recognition Principles	Wesley Publication Company, London	2008

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Duda R.O., andHart.P.E	Pattern Classification and SceneAnalysis	Wiley, New York	2009

		L	T	P	C
23ITE17	**Network Programming and Management**	**3**	**0**	**0**	**3**

Course Objective:

- To Explain socket programming to design client server environment
- To understand the basics of socket programming using TCP and UDP Sockets
- To analyze the socket options and Internet protocol interoperability
- To develop macros for including objects in MIB structure.
- T o Understand SNMPv1, v2 and v3 protocols & practical issues

Course Outcomes:

23ITE17.CO1 Apply socket structure and functions to client server applications

23ITE17.CO2 Design applications using TCP and UDP sockets

23ITE17.CO3 Implement socket options and advanced sockets to applications

23ITE17.CO4 Compare number of variations of the network management architecture

23ITE17.CO5 Configure and manage network services and network architecture

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITE17.CO1	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITE17.CO2	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITE17.CO3	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITE17.CO4	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITE17.CO5	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X

Unit-I Socket Structure and Functions **9**

Introduction to Socket Programming - OSI Layer and Services - Overview of TCP/IP Protocols - Socket Introduction - Socket address Structures - Value - Result Arguments - Byte Ordering Functions Byte Manipulation Functions - Elementary TCP sockets - Socket, connect, bind, listen, accept, fork and exec functions,concurrent servers - Close function.

Unit-II TCP and UDP Sockets **9**

TCP Echo Server - TCP Echo Client - Posix Signal handling - TCP Echo server functions - Normal startup - terminate and signal handling server process termination - Crashing and Rebooting of server host - shutdown of server host - I/O multiplexing - I/O Models - select function - shutdown function - pselect function - poll function- Multiplexing TCP Sockets - TCP socket options - Elementary UDP sockets - UDP echo Server - UDP echo Client - Multiplexing UDP sockets.

Unit-III Socket Options and Advanced Sockets **9**

Socket options - getsocket and setsocket functions - generic socket options - IP socket options - ICMP socket options - Domain name system - gethostbyname function - gethostbyadr function -getservbyname and getservbyport functions Ipv4 and Ipv6 interoperability - threaded servers - thread creation and termination
- Mutex - condition variables - raw sockets - raw socket creation - raw socket output - raw socket input - ping program – trace route program

Unit-IV Simple Network Management **9**

SNMP network management concepts - SNMPv1 - Management information - MIB Structure - Object syntax - Standard MIBs - MIB-II Groups - SNMPv1 protocol and Practical issues

Unit-V SNMP Enhanced Features and RMON **9**

Introduction to SNMPv2 - SMI for SNMPV2 - Protocol - SNMPv3 - Architecture and Applications - Security and access control model - Overview of RMON

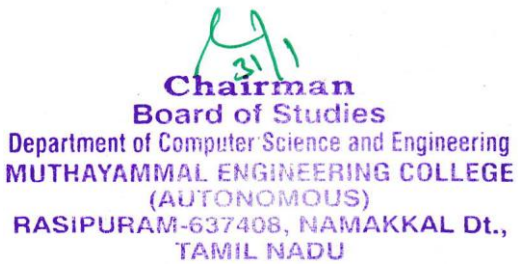
Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	W. Richard Stevens, Bill Fenner Andrew M. Rudoff	Unix Network Programming Vol-I	Pearson Education	2015
2.	Mani Subramaniam	Network Management: Principles and Practice	PHI	2012

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Juha Korhonen	Introduction to 4G Mobile Communications	Artech House Publishers	2014
2.	D.E. Comer,David L. Stevens	Internetworking with TCP/IPVol- III	Pearson Education	2015
3.	Brijendra Singh	Network Security and Management	PHI	2012
4.	William Stallings	SNMP, SNMPv2, SNMPv3 and RMON 1 and 2	Pearson Education	2011
5.	W. Richard Stevens	Unix Network Programming Vol-II	Pearson Education	2015



23ITE18	Business Intelligence	L	T	P	C
		3	0	0	3

Course Objective:

- To understand the business intelligence architectures.
- To develop a foundation in Business Intelligence (BI) for Business Analysis through knowledge delivery.
- To understand the different aspects of the BI environment, and data envelopment analysis.
- To implementation methodology and project life cycle business intelligence
- To understand the management and future of business intelligence

Course Outcomes:

23ITE18.CO1	Explain about business intelligence architectures.
23ITE18.CO2	Summarize various knowledge delivery methods
23ITE18.CO3	Summarize data envelopment analysis
23ITE18.CO4	Implement the business intelligent system for real time application.
23ITE18.CO5	Explain the management and future of business intelligent system

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITE18.CO1	X	X	X	X	X	-	-	X	X	-	X	X	X	X	X
23ITE18.CO2	X	X	X	X	X	-	-	-	-	-	-	X	X	X	X
23ITE18.CO3	X	X	X	X	X	-	-	-	-	-	-	X	X	X	X
23ITE18.CO4	X	X	X	X	X	X	-	X	-	-	-	X	X	X	X
23ITE18.CO5	X	X	X	X	X	-	-	-	-	-	-	X	X	X	X

Unit-I Business Intelligence **9**

Effective and timely decisions – Data, information and knowledge – Role of mathematical models – Busines Intelligence architectures: Cycle of a business intelligence analysis – Enabling factors in business intelligenceprojects – Development of a business intelligence system – Ethics and business intelligence.

Unit-II Knowledge Delivery **9**

The business intelligence user types, Standard reports, Interactive Analysis and Ad Hoc Querying, Parameterized Reports and Self-Service Reporting, dimensional analysis, Alerts/Notifications, Visualization: Charts, Graphs, Widgets, Scorecards and Dashboards, Geographic Visualization, Integrated Analytics, Considerations: Optimizing the Presentation for the Right Message

Unit-III Data Envelopment Analysis **9**

Efficiency measures – The CCR model: Definition of target objectives- Peer groups – Identification of good operating practices; cross efficiency analysis – virtual inputs and outputs – Other models.

Unit-IV Business Intelligence Implementation: Integration and Emerging Trends **9**

Implementing BI – Overview – BI and Integration Implementation – Connecting BI System to Database and other Enterprise Systems – On-Demand BI – Issues of Legality, Privacy, and Ethics –Emerging Topics in BI – The Rise of Collaborative Decision Making

Unit-V Management and Future Of Business Intelligence **9**

Development of BI - Business Intelligence System - Reporting system - Data Warehouse - Data Mart- Knowledge Management Systems - Discussion and Case Study – The Future of Business Intelligence

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	David Loshin Morgan,Kaufman	Business Intelligence: TheSavyManagers Guide	Wiley Publications	2012
2.	Efraim Turban, RameshSharda, Jay E.Aronson, David King	Business Intelligence: A Managerial Approach	Pearson Education	2011

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Efraim Turban, Ramesh Sharda,Dursun Delen,	Decision Support and BusinessIntelligence Systems	Pearson	2013
2.	Rajiv Sabherwal, IrmaBecerra-Fernandez	Business Intelligence Practices,Technologies, and Management	Wiley	2011
3.	Carlo Vercellis	Business Intelligence: Data Miningand Optimization for Decision Making	Wiley Publications	2009

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23ITE19	Wireless Sensor Networks	L	T	P	C
		3	0	0	3

Course Objective:

- To understand basic sensor network concepts
- To know physical layer issues, medium Access control Protocols
- To comprehend network layer characteristics and protocols and transport layer issues and protocols
- To understand the network management in Wireless sensor network.
- To understand the Middleware services

Course Outcomes:

23ITE19.CO1	Explain the basic concepts of wireless sensor networks.
23ITE19.CO2	Describe the structure physical and medium access layer of wireless sensor networks.
23ITE19.CO3	Apply structure of network and transport layer in wireless sensor networks (WSN) to various application areas.
23ITE19.CO4	Implement and manage the Wireless Sensor Network.
23ITE19.CO5	Implement the middleware for Wireless Sensor Network

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITE19.CO1	X	X	X	X	-	-	X	-	-	-	X	-	X	X	X
23ITE19.CO2	X	X	X	X	X	-	X	-	X	X	X	X	X	X	X
23ITE19.CO3	X	X	X	X	X	X	X	-	X	-	X	-	X	X	X
23ITE19.CO4	X	X	X	X	-	X	X	-	-	-	-	X	X	X	X
23ITE19.CO5	X	X	X	X	X	-	-	X	X	-	X	-	X	X	X

Unit-I Introduction **9**

Introduction to wireless sensor networks - Challenges and Constraints - Application of sensor networks – Node architecture - Operating System - Fundamental aspects

Unit-II Physical Layer and Medium Access Layer **9**

Basic architectural framework – Physical layer – source encoding –channel encoding – modulation – medium access control- Wireless MAC protocols – Characteristics of MAC protocols in sensor networks – Contention free MAC protocols - traffic adaptive medium access - Low-Energy Adaptive Clustering Hierarchy –Contention based protocols - Power Aware Multi-Access with Signaling - Data-Gathering MAC - Receiver-Initiated MAC

Unit-III Network Layer and Transport Layer **9**

Routing metrics – Data centric Routing - Proactive routing – OLSR – Reactive Routing – AODV – Location Based Routing - Traditional Transport Control Protocols - TCP (RFC 793) - UDP (RFC 768) - Mobile IP - Feasibility of Using TCP or UDP for WSNs - Transport Protocol Design Issues – Examples of Existing Transport Control Protocols- CODA (Congestion Detection and Avoidance).

Unit-IV Network Management **9**

Power Management - Local Power Management Aspects - Processor Subsystem - Communication Subsystem - Active Memory - Power Subsystem- Dynamic Power Management - Dynamic Operation Modes - Time Synchronization – Clocks and the Synchronization Problem - Time Synchronization in Wireless Sensor Networks - Reasons for Time Synchronization - Challenges for Time Synchronization - Basics of Time Synchronization - Synchronization Messages Non determinism of Communication Latency -Time Synchronization Protocols Lightweight Tree-Based Synchronization - Timing-sync Protocol for

Sensor Networks Localization -Ranging Techniques -Time of Arrival - Time Difference of Arrival - Angle of Arrival - Received Signal Strength - Range- Based Localization - Triangulation -Range-Free Localization - Ad Hoc Positioning System (APS)

Unit-V Middleware for Wireless sensor Networks 9

Introduction -WSN Middleware Principles - Middleware Architecture – Data Related Functions, Architectures – Case study - MiLAN (Middleware Linking Applications and Networks) - IrisNet (Internet-Scale Resource- Intensive Sensor Networks Services)

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Dr.Xerenium, Shen, Dr. Yi Pan	Fundamentals of Wireless Sensor Networks, Theory and Practice	Wiley Series	2010
2.	H. Karl and A. Willig	Protocols and Architectures for Wireless Sensor Networks	John Wiley & Sons	2005

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Kazem Sohraby, Daniel Manoli	Wireless Sensor networks- Technology, Protocols and Applications	Wiley Inter Science Publications	2007
2.	Bhaskar Krishnamachari	Networking Wireless Sensors	Cambridge universitypress	2005
3.	C. S. Raghavendra, K. M. Sivalingam, and T.	Wireless Sensor Networks	John Wiley & Sons	2007
4.	N.P. Mahalik	Sensor Networks and Configuration: Fundamentals, Standards, Platforms,and	Springer	2006

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23ITE20	Information Retrieval Techniques	L	T	P	C
		3	0	0	3

Course Objective:

- To know about Information retrieval system strategies.
- To learn Web Search Engine and Compare various types of retrieval utilities.
- To know about Information Retrieval modeling techniques
- To Identify various web based information retrieval techniques using modern tools.
- To understand information retrieval techniques in XML retrieval and multimedia

Course Outcomes:

23ITE20.CO1	Explain the factors which optimize the information retrieval process
23ITE20.CO2	Understand web based information retrieval techniques
23ITE20.CO3	Identify the techniques of Information Retrieval modeling
23ITE20.CO4	Apply parallel information retrieval models and distributed information retrieval models in real time problem.
23ITE20.CO5	Summarize various steps involved in XML and multimedia information retrieval techniques

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITE20.CO1	X	X	X	X	-	-	-	-	-	X	-	X	X	X	X
23ITE20.CO2	X	X	X	X	X	-	-	-	X	X	X	X	X	X	X
23ITE20.CO3	X	X	X	X	-	X	-	-	X	X	X	X	X	X	X
23ITE20.CO4	X	X	X	X	X	-	-	-	-	-	X	X	X	X	X
23ITE20.CO5	X	X	X	X	X	-	-	-	X	X	X	X	X	X	X

Unit-I Introduction **9**

Introduction - History of IR- The IR problem – Software Architectures of the IR system – The retrieval and ranking processes – Open source Search engine Frameworks - The impact of the web on IR - The role of artificial intelligence (AI) in IR – IR Versus Web Search - Components of a Search engine- Characterizing the web

Unit-II Web Retrieval and Web Crawling **9**

Web retrieval – Introduction – The web – search engine architectures – search engine ranking – managing web data – search engine user interaction – browsing – Web crawling – Introduction – Applications of web crawler – Architecture and implementation

Unit-III Information Retrieval Modeling **9**

IR Models-Modeling and Ranking - A Taxonomy of IR Models - Classic Information Retrieval -The Boolean Model – TF - IDF Weights - Document Length Normalization - The Vector Model- The Probabilistic Model - Alternative Set Theoretic Models - Set-Based Model - Extended Boolean Model-Fuzzy Set Model - Alternative Algebraic Models - Generalized Vector Space Model - Latent Semantic Indexing Model - Neural Network Model - Alternative Probabilistic Models - BM25 - Language Models - Divergence from Randomness – Bayesian Network Models

Unit-IV Parallel and Distributed Information Retrieval **9**

Distributed Information Retrieval – Introduction – A taxonomy of Distributed IR systems – Theoretical Model – Data partitioning – Parallel IR – Introduction – Parallel Indexing – Clustering and Classification – Parallel Systems – Parallel IR on MIMD architectures – parallel IR on SIMD architectures – Cluster based IR – Retrieval in peer to peer networks.

Unit-V Xml Retrieval and Multimedia Information Retrieval 9

XML Retrieval – Introduction – XML retrieval evaluation – Query Languages – Multimedia Information Retrieval –The challenges – Content based image retrieval – Audio and Music retrieval – Retrieving and browsing video

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: TheConcepts and Technology behind search	ACM Press Books	2011
2.	Stefan Buettcher, Charles L. A. Clarke, Gordon V. Cormack	Information Retrieval: Implementing and Evaluating Search Engines	The MIT Press	2010

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	G.G. Chowdhury	Introduction to Modern InformationRetrieval	Neal- Schuman Publishers	2010
2.	Mark Levene	An Introduction to Search Engines and Web Navigation	Wiley	2010
3.	Bruce Croft, DonaldMetzler and Trevor Strohman	Search Engines: Information Retrieval in Practice	1st Edition AddisonWesley	2009
4.	Christopher D. Manning, PrabhakarRaghavan, Hinrich Schütze	An Introduction to InformationRetrieval	Cambridge UniversityPress, Cambridge, England	2008
5.	David A. Grossman,Ophir Frieder	Information Retrieval: Algorithms, andHeuristics	Academic Press	2008

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23ITE21	Service Oriented Architecture	L	T	P	C
		3	0	0	3

Course Objective:

- To study the importance of Service Oriented Architecture.
- To provide an overview of XML Technology and modeling databases in XML
- To introduce Security solutions in XML and Web Services and to introduce Security standards for Web Services
- To learn to implement SOA in the J2EE and .Net environment
- To Implement the various advanced web services using J2EE

Course Outcomes:

23ITE21.CO1	Explain the fundamental principles of SOA
23ITE21.CO2	Develop a simple XML services using SOA principles
23ITE21.CO3	Develop a simple web services using SOA principles
23ITE21.CO4	Model and analyze the JAVA web services and architecture.
23ITE21.CO5	Implement the various advanced web services using J2EE

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITE21.CO1	X	X	X	X	X	X	-	X	X	-	-	X	X	X	X
23ITE21.CO2	X	X	X	X	X	-	-	X	X	X	-	-	X	X	X
23ITE21.CO3	X	X	X	X	-	X	-	-	X	X	-	X	X	X	X
23ITE21.CO4	X	X	X	X	X	X	-	X	X	X	-	X	X	X	X
23ITE21.CO5	X	X	X	X	X	X	-	X	X	-	-	X	X	X	X

Unit-I Introduction **9**

The Evolution of SOA –Characteristics of SOA – Introducing SOA- Service oriented analysis – Business- centric SOA – Deriving business services- service modeling - Service Oriented Design- SOAP basics – SOA composition guidelines – Entity-centric business service design – Application service design– Task centric business servicedesign.

Unit-II XML Services **9**

XML document structure – Well formed and valid documents – Namespaces – DTD – XML Schema – X- Files- Parsing XML – using DOM, SAX – XML Transformation and XSL – XSL Formatting – Modeling Databases in XML

Unit-III Web Services and SOA **9**

Web services – Service descriptions – Messaging with SOAP –Message exchange Patterns – Coordination-Atomic Transactions – Business activities – Orchestration – Choreography- Service layer abstraction –Application Service Layer – Business Service Layer – Orchestration Service Layer.

Unit-IV Java Web Services Architecture **9**

Java Web Service Developer pack– JAXP- Architecture-SAX-DOM-XSLT-JDOM-JAX RI – JAX- RPC- Service Model - JAX RPC and J2EE - JAXM – JAXM Architecture –JAXR - Registries and Repositories – JAXR Architecture – JAXR Information Model - JAXB – Architecture – Developing with JAXB - XML to Java mapping – JAXB API - Validation with JAXB – Customizing JAXB

Unit-V Extended Web Services Specification **9**

Metadata Management - Metadata Specification - Policy – Metadata exchange – Web Services Security – Core concepts – Challenges - Threads and Remedies – Message Level Security – Data Level Security – Advanced Messaging – Reliable Messaging - Notification – Transaction Management - Protocols and Specification – Transaction Specification

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Eric Newcomer, Greg Lomow	Understanding SOA with WebServices	Pearson Education	2005
2.	James	Java Web Services		

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Thomas Erl	Service Oriented Architecture	Pearson Education	2005
2.	Frank Cohen	Fast SOA	Elsevier	2007
3.	Scott Campbell, VamsiMohun,	Mastering Enterprise SOA	Wiley	2007
4.	Eric Pulier, HughTaylor	Understanding Enterprise SOA	Dreamtech Press	2007
5.	Sandeep Chatterjee,James Webber	Developing Enterprise Web Services	Pearson Education	2004

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		L	T	P	C
23ITE22	**Agile Technology**	**3**	**0**	**0**	**3**

Course Objective:

- To Identify core agile principles
- To Describe agile requirement over traditional methods of software development
- To Understand Extreme Programming Concepts.
- To develop the agile products.
- To Demonstrate the advanced techniques of Agile Methods

Course Outcomes:

23ITE22.CO1 Apply agile principles and practices in an actual project.
23ITE22.CO2 Prepare the Document and assess an agile project.
23ITE22.CO3 Apply Extreme Programming in agile technology.
23ITE22.CO4 Explain the steps of releasing agile product.
23ITE22.CO5 Demonstrate the advanced techniques of Agile Methods

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITE22.CO1	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITE22.CO2	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITE22.CO3	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITE22.CO4	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITE22.CO5	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X

Unit-I Introduction to Agile Software Development **9**

Agile Software Development-Cayman design- Organizational Culture Considerations with Agile - eam Members'Viewpoint- Manager's Viewpoint- Executive's Viewpoint- Different Types of Agile- Extreme Programming (XP)- Scrum- Feature-Driven Development- Dynamic Systems Development Method- Kanban Method- Crystal Family- Certification - Different Roles- Deep Dive into Scrum Roles- Roles in Other Methodologies

Unit-II Agile Requirements **9**

Document Requirements- Scrum- Enhancing Requirements- From User Stories to Deliverables- Grooming and Planning- Product Backlog- Prioritization of Stories – Estimating- Product Backlog Grooming- Sprint Planning- XP Planning Game- Maintenance of Legacy Code - Triple Constraints- Refactored Code- Tracking - Meetings or Ceremonies - Products beyond Software Development

Unit-III Extreme Programming **9**

XP Life Cycle-XP Team-XP Concepts-Prerequisite of XP-Recommendation of XP-Pair Programming- Energized Work-Informative Workspace-Root-Cause Analysis-Retrospectives-Collaborating-Team Strategy- Organizational Strategy-Sit Together-Real Customer Involvement-Ubiquitous Language-Coding Standards- Iteration Demo-Reporting

Unit-IV Releasing Agile Products **9**

Done Done-No Bugs-Version Control-Continuous Integration-Collective Code Ownership- Documentation-Planning-Vision-Release Planning-Planning Game-Risk Management-Iteration Planning-Slack- Stories- Estimating.

Unit-V Mastering Agility **9**

Developing-Incremental Requirements-Customer Tests-Test Driven Development-Refactoring-Simple Design-Incremental Design and Architecture-Spike Solutions-Performance Optimization-Exploratory Testing Values and Principles-Improve the Process-Rely on People-Eliminate Waste-Deliver Value-Seek Technical Excellence- Case Study

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Sondra Ashmore, Kristin Runyan	Introduction to Agile Methods	Addison-Wesley Professional	2014
2.	James Shore, Shane Warden	The Art of Agile Development	O'REILLY	2008

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Woodward,E.Surdeck	A Practical guide to DistributedScrum	Addison-wesley	2010
2.	Dean Leffingwell	Agile Software Requirements	Agile software Development Series	2010
3.	Kent ,Beck	Extreme Programming Explained	Pearson Education	2008
4.	Larman	Agile and iterative development: A Managers Guide	Addison-wesley	2004
5.	Anderson, David	Agile Management for SoftwareEngineering: Applying the Theory of Constraints forBusiness Results	Prentice Hall	2003

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23ITE23	Social Network Analysis	L	T	P	C
		3	0	0	3

Course Objective:

- Understand the concept of semantic web and related applications.
- Learn knowledge representation using ontology.
- Understand human behaviour in social web and related communities
- Learn to handle privacy related issues
- Learn visualization of social networks

Course Outcomes:

23ITE23.CO1	Develop semantic web related applications.
23ITE23.CO2	Represent knowledge using ontology.
23ITE23.CO3	Predict human behaviour in social web and related communities.
23ITE23.CO4	Handle privacy related issues
23ITE23.CO5	Visualize social networks

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITE23.CO1	X	X	X	X	X	-	-	X	X	-	X	X	X	X	X
23ITE23.CO2	X	X	X	X	X	-	-	-	-	-	-	X	X	X	X
23ITE23.CO3	X	X	X	X	X	-	-	-	-	-	-	X	X	X	X
23ITE23.CO4	X	X	X	X	X	X	-	X	-	-	-	X	X	X	X
23ITE23.CO5	X	X	X	X	X	-	-	-	-	-	-	X	X	X	X

Unit-I Social Network Analysis **9**

Social Network Analysis: History, Concepts and Research - Structure and Dynamics of Social Networks - Analysis of Social Networks - Analyzing the Dynamics of Communication in Online Social Networks - Qualitative Analysis of Commercial Social Network Profiles - Analysis of Social Networks Extracted from Log Files - Perspectives on Social Network Analysis for Observational Scientific Data - Modeling Temporal Variation in Social Network: An Evolutionary web graph approach - Churn in Social Networks

Unit-II Social Media Mining and Search **9**

Discovering Mobile Social Networks - Online Identities and Social Networking - Detecting Communities - Concept Discovery in Youtube.com - Mining Regional Representative Photos from Consumer- Generated Geo tagged Photos - Collaborative Filtering Based on Choosing a Different Number of Neighbors - Discovering Communities from Social Networks.

Unit-III Social Network Infrastructures and Communities **9**

Decentralized Online Social Networks - Multi-Relational Characterization of Dynamic Social Network Communities- Accessibility Testing of Social Websites - Understanding and Predicting Human Behavior for Social Communities- Associating Human-Centered Concepts with Social Networks Using Fuzzy Sets

Unit-IV Privacy in Online Social Networks **9**

Managing Trust in Online Social Networks - Security and Privacy in Online Social Networks - Investigation of Key-Player Problem in Terrorist Networks Using Bayes Conditional Probability - Optimizing Targeting of Intrusion Detection Systems in Social Networks - Security Requirements for Social Networks in Web 2.0

Unit-V Visualization and Applications of Social Networks **9**

Visualization of Social Networks - Novel Visualizations and Interactions for Social Networks Exploration- Applications of Social Network Analysis - Online Advertising in Social Networks - Social Bookmarking on a Company's Intranet: A Study of Technology Adoption and Diffusion

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Furht, Borko	Handbook of Social Network Technologies and Applications	Springer	2010
2.	Giles, Mark Smith, JohnYen	Advances in Social Network Mining andAnalysis	Springer	2010

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Max Chevalier, Christine Julien and Chantal Soul-Dupuy	Collaborative and Social Information Retrieval and Access: Techniques for Improved User Modeling	IGI Global snippet	2010
2.	Charu C. Aggarwal	Social Network Data Analytics	Springer	2011
3.	Guandong Xu, Yanchun Zhang andLin Li	Web Mining and Social Networking Techniques and applications	Springer	2011
4.	John Scott	Social Network Analysis	SAGE Publications Ltd	2013
5.	Toby Segaran	Programming Collective Intelligence	O'Reilly	2012

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23ITE24	Game Programming	L	T	P	C
		3	0	0	3

Course Objective:

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

Course Outcomes:

23ITE24.CO1 Understand the concepts of Game design and development.

23ITE24.CO2 Learn the processes, mechanics and issues in Game Design.

23ITE24.CO3 Be exposed to the Core architectures of Game Programming.

23ITE24.CO4 Know about Game programming platforms, frame works and engines.

23ITE24.CO5 Learn to develop games

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITE24.CO1	X	X	X	X	-	-	X	-	-	-	X	-	X	X	X
23ITE24.CO2	X	X	X	X	X	-	X	-	X	X	X	X	X	X	X
23ITE24.CO3	X	X	X	X	X	X	X	-	X	-	X	-	X	X	X
23ITE24.CO4	X	X	X	X	-	X	X	-	-	-	-	X	X	X	X
23ITE24.CO5	X	X	X	X	X	-	-	X	X	-	X	-	X	X	X

Unit-I 3D Graphics for Game Programming **9**

Coordinate Systems, Ray Tracing, Modeling in Game Production, Vertex Processing, Rasterization, FragmentProcessing and Output Merging, Illumination and Shaders, Parametric Curves and Surfaces, Shader Models, Image Texturing, Bump Mapping, Advanced Texturing, Character Animation, Physics-based Simulation

Unit-II Game Design Principles **9**

Character development, Story Telling, Narration, Game Balancing, Core mechanics, Principles of level design, Genres of Games, Collision Detection, Game Logic, Game AI, Path Finding

Unit-III Gaming Engine Design **9**

Renderers, Software Rendering, Hardware Rendering, and Controller based animation, Spatial Sorting, Level of detail, collision detection, standard objects, and physics

Unit-IV Gaming Platforms and Frameworks **9**

Flash, DirectX, OpenGL, Java, Python, XNA with Visual Studio, Mobile Gaming for the Android, iOS, Game engines - Adventure Game Studio, DXStudio, Unity.

Unit-V Game Development **9**

Developing 2D and 3D interactive games using OpenGL, DirectX – Isometric and Tile Based Games, Puzzle games, Single Player games, Multi Player games

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	David H. Eberly	Game Engine Design, Second Edition: A Practical Approach to Real Time Computer Graphics	-3D|| Morgan Kaufmann, 2 Edition	2006
2.	Ernest Adams and Andrew Rollings	Fundamentals of Game Design	Prentice Hall 1st edition	2006

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Roger E. Pedersen	Game Design Foundations	Edition 2, Jones & Bartlett Learning	2006

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23ITE25	Natural Language Processing	L	T	P	C
		3	0	0	3

Course Objective:

- To tag a given text with basic language processing features,
- To Design An innovative application using NLP components,
- To implement a rule based system to tackle morphology/syntax of a language,
- To Design a tag set to be used for statistical processing keeping an application in mind,
- To Compare and contrast use of different statistical approaches for different types of applications

Course Outcomes:

23ITE25.CO1	Understand the basic concepts of Natural Language Processing.
23ITE25.CO2	Describe the tag a given text with basic language processing features,
23ITE25.CO3	Implement a rule based system to tackle morphology/syntax of a language
23ITE25.CO4	Design a tag set to be used for statistical processing keeping an application in mind
23ITE25.CO5	To Compare and contrast use of different statistical approaches for different types of applications

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITE25.CO1	X	X	X	X	-	-	-	-	-	X	-	X	X	X	X
23ITE25.CO2	X	X	X	X	X	-	-	-	X	X	X	X	X	X	X
23ITE25.CO3	X	X	X	X	-	X	-	-	X	X	X	X	X	X	X
23ITE25.CO4	X	X	X	X	X	-	-	-	-	-	X	X	X	X	X
23ITE25.CO5	X	X	X	X	X	-	-	-	X	X	X	X	X	X	X

Unit-I Introduction **9**

Natural Language Processing tasks in syntax, semantics, and pragmatics – Issues - Applications - The role of machine learning - Probability Basics –Information theory – Collocations -N-gram Language Models - Estimating parameters and smoothing -Evaluating language models

Unit-II Morphology and Part of Speech Tagging **9**

Linguistic essentials - Lexical syntax- Morphology and Finite State Transducers - Part of speech Tagging - Rule-Based Part of Speech Tagging - Markov Models - Hidden Markov Models – Transformation based Models - Maximum Entropy Models. Conditional Random Fields

Unit-III Syntax Parsing **9**

Syntax Parsing - Grammar formalisms and treebanks - Parsing with Context Free Grammars - Features and Unification - Statistical parsing and probabilistic CFGs (PCFGs)-Lexicalized PCFGs

Unit-IV Semantic Analysis **9**

Representing Meaning – Semantic Analysis - Lexical semantics –Word-sense disambiguation - Supervised – Dictionary based and Unsupervised Approaches - Compositional semantics Semantic Role Labeling and Semantic Parsing – Discourse Analysis

Unit-V Applications **9**

Named entity recognition and relation extraction- IE using sequence labeling-Machine Translation (MT) – Basic issues in MT-Statistical translation-word alignment- phrase-based translation –Question Answering

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Roland R. Hausser	Foundations of Computational Linguistics:	MIT Press	2011
2.	Daniel Jurafsky and James H. Martin	Martin Speech and Language Processing	McGraw Hill	2008

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Roger E. Pedersen	Game Design Foundations	Edition 2, Jones &Bartlett Learning	2006
2.	Christopher D. Manning and Hinrich Schuetze	Foundations of Statistical Natural Language Processing	MIT Press	1999
3.	Steven Bird, Ewan Klein and Edward Loper	Natural Language Processing withPython	O'Reilly Media	2009
4.	Pierre M. Nugues	An Introduction to Language Processing with Perl and Prolog: An Outline of Theories, Implementation, and Application with Special	Soft cover reprint	2010
5.	James Allen,	Natural Language Understanding	Addison Wesley	1994

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23ITE26	Big Data Analytics	L	T	P	C
		3	0	0	3

Course Objective:

- To Learn tips and tricks for Big Data.
- To Learn to build and maintain reliable, scalable, distributed systems with Apache Hadoop
- To Learn the Hadoop Architecture
- To apply Hadoop ecosystem components
- To Learn to build Hadoop Advanced Data base Systems

Course Outcomes:

23ITE26.CO1	Understand the basic concepts of Big Data.
23ITE26.CO2	Explain the basics of Hadoop.
23ITE26.CO3	Describe the architecture of Hadoop.
23ITE26.CO4	Design Hadoop Ecosystem and yarn.
23ITE26.CO5	Explain the techniques of HIVE AND HIVEQL, HBASE

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITE26.CO1	X	X	X	X	X	X	-	X	X	-	-	X	X	X	X
23ITE26.CO2	X	X	X	X	X	-	-	X	X	X	-	-	X	X	X
23ITE26.CO3	X	X	X	X	-	X	-	-	X	X	-	X	X	X	X
23ITE26.CO4	X	X	X	X	X	X	-	X	X	X	-	X	X	X	X
23ITE26.CO5	X	X	X	X	X	X	-	X	X	-	-	X	X	X	X

Unit-I Introduction to Big Data **9**

Introduction – distributed file system – Big Data and its importance, Four Vs, Drivers for Big data, Big data analytics, Big data applications. Algorithms using map reduce, Matrix-Vector Multiplication by Map Reduce

Unit-II Introduction Hadoop **9**

Big Data – Apache Hadoop & Hadoop EcoSystem – Moving Data in and out of Hadoop – Understanding inputs and outputs of MapReduce - Data Serialization

Unit-III Hadoop Architecture **9**

Hadoop Architecture, Hadoop Storage: HDFS, Common Hadoop Shell commands , Anatomy of File Write and Read., NameNode, Secondary NameNode, and DataNode, Hadoop MapReduce paradigm, Map and Reduce tasks, Job, Task trackers - Cluster Setup – SSH & Hadoop Configuration – HDFS Administering –Monitoring & Maintenance

Unit-IV Hadoop Ecosystem and Yarn **9**

Hadoop ecosystem components - Schedulers - Fair and Capacity, Hadoop 2.0 New Features- NameNode High Availability, HDFS Federation, MRv2, YARN, Running MRv1 in YARN

Unit-V HIVE and HIVEQL, HBASE **9**

Hive Architecture and Installation, Comparison with Traditional Database, HiveQL - Querying Data - Sorting And Aggregating, Map Reduce Scripts, Joins & Subqueries, HBase concepts- Advanced Usage, Schema Design, Advance Indexing - PIG, Zookeeper - how it helps in monitoring a cluster, HBase uses Zookeeper and how to Build Applications with Zookeeper.

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Boris lublinsky, Kevin t. Smith, Alexey Yakubovich	Professional Hadoop Solutions	Wiley	2015
2.	Chris Eaton, Dirk deroos	Understanding Big data	McGraw Hill	2012

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Tom White	HADOOP: The definitive GuideEverything	O Reilly	2012
2.	Vignesh Prajapati	Big Data Analytics with R andHaoop	Packet Publishing	2013
3.	Tom Plunkett, Brian Macdonald	Oracle Big Data Handbook	Oracle Press	2014
4.	Jy Liebowitz,	Big Data and Business analytics	CRC press	2013
5.	Seema Acharya and Subhashini C	Big Data and Analytics	Wiley India	2015

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23ITE27	Ad-Hoc And Sensor Networks	L	T	P	C
		3	0	0	3

Course Objective:

- To Understand the design issues in ad hoc and sensor networks
- To learn the different types of MAC protocols.
- Be familiar with different types of adhoc routing protocols.
- Be expose to the TCP issues in adhoc networks.
- To Learn the architecture and protocols of wireless sensor network

Course Outcomes:

23ITE27.CO1	Explain the concepts, network architectures and applications of ad hoc and wireless sensor networks.
23ITE27.CO2	Analyze the protocol design issues of ad hoc and sensor networks
23ITE27.CO3	Design routing protocols for ad hoc and wireless sensor networks with respect to some protocol design issues
23ITE27.CO4	Evaluate the QoS related performance measurements of ad hoc and sensor networks.
23ITE27.CO5	Explain the techniques of protocols networks

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITE27.CO1	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITE27.CO2	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITE27.CO3	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITE27.CO4	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITE27.CO5	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X

Unit-I Introduction **9**

Fundamentals of Wireless Communication Technology – The Electromagnetic Spectrum – Radio propagation Mechanisms – Characteristics of the Wireless Channel -mobile ad hoc networks (MANETs) and wireless sensor networks (WSNs): concepts and architectures. Applications of Ad Hoc and Sensor networks. Design Challenges in Ad hoc and Sensor Networks

Unit-II MAC Protocols for Ad Hoc Wireless Networks **9**

Issues in designing a MAC Protocol- Classification of MAC Protocols- Contention based protocols-Contention based protocols with Reservation Mechanisms- Contention based protocols with Scheduling Mechanisms – Multi channel MAC-IEEE 802.11

Unit-III Routing Protocols and Transport Layer in Ad Hoc Wireless Networks **9**

Issues in designing a routing and Transport Layer protocol for Ad hoc networks- proactive routing, reactive routing (on- demand), hybrid routing- Classification of Transport Layer solutions-TCP over Ad hoc wireless Networks

Unit-IV Wireless Sensor Networks (WSNS) And MAC Protocols **9**

Single node architecture: hardware and software components of a sensor node – WSN Network architecture: typical network architectures-data relaying and aggregation strategies -MAC layer protocols: self-organizing, Hybrid TDMA/FDMA and CSMA based MAC- IEEE 802.15.4.

Unit-V WSN Routing, Localization & QOS **9**

Issues in WSN routing – OLSR- Localization – Indoor and Sensor Network Localization-absolute and relative localization, triangulation-QOS in WSN-Energy Efficient Design-Synchronization-Transport Layer issues

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	C. Siva Ram Murthy, and B. S. Manoj	Ad Hoc Wireless Networks: Architectures and Protocols	Prentice Hall Professional Technical Reference	2008
2.	Carlos De Morais Cordeiro, Dharma Prakash Agrawa	Ad Hoc & Sensor Networks: Theory andApplications	World Scientific Publishing Company	2006.

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Feng Zhao and Leonide Guibas	Wireless Sensor Networks	Elsevier Publication	2002
2.	Holger Karl andAndreas Willig	Protocols and Architectures forWireless Sensor Networks	Wiley	2005
3.	Kazem Sohraby, DanielMinoli, & Taieb Znati	Wireless Sensor Networks-Technology, Protocols, and Applications	John Wiley	2007
4.	Anna Hac	Wireless Sensor Network Designs	John Wiley,	2003

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23ITE28	Management Information System	L	T	P	C
		3	0	0	3

Course Objective:

- To describe the role of information technology and decision support systems in business and record the
- current issues with those of the firm to solve business problems.
- To introduce the fundamental principles of computer-based information systems analysis and design and develop an understanding of the principles and techniques used.
- To enable students understand the various knowledge representation methods and different expert system
- structures as strategic weapons to counter the threats to business and make business more competitive.
- To enable the students to use information to assess the impact of the Internet and Internet technology on electronic commerce and electronic business and understand the specific threats and vulnerabilities of computer systems.
- To provide the theoretical models used in database management systems to answer business questions

Course Outcomes:

23ITE28.CO1	Relate the basic concepts and technologies used in the field of management information systems;
23ITE28.CO2	Compare the processes of developing and implementing information systems.
23ITE28.CO3	Outline the role of the ethical, social, and security issues of information systems.
23ITE28.CO4	Translate the role of information systems in organizations, the strategic management processes, with the implications for the management.
23ITE28.CO5	Apply the understanding of how various information systems like DBMS work together to accomplish the information objectives of an organization.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITE28.CO1	X	X	X	X	X	-	-	X	X	-	X	X	X	X	X
23ITE28.CO2	X	X	X	X	X	-	-	-	-	-	-	X	X	X	X
23ITE28.CO3	X	X	X	X	X	-	-	-	-	-	-	X	X	X	X
23ITE28.CO4	X	X	X	X	X	X	-	X	-	-	-	X	X	X	X
23ITE28.CO5	X	X	X	X	X	-	-	-	-	-	-	X	X	X	X

Unit-I MANAGEMENT INFORMATION SYSTEM IN A DIGITAL FIRM 9

MIS concept - Definition –Role of the MIS - Impact of the MIS-MIS and the user - Management as a control system - MIS a support to management - Development process of the MIS

Unit-II SYSTEM ANALYSIS AND DESIGN 9

System - Need for system analysis - System analysis of the existing system - System analysis of a new requirements – System Development Model - Structured System Analysis and Design - Object Oriented Analysis

Unit-III INFORMATION SYSTEM APPLICATIONS 9

MIS applications, DSS – GDSS - DSS applications in E enterprise - Knowledge Management System and Knowledge Based Expert System- Enterprise Model System and E-Business, E- Commerce, E-communication, Business Process Reengineering

Unit-IV TECHNOLOGY OF INFORMATION SYSTEM 9

Data process- Transaction and application process- Information system process; Unified communication and network; Security challenges in E-enterprises; Security threats and vulnerability-Controlling security threat and vulnerability

Unit-V DATA BASE MANAGEMENT SYSTEM **9**

Objectives of data base approach- Characters of database Management systems- Data processing system- Components of DBMS packages- Data base administration- Data models - Data warehouse

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Jawadekar, W.S	Management Information Systems	Tata McGrawHill Private Limited	2009
2.	Kenneth C. Laudon and Jane P. Laudon	Management Information Systems	Pearson Education	-

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Alex Leon and Mathew Leon	Data Base Management Systems	Vikas Publishing House	-
2.	Goyal, D.P	Management Information System	MACMILLAN India Limited	2008
3.	Panneerselvam R	Database Management System	PHI Private Limited	2008

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23ITE29	Software Quality Assurance	L	T	P	C
		3	0	0	3

Course Objective:

- Understand the basic tenets of software quality and quality factors.
- Be exposed to the Software Quality Assurance (SQA) architecture and the details of SQA components.
- Understand of how the SQA components can be integrated into the project life cycle.
- Be familiar with the software quality infrastructure.
- Be exposed to the management components of software quality

Course Outcomes:

23ITE29.CO1 Utilize the concepts in software development life cycle.

23ITE29.CO2 Demonstrate their capability to adopt quality standards.

23ITE29.CO3 Assess the quality of software product.

23ITE29.CO4 Apply the concepts in preparing the quality plan & documents.

23ITE29.CO5 Demonstrate testing a software and apply management principles on decision making

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITE29.CO1	X	X	X	X	-	-	X	-	-	-	X	-	X	X	X
23ITE29.CO2	X	X	X	X	X	-	X	-	X	X	X	X	X	X	X
23ITE29.CO3	X	X	X	X	X	X	X	-	X	-	X	-	X	X	X
23ITE29.CO4	X	X	X	X	-	X	X	-	-	-	-	X	X	X	X
23ITE29.CO5	X	X	X	X	X	-	-	X	X	-	X	-	X	X	X

Unit-I Software Quality **9**

Introduction, Constraints of Software Product Quality Assessment, Customer is a King, Quality and Productivity Relationship, Requirements of a Product, Organisation Culture, Characteristics of Software, Software Development Process, Types of Products, Schemes of Criticality Definitions, Problematic Areas of Software Development Life Cycle, Software Quality Management, Why Software Has Defects? Processes Related to Software Quality, Quality Management System Structure, Pillars of Quality Management System, and Important Aspects of Quality Management

Unit-II Fundamentals of Testing **9**

Introduction, Necessity of testing, what is testing? Fundamental test process, The psychology of testing, Historical Perspective of Testing, Definitions of Testing, Approaches to Testing, Testing During Development Life Cycle, Requirement Traceability Matrix, Essentials of Software Testing, Workbench, Important Features of Testing Process, Misconceptions About Testing, Principles of Software Testing, Salient Features of Good Testing, Test Policy, Test Strategy or Test Approach, Test Planning, Testing Process and Number of Defects Found in Testing, Test Team Efficiency, Mutation Testing, Challenges in Testing

Unit-III Testing Strategies: Unit Testing- Boundary Value Testing **9**

Normal Boundary Value Testing, Robust Boundary Value Testing, Worst-Case Boundary Value Testing, Special Value Testing, Examples, Random Testing, Guidelines for Boundary Value Testing-**Equivalence Class Testing:** Equivalence Classes, Traditional Equivalence Class Testing, Improved Equivalence Class Testing, Edge Testing, Guidelines and Observations- **Decision Table–Based Testing:** Decision Tables, Decision Table Techniques, Cause-and-Effect Graphing, Guidelines and Observations- **Path Testing:** Program Graphs, DD-Paths, Test Coverage Metrics, Basis Path Testing, Guidelines and Observations- **Data Flow Testing:** Define/Use Testing, Slice-Based Testing, Program Slicing Tools.

Unit-IV Software Verification and Validation 9

Introduction, Verification, Verification Workbench, Methods of Verification, Types of reviews on the basis od Stage Phase, Entities involved in verification, Reviews in testing lifecycle, Coverage in Verification, Concerns of Verification, Validation, Validation Workbench, Levels of Validation, Coverage in Validation, Acceptance Testing, Management of Verification and Validation, Software development verification and validation activities. V-test Model: Introduction, V-model for software, Testing during Proposal stage, Testing during requirement stage, Testing during test planning phase, Testing during design phase, Testing during coding, VV Model, Critical Roles and Responsibilities. Levels of Testing: Introduction, Proposal Testing, Requirement Testing, Design Testing, Code Review, Unit Testing, Module Testing, Integration Testing, Big-Bang Testing, Sandwich Testing & Critical Path First

Unit-V Special Tests 9

Introduction, GUI testing, Compatibility Testing, Security Testing, Performance Testing, Volume Testing, Stress Testing, Recovery Testing, Installation Testing, Requirement Testing, Regression Testing, Error Handling Testing, Manual Support Testing, Intersystem Testing, Control Testing, Smoke Testing, Adhoc Testing, Parallel Testing, Execution Testing, Operations Testing, Compliance Testing, Usability Testing, Decision Table Testing, Documentation Testing, Training testing, Rapid Testing, Control flow graph, Generating tests on the basis of Combinatorial Designs, State Graph, Risk Associated with New Technologies, Process maturity level of Technology, Testing Adequacy of Control in New technology usage, Object Oriented Application Testing, Testing of Internal Controls, COTS Testing, Client Server Testing, Web Application Testing, Mobile Application Testing, eBusiness eCommerce Testing, Agile Development Testing, Data Warehousing Testing

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	William E. Lewis	Software Testing and ContinuousQuality Improvement	CRC Press	2016
2.	M. G. Limaye	Software Testing: Principles, Techniques and Tools	TCH	2017

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Dorothy Graham, Erik van Veenendaal, IsabelEvans, Rex Black	Foundations of Software Testing	Cengage Learning	-
2.	Paul C. Jorgenson	Software Testing: A Craftsman‘s Approach	CRC Press	2017

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		L	T	P	C
23ITE30	**Bioinformatics**	**3**	**0**	**0**	**3**

Course Objective:

- To improve the programming skills of the student
- To let the students know the recent evolution in biological science.
- To learn about Phylogenetics and its applications
- To know about inference problems in biology and its applications
- To learn how to perform RNA modeling

Course Outcomes:

23ITE30.CO1 Develop bioinformatics tools with programming skills.

23ITE30.CO2 Apply computational based solutions for biological perspectives.

23ITE30.CO3 Able to understand phylogenetics and its applications

23ITE30.CO4 Able to apply engineering techniques in the field of molecular biology

23ITE30.CO5 Able to create RNA models using various algorithms

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITE30.CO1	X	X	X	X	-	-	-	-	-	X	-	X	X	X	X
23ITE30.CO2	X	X	X	X	X	-	-	-	X	X	X	X	X	X	X
23ITE30.CO3	X	X	X	X	-	X	-	-	X	X	X	X	X	X	X
23ITE30.CO4	X	X	X	X	X	-	-	-	-	-	X	X	X	X	X
23ITE30.CO5	X	X	X	X	X	-	-	-	X	X	X	X	X	X	X

Unit-I Introduction **9**

Introduction to Operating systems, Linux commands, File transfer protocols ftp and telnet, Introduction to Bioinformatics and Computational Biology, Biological sequences, Biological databases, Genome specific databases, Data file formats, Data lifecycle, Database management system models, Basics of Structured Query Language (SQL).

Unit-II Sequence Analysis **9**

Sequence Analysis, Pair-wise alignment, Dynamic programming algorithms for computing edit distance, string similarity, shotgun DNA sequencing, end space free alignment. Multiple sequence alignment, Algorithms for Multiple sequence alignment, Generating motifs and profiles, Local and Global alignment, Needleman and Wunsch algorithm, Smith Waterman algorithm, BLAST, PSIBLAST and PHIBLAST algorithms

Unit-III Phylogenetics **9**

Introduction to phylogenetics, Distance based trees UPGMA trees, Molecular clock theory, Ultrametric trees, Parsimonious trees, Neighbour joining trees, trees based on morphological traits, Bootstrapping. Protein Secondary structure and tertiary structure prediction methods, Homology modeling, abinitio approaches, Threading, Critical Assessment of Structure Prediction, Structural genomics

Unit-IV Molecular Biology **9**

Inference problems and techniques for molecular biology- Overview of key inference problems in biology: Homology identification, Genomic sequence annotation (Genes and ORFs identification), Protein structure prediction (Secondary and Tertiary structure prediction), Protein function prediction, Biological network identification, Next generation sequencing

Unit-V RNA Modeling **9**

Basics of RNA Structure prediction and its limitations, Features of RNA Secondary Structure,RNA structure prediction methods: Based on self-complementary regions in RNA sequence, Minimum free energy methods, Suboptimal structure prediction by MFOLD, Prediction based on finding most probable structure and Sequence co-variance method. Application of RNA structure modeling.

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Lesk, A. K.	Introduction toBioinformatics	Oxford University Press	2013
2.	Dan Gusfield	Algorithms on Strings, Trees and Sequences: Computer Science and Computational Biology	Cambridge University Press	1997

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Durbin, R., Eddy, S., Krogh, A.,and Mitchison, G.	Biological Sequence Analysis Probabilistic Models of proteinsand nucleic acids	Cold SpringHarbor Laboratory Press	2004
2.	Baldi, P. and Brunak, S	Bioinformatics: The Machine Learning Approach	Cam University Press	1998

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23ITE31	C# and .Net Framework	L	T	P	C
		3	0	0	3

Course Objective:

- To discuss the concepts of NET Framework and C# language
- To Design and develop real-time applications using object oriented concepts in C#
- To Design and develop real-time applications using .NET
- To Design and develop windows and web based applications using C#
- To Develop C# programs for Multithreading and database applications

Course Outcomes:

23ITE31.CO1 Discuss the concepts of NET Framework and C# language

23ITE31.CO2 Design and develop real-time applications using object oriented concepts in C#

23ITE31.CO3 Design and develop real-time applications using.NET

23ITE31.CO4 Develop the web based applications using ADO.NET in C#

23ITE31.CO5 Implement the network application by using .Net framework.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITE31.CO1	X	X	X	X	X	X	-	X	X	-	-	X	X	X	X
23ITE31.CO2	X	X	X	X	X	-	-	X	X	X	-	-	X	X	X
23ITE31.CO3	X	X	X	X	-	X	-	-	X	X	-	X	X	X	X
23ITE31.CO4	X	X	X	X	X	X	-	X	X	X	-	X	X	X	X
23ITE31.CO5	X	X	X	X	X	X	-	X	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 Aspects Of C# 9

Classes, Objects, Inheritance, Polymorphism, Interfaces, Operator Overloading, Delegates, Events, Errors and Exceptions

Unit-III Application Development On .Net 9

Windows Applications: Basic windows controls. Advanced controls, multi window applications, Accessing Data with ADO.NET: Connections, Data Adapters, Datasets, Data Application, Working with relational databases, multiple tables in a single dataset, Data views, Data Binding, Complex Binding, Navigating through datasets using bound controls

Unit-IV Web Based Application Development On .Net 9

Programming Web Applications with Web Forms, web server controls, Programming Web Services

Unit-V The CLR AD the .Net Framework 9

Assemblies, Versioning, Attributes, Reflection, Viewing Metadata, Type Discovery, Reflecting on a Type, Marshaling, Remoting, Understanding Server Object Types, Specifying a Server with an Interface, Building a Server, Building the Client, Using Single Call, Threads

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	E. Balagurusamy	Programming in C#	Tata McGraw-Hill	2004
2.	J. Liberty	Programming C#	O'Reilly	2002

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Herbert Schildt	The Complete Reference: C#	Tata McGraw-Hill	2004
2.	Robinson et al	Professional C#	Wrox Press	2002
3.	Andrew Troelsen	C# and the .NET Platform	A1 Press	2003
4.	Thamarai Selvi, R.	A Textbook on C#	Pearson Education	2003
5.	Murugesan	A Textbook on C#	Pearson Education	2003

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23ITE32	Open Stack Essentials	L	T	P	C
		3	0	0	3

Course Objective:

- To Understand Open Stack Architecture
- To Know The Principles Of Identity And Image Management
- To Define Network And Instance Management
- To Develop A Block And Object Storage
- To Design And Build Simple Nodes

Course Outcomes:

23ITE32.CO1 Installing Pack stack and generating an answer file

23ITE32.CO2 Develop Glance as a Registry of images

23ITE32.CO3 Build Web Interface External Network Setup

23ITE32.CO4 Develop Object file management in the web interface

23ITE32.CO5 Develop 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
23ITE32.CO1	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITE32.CO2	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITE32.CO3	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITE32.CO4	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITE32.CO5	X	X	X	X	X	-	-	X	-	-	X	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	OpenStack Essentials, Second Edition	Packt Publishing	2015
2.	Neependra Khare	Docker Cookbook	Packt Publishing	2013

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Omar Khedher	Learning OpenstackNetworking - 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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23ITE33	User Centric Design	L	T	P	C
		3	0	0	3

Course Objective:

- Given a problem setting, critically discuss the appropriateness of potential design methods such as contextual design, prototyping, ideation, etc.
- Describe the issues and challenges to achieving a human-centered design process.
- Gather useful information about users and activities through observation or systematic in-quiry.
- Use, adapt and extend design standards, guidelines, and patterns.
- Create a prototype for a small system and plan and perform a usability evaluation

Course Outcomes:

23ITE33.CO1	Develop an appreciation for the theory and sensibilities of user-centered design
23ITE33.CO2	Develop skills in the use and application of a variety of design methods, specifically Applicable to user- centered design
23ITE33.CO3	Improve individual and collaborative skills in design-based problem solving
23ITE33.CO4	Develop UCD is an Iterative process
23ITE33.CO5	Develop 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
23ITE33.CO1	X	X	X	X	X	-	-	X	X	-	X	X	X	X	X
23ITE33.CO2	X	X	X	X	X	-	-	-	-	-	-	X	X	X	X
23ITE33.CO3	X	X	X	X	X	-	-	-	-	-	-	X	X	X	X
23ITE33.CO4	X	X	X	X	X	X	-	X	-	-	-	X	X	X	X
23ITE33.CO5	X	X	X	X	X	-	-	-	-	-	-	X	X	X	X

Unit-I User Centered Design Overview **9**

User centered Design- UCD Principle - Iterative Process-Phase 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 Trends 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: User-Friendly Applications,	O'Reilly Media	2013
2.	Brian Still and Kate Crane	Fundamentals of User-Centered Design: A Practical Approach	CRC Press	2016

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Elizabeth F. Churchill, Frank Ritter, andGordon 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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		L	T	P	C
23ITE34	**Software Testing**	**3**	**0**	**0**	**3**

Course Objective:

- To understand the basic software testing principles.
- To understand the working principles of various testing methodologies.
- To Understand knowledge of techniques for system testing and functional testing
- To understand the ways and means of controlling and monitoring testing activity.
- To understand the concept of modern software testing tools.

Course Outcomes:

23ITE34.CO1 Explain the basic software testing principles.

23ITE34.CO2 Classify the types of testing

23ITE34.CO3 Differentiate operation of system testing & functional testing

23ITE34.CO4 Analyze the techniques in testing in planning, automation & execution management.

23ITE34.CO5 Implement the testing using modern software testing tools

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITE34.CO1	X	X	X	X	-	-	X	-	-	-	X	-	X	X	X
23ITE34.CO2	X	X	X	X	X	-	X	-	X	X	X	X	X	X	X
23ITE34.CO3	X	X	X	X	X	X	X	-	X	-	X	-	X	X	X
23ITE34.CO4	X	X	X	X	-	X	X	-	-	-	-	X	X	X	X
23ITE34.CO5	X	X	X	X	X	-	-	X	X	-	X	-	X	X	X

Unit-I Introduction **9**

Basic Concepts and preliminaries –Objectives of Testing-Testing Activities-Testing Levels-Role of Testing-Verification and Validation-Test Case-Theory of Program Testing- Theory of Good enough and Gerhart-Weyuker and Ostrand- Gourlay- Adequacy of Testing- Limitations of Testing

Unit-II Types of Testing **9**

Unit Testing-Static and Dynamic Unit Testing-Defect Prevention-Mutation Testing and Debugging-Control Flow Testing- Control Flow Graph- Paths in a Control Flow Graph- Path Selection Criteria- Generating Test Input-Data

Flow Testing- Data Flow Graph- Data Flow Terms- Data Flow Testing Criteria- Comparison of Data Flow Test Selection Criteria- Feasible Paths and Test Selection Criteria- Comparison of Testing Techniques-Domain Testing

Unit-III System Testing and Functional Testing **9**

System Testing- Different Types of Interfaces and Interface Errors- System Integration Techniques- Software and Hardware Integration- Test Plan for System Integration- Test Categories- Basic Tests- Functionality Tests- Robustness Tests- Functional Testing- Functional Testing Concepts of Howden- Pairwise Testing- Equivalence Class Partitioning- Boundary Value Analysis- Decision Tables- Random Testing- Error Guessing- Category Partition

Unit-IV Planning, Automation and Execution **9**

Planning And Automation- Approach- Suite Structure- Environment- Execution Strategy- Effort Estimation- System Test Automation- Evaluation and Selection of Test Automation Tools- Characteristics of Automated Test Cases- Structure of an Automated Test Case- Test Execution- Modeling Defects- Metrics for Tracking System Test- Orthogonal Defect Classification- Defect Causal Analysis- Beta Testing- First Customer Shipment- System

Test Report- Product Sustaining-Measuring Test Effectiveness.

Unit-V Modern Software Testing Tools **9**

Evolution of Automated Testing Tools-Variable Capture/Replay Tools-Extreme Programming-Software Testing Trends-Taxonomy of Testing Tools-Methodology to Evaluate Automated Testing Tools-Case Study

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Kshirsagar Naik, Priyadarshi Tripathy	Software Testing & QualityAssurance	A John Wiley & Sons	2011
2.	William E.Lewis, Gunasekaran Veerapillai	Software Testing & Continuous Quality Improvement	Auerbach Publications	2011

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Alan C Gillies	Software Quality Theory and Management	Cengage Learning	2011
2.	Srinivasan Desikan, Gopalaswamy Ramesh	Software Testing – Principles andPractices	Pearson Education	2009
3.	Ron Patton	Software testing	Pearson Education	2007
4.	William E. Perry	Effective Methods for SoftwareTesting	Wiley India	2006
5.	Renu Rajani and Pradeep Oak	Software Testing – Effective Methods, Tools and Techniques	Tata McGraw Hill Publishing Company Limited	2005

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23ITE35	Ethical Hacking and Cyber Security	L	T	P	C
		3	0	0	3

Course Objective:

- To understand the concept of Hacking.
- To understand the Hacking methods and types.
- To understand the Hacking tools.
- To understand the Concept of Cyber Security
- To understand the Cyber Security tools

Course Outcomes:

23ITE35.CO1	Explain the basic concept of Ethical hacking.
23ITE35.CO2	Implement the techniques for system hacking wireless hacking and web server hacking.
23ITE35.CO3	Explain the basic concept of Cyber Security and Penetration testing.
23ITE35.CO4	Implement the Cyber Security by using its tools.
23ITE35.CO5	Implement the cyber Forensic analysis

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITE35.CO1	X	X	X	X	-	-	-	-	-	X	-	X	X	X	X
23ITE35.CO2	X	X	X	X	X	-	-	-	X	X	X	X	X	X	X
23ITE35.CO3	X	X	X	X	-	X	-	-	X	X	X	X	X	X	X
23ITE35.CO4	X	X	X	X	X	-	-	-	-	-	X	X	X	X	X
23ITE35.CO5	X	X	X	X	X	-	-	-	X	X	X	X	X	X	X

Unit-I Introduction to Ethical Hacking **9**

Introduction-Ethical hacking Terminology-types of hacking technologies-phases of ethical hacking-Foot printing- Social Engineering-Scanning and enumeration. Understanding the password hacking techniques-Root kits- Trojans-Backdoors-Viruses and worms-sniffers-denial of service-Session hijacking

Unit-II Web Server Hacking **9**

Hacking web servers-web application vulnerabilities –Buffer overflow-Wireless hacking Physical Security. WEP, WPA Authentication mechanism-wireless sniffers-Physical Security-factors affecting physical security- honey pots-Firewall types

Unit-III Penetration Testing and cyber Security **9**

Cryptography-overview of MD5, SHA, RC4-penetration testing methodologies- steps pen Test legal framework-penetration testing tools. Cyber crime: Mobile and Wireless devices-Trend mobility-authentication service security- Attacks on mobile phones-mobile phone security Implications for organizations-Organizational measurement for Handling mobile-Security policies and measures in mobile computing era

Unit-IV Cyber Security Tools **9**

Tools and methods used in cyber crime-Proxy servers and Anonymizers- Phishing- Password cracking-Key loggers and Spy wares-Virus and worms-Trojan Horse and Backdoors-Steganography-SQL Injection-Buffer overflow-Attacks on wireless network. Understanding computer forensic-Historical background of cyber forensic Analysis of e-mail-Digital forensic life cycle-Network forensic-Setting up a computer forensic Laboratory- Relevance of the OSI 7 Layer model to computer Forensic- Computer forensic from compliance perspectives

Unit-V Forensic of Hand Held Devices **9**

Forensic of Hand –Held Devices-Understanding cell phone working characteristics-Hand-Held devices and digital forensic- Toolkits for Hand-Held device-Forensic of i-pod and digital music devices-Techno legal Challenges with evidence from hand-held Devices. Cyber Security –Organizational implications-cost of cybercrimes and IPR issues Web threats for organizations: the evils and Perils-Social media marketing- Security and privacy Implications- Protecting people privacy in the organizations Forensic best practices for organizations

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Michael T. Simpson	Hands-On Ethical Hacking andNetwork Defense	James Corley	2012
2.	Nina Godbole & Sunit Belapure	Cyber Security	Wiley India	2012

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Patrick Engebretson	The Basics of Hacking and Penetration Testing	Elsevier	2011
2.	Harish Chander	Cyber laws & IT protection	PHI	2012
3.	Dhiren R Patel	Information security theory & practice	PHI	2010
4.	MS.M.K.Geetha &Ms.Swapne Raman	Cyber Crimes and Fraud Management	MACMILLAN	2012
5.	Vivek Sood	Cyber Law Simplified	TMH	2012

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23ITE36	Soft Computing	L	T	P	C
		3	0	0	3

Course Objective:

- To understand the basic concepts of soft computing,
- To understand the fundamentals of artificial and neural networks
- To understand the fundamentals Unsupervised Learning Network
- To understand the fuzzy sets and fuzzy logic and genetic algorithms.
- To understand the fuzzy Fuzzy Arithmetic and Fuzzy Measures

Course Outcomes:

23ITE36.CO1	Build intelligent machines using soft computing techniques.
23ITE36.CO2	Design a Neural Networks for the real time problems.
23ITE36.CO3	Implement various learning techniques
23ITE36.CO4	Apply fuzzy logic and Develop fuzzy sets for real time problems.
23ITE36.CO5	Develop genetic algorithms for various real time applications

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITE36.CO1	X	X	X	X	X	X	-	X	X	-	-	X	X	X	X
23ITE36.CO2	X	X	X	X	X	-	-	X	X	X	-	-	X	X	X
23ITE36.CO3	X	X	X	X	-	X	-	-	X	X	-	X	X	X	X
23ITE36.CO4	X	X	X	X	X	X	-	X	X	X	-	X	X	X	X
23ITE36.CO5	X	X	X	X	X	X	-	X	X	-	-	X	X	X	X

Unit-I AI Problems and Search **9**

AI problems, Techniques, Problem Spaces and Search, Heuristic Search Techniques- Generate and Test, Hill Climbing, Best First Search Problem reduction, Constraint Satisfaction and Means End Analysis. Approaches to Knowledge Representation- Using Predicate Logic 2nd Rules

Unit-II Artificial Neural Networks **9**

Introduction, Basic models of ANN, important terminologies, Supervised Learning Networks, Perception Networks, Adaptive Linear Neuron, Back propagation Network. Associative Memory Networks, Training Algorithms for pattern association, BAM and Hopfield Networks

Unit-III Unsupervised Learning Network **9**

Introduction, Fixed Weight Competitive Nets, Maxnet, Hamming Network, Kohonen Self-Organizing Feature Maps, Learning Vector Quantization, Counter Propagation Networks, Adaptive Resonance Theory Networks. Special Networks-Introduction to various i networks

Unit-IV Fuzzy Logic **9**

Introduction to Classical Sets (crisp Sets)and Fuzzy Sets- operations and Fuzzy sets. Classical Relations -and Fuzzy Relations- Cardinality, Operations, Properties and composition. Tolerance and equivalence relations. Membership functions- Features, Fuzzification, membership value assignments, Defuzzification

Unit-V Applications **9**

Fuzzy Arithmetic and Fuzzy Measures, Fuzzy Rule Base and Approximate Reasoning Fuzzy Decision making Fuzzy Logic Control Systems. Genetic Algorithm- Introduction and basic operators and Terminology. Applications: Optimization of TSP, Internet Search technique

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	S N Sivanandam, S NDeepa	Principles of Soft Computing	Wiley India	2007
2.	Fakhreddine 0 Karray,Clarence D Silva	Soft Computing and IntelligentSystem Design	Pearson Edition	2004

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Amit Konar	Artificial Intelligence and Soft Computing- Behavioral and CognitiveModeling of the Human Brain	CRC press	2000
2.	Elaine Rich andKevin Knight	Artificial Intelligence	TMH	2008
3.	Stuart J. Russell andPeter Norvig	Artificial Intelligence A Modern Approach	Prentice Hall	2010
4.	Hung T. Nguyen, Elbert A. Walker	A first course in Fuzzy Logic	CRC. Press	2005
5.	N. P. Padhy	Artificial Intelligence and IntelligentSystems	Oxford University Press	2005

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23ITE37	Real Time Systems	L	T	P	C
		3	0	0	3

Course Objective:

- To understand the basic concepts of real-time computing
- To understand the major issues real-time scheduling and real-time kernels. To write Real-time scheduling
- algorithms
- To understand timing analysis and resource control in realtime system
- To design the real time database and fault tolerant techniques
- To implementation the real-time operating systems

Course Outcomes:

23ITE37.CO1	Apply the knowledge of operating system concepts to understand real time system.
23ITE37.CO2	Implement the tasks scheduling of Real time systems.
23ITE37.CO3	Define various protocols for effective resource sharing.
23ITE37.CO4	Find out the fault in real time system by using various techniques.
23ITE37.CO5	Design real time system for various real time applications

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITE37.CO1	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITE37.CO2	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITE37.CO3	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITE37.CO4	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITE37.CO5	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X

Unit-I Introduction to Real Time System **9**

Typical RT applications - Hard and soft Real Time constraints - Hard and soft RTS - Reference Modeling RTS - Issues in RTS - Structure of RTS

Unit-II Real Time Scheduling **9**

Task, processes, processors - Task allocation algorithm - Single processor and multi processor Scheduling – Clock driven and priority based scheduling algorithm

Unit-III Timing Analysis and Resource Control **9**

Prediction of Execution Time - Worst Case Execution Time (WCET) analysis – Assumptions on Resources and Their Usage – Resource Contention and Resource Access Control – Priority Ceiling Protocol – Priority Inheritance Protocol – Stack Based Priority Ceiling Protocol – Preemption Ceiling Protocol

Unit-IV Real Time Database and Fault Tolerant Techniques **9**

Transaction priority and concurrency control issues - Disk scheduling - Fault type and Detection Techniques – Redundancy management – Integration issues

Unit-V Real Time System Case Studies **9**

Examples of Hard, Soft and Firm real time systems like automatic chocolate vending machine, Smart Card and Adaptive Cruise Control System in a car or flight

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Jane .W. S. Liu	Real Time Systems	Pearson Education	2012
2.	Krishna .C.M	Real Time Systems	Mc-Graw Hill	2010

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Amit Konar	Artificial Intelligence and SoftComputing- Behavioral and Cognitive Modeling of the HumanBrain	CRC press	2000
2.	Elaine Rich andKevin Knight	Artificial Intelligence	TMH	2008
3.	Stuart J. Russell andPeter Norvig	Artificial Intelligence A Modern Approach	Prentice Hall	2010
4.	Hung T. Nguyen, Elbert A. Walker	A first course in Fuzzy Logic	CRC. Press	2005
5.	N. P. Padhy	Artificial Intelligence and IntelligentSystems	Oxford University Press	2005

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23ITE38	High Speed Networks	L	T	P	C
		3	0	0	3

Course Objective:

- To learn High speed networks and ATM Architecture
- To understand resource allocation and s congestion management approaches
- To understand ATM Congestion control management
- To understand the integrated and differentiated services
- To learn protocols for QOS support

Course Outcomes:

23ITE38.CO1	Summarize the mechanisms to provide high speed networking through case studies of ATM and frame relay networks
23ITE38.CO2	Construct queuing system with different arrival and service rates
23ITE38.CO3	Analyze the performance of various congestion controls in ATM.
23ITE38.CO4	Design the integrated and differentiated services Explain the protocols needed for QoS support
23ITE38.CO5	Apply RSVP, MPLS, and RTP/RTCP protocols for efficient resource reservation, data flow management, and real-time communication in networks

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITE38.CO1	X	X	X	X	X	-	-	X	X	-	X	X	X	X	X
23ITE38.CO2	X	X	X	X	X	-	-	-	-	-	-	X	X	X	X
23ITE38.CO3	X	X	X	X	X	-	-	-	-	-	-	X	X	X	X
23ITE38.CO4	X	X	X	X	X	X	-	X	-	-	-	X	X	X	X
23ITE38.CO5	X	X	X	X	X	-	-	-	-	-	-	X	X	X	X

Unit-I High Performance Networks **9**

Frame Relay Networks – Asynchronous Transfer Mode (ATM) – ATM Protocol Architecture - ATM logical connection - ATM cell – ATM service categories – ATM Adaptation Layer (AAL) - High Speed LANs: Fast ethernet - Gigabit ethernet - Fiber channel

Unit-II Queuing models and Congestion Management **9**

Queuing analysis- Queuing models – Single server queues – Effects of congestion – Congestion control – Traffic management – Congestion control in packet switching networks

Unit-III ATM Congestion Control **9**

Performance of TCP over ATM - Traffic and congestion control in ATM – Requirements – Attributes – Traffic management frame work - Traffic control – Available Bit Rate (ABR) Traffic management – ABR rate control - Resource Management (RM) Cell formats – ABR capacity allocations

Unit-IV Integrated and Differentiated Services **9**

Integrated services architecture – Approach - Components - Services - Queuing discipline – Fair admission control - Traffic shaping - Resource reservation queuing (FQ) - Processor Sharing (PS) - Bit-Round Fair Queuing (BRFQ) - Generalized Processor Sharing (GPS) - Weighted Fair Queuing (WFQ) – Random early detection - Differentiated services DS code points – Per Hop Behavior

Unit-V PROTOCOLS FOR QOS SUPPORT **9**

Resource Reservation (RSVP) – Goals & characteristics - Data flow - RSVP operations - Protocol mechanisms – Multiprotocol label switching – Operations - Label stacking – Protocol details – Real Time Protocol (RTP) – Protocol architecture - Data transfer protocol - Real Time Control Protocol (RTCP)

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	William Stallings	High Speed Networks	Pearson Education	2002
2.	Warland & PravinVaraiya	High Performance Communication Networks	Jean Harcourt Asia Pvt. Ltd	2001

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	IrvanPepelnjk, et al	MPLS and VPN architecture	Cisco Press	2003
2.	Behrouz A. Forouzan, Sophia Chung Fegan	Data Communications and Networking	McGraw-Hill Higher Education	2003

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23ITE39	Angular JS	L	T	P	C
		3	0	0	3

Course Objective:

- Understand Angular Technology Stack and Components
- Outline the layout for dynamic web sites
- Explain the use of Angular framework, directives
- Define the basics for pipeline and forms creation
- Interpret routing methods and testing tools

Course Outcomes:

23ITE39.CO1 Develop Angular Components, Web components and Custom Elements

23ITE39.CO2 Design dynamic Web sites using SystemJS and Webpack

23ITE39.CO3 Build applications using Angular framework and Directives

23ITE39.CO4 Create pipes and forms using model driven approach

23ITE39.CO5 Test Angular applications and Services

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITE39.CO1	X	X	X	X	-	-	X	-	-	-	X	-	X	X	X
23ITE39.CO2	X	X	X	X	X	-	X	-	X	X	X	X	X	X	X
23ITE39.CO3	X	X	X	X	X	X	X	-	X	-	X	-	X	X	X
23ITE39.CO4	X	X	X	X	-	X	X	-	-	-	-	X	X	X	X
23ITE39.CO5	X	X	X	X	X	-	-	X	X	-	X	-	X	X	X

Unit-I Introduction to Angular **9**

Angular Features and Advantages-Understanding the Angular technology stack and Angular library components- Type Script - Features of Angular - Angular Components: Building with Angular Components, Building Web Components, Custom Elements, Angular CLI, ng-package, The Lifecycle Of Angular Components, Creating A Component, and Deeper Nesting

Unit-II Web Designing and Event Binding **9**

Building Responsive Web Design With Angular-Introduction To Bootstrap-Creating Responsive Layouts With Bootstrap-Code Design For Responsive Websites. Event Binding - Event Binding In Angular- Building directives, Template Model- SystemJS and Webpack

Unit-III Dependency Injection, Directives in Angular **9**

Understanding dependency injection- The dependency injection API-Angular framework for dependency injection- coding pattern for dependencies- overview of service. Directives in Angular-The function of a directive in Angular- Various Types Of Directives- Custom Directive-Built-In Directives And Custom Structural Directives

Unit-IV Pipes and Forms in Angular **9**

Pipes in angular - features- various built-in pipes in angular, creating a custom pipe in angular. Forms in angular -Advantages Of Forms- Template-Driven Forms-Reactive Forms, Angular Validation-Model Driven Approach

Unit-V Angular Routing, Testing Angular Applications **9**

What is Angular Routing- Fundamentals, Benefits, and Features-Building A Single Page Application And Updating It Dynamically With Angular Routing - Parameter Routing- Router Lifecycle Hooks and Child Routes.Testing Angular applications- Setup and Tools For Testing-Deploying Angular Test Bed For Testing On The Angular Framework-Testing Services In Angular

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Ray Yao	ANGULARJS: In 8 Hours, ForBeginners, Learn Coding Fast!	CreateSpace Independent Publishing Platform	2016
2.	Felix Alvaro	ANGULARJS: Easy AngularJSFor Beginners	CreateSpace Independent Publishing Platform	2016

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Matt Frisbie	AngularJS Web Application Development Cookbook	Packt Publishing	2014
2.	Shyam Seshadri	AngularJS: Up and Running: Enhanced Productivity with Structured Web Apps	Paper back	2014
3.	Adam Freeman	Pro AngularJS	Paper back	2018
4.	Istan Novak	Unraveling AngularJS 1.5: With Over 140 Complete Samples	CreateSpace Independent Publishing Platform	2015
5.	Brad Green , Shyam Seshadri	AngularJS	O'Reilly Media, Inc.	2013

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23ITE40	Angular JS Laboratory	L	T	P	C
		0	0	2	1

Course Objective:

- Understand Angular Technology Stack and Components
- Outline the layout for dynamic web sites
- Explain the use of Angular framework, directives
- Define the basics for pipeline and forms creation
- Interpret routing methods and testing tools

Course Outcomes:

23ITE40.CO1	Develop Angular Components, Web components and Custom Elements
23ITE40.CO2	Design dynamic Web sites using SystemJS and Webpack
23ITE40.CO3	Build applications using Angular framework and Directives
23ITE40.CO4	Create pipes and forms using model driven approach
23ITE40.CO5	Test Angular applications and Services

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITE40.CO1	X	X	X	X	-	-	-	-	-	X	-	X	X	X	X
23ITE40.CO2	X	X	X	X	X	-	-	-	X	X	X	X	X	X	X
23ITE40.CO3	X	X	X	X	-	X	-	-	X	X	X	X	X	X	X
23ITE40.CO4	X	X	X	X	X	-	-	-	-	-	X	X	X	X	X
23ITE40.CO5	X	X	X	X	X	-	-	-	X	X	X	X	X	X	X

Sl.No.	List of Experiments
1.	Creating a Data bound Component
2.	Communicating with Child Components
3.	Communicating with Parent Components
4.	Hiding and Showing Elements with ngSwitch
5.	Adding Style with ngClass
6.	Creating and Injecting Service
7.	Create a Directive
8.	Using the Lowercase Pipe
9.	Using the Date Pipe with Parameters
10.	Creating a Custom Pipe
11.	Creating and Validating a Template-based Form
12.	Creating and Validating a Reactive Form
13.	Write a Basic Test
14.	Test a Service

Total Periods: 30

23ITE41	Digital and Social Media Marketing	L	T	P	C
		3	0	0	3

Course Objective:

- Demonstrate knowledge on digital Marketing Strategies
- Analyze the marketing potential of digital technologies and social media platforms for a particular real-life
- marketing challenge
- Analyze digital marketing strategies for improving digital marketing
- Identify the Scope of Social Interaction, Customer Relationships
- Design social business Techniques for business analysis.

Course Outcomes:

23ITE41.CO1	Demonstrate knowledge on digital Marketing Strategies
23ITE41.CO2	Analyze the marketing potential of digital technologies and social media platforms for a particular real-life marketing challenge
23ITE41.CO3	Analyze digital marketing strategies for improving digital marketing
23ITE41.CO4	Identify the Scope of Social Interaction, Customer Relationships
23ITE41.CO5	Design social business Techniques for business analysis.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITE40.CO1	X	X	X	X	X	X	-	X	X	-	-	X	X	X	X
23ITE40.CO2	X	X	X	X	X	-	-	X	X	X	-	-	X	X	X
23ITE40.CO3	X	X	X	X	-	X	-	-	X	X	-	X	X	X	X
23ITE40.CO4	X	X	X	X	X	X	-	X	X	X	-	X	X	X	X
23ITE40.CO5	X	X	X	X	X	X	-	X	X	-	-	X	X	X	X

Unit-I Introduction to Digital Marketing **9**

Digital Marketing Fundamentals, Key features of digital marketing strategies, Applications of Digital Marketing, Benefits of Digital marketing, Alternative digital business models, The relationship between digital and traditional communications, different types of social media marketing tools, Key communications concepts for digital marketing

Unit-II Online Marketplace Analysis **9**

Situation analysis for digital marketing, Digital marketing environment, Understanding customer journeys, Consumer behavior and implications for Marketing, Competitors, Suppliers, Business Model for e-commerce

Unit-III Digital Marketing Strategy **9**

The need for an integrated digital marketing strategy, How to structure a digital marketing strategy, Situation analysis, Setting goals and objectives for digital marketing, Strategy formulation for digital marketing, The need for integrated digital marketing , strategy implementation. Setting SMART objectives

Unit-IV Social Media and Customer Engagement **9**

The Social Feedback Cycle, The Social Web and Engagement, The Operations and Marketing Connection, The New Role: Social Interaction, Customer Relationships: CRM Gets Social, Outreach and Influencer Relations, Social CRM and Blogger Outreach, Build a Social Business. The Social Business Ecosystem

Unit-V Social Technology and Business Decisions **9**

Create a Social Business, Understand the Conversations That Matter, Social CRM and Decision Support, Social Analytics, Know Your Influencers, Engagement on the Social Web, Engagement as a Customer Activity, Engagement as a Business Activity, Social CRM and Business Design

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Dave chaffey and Fiona ellis-chadwick,	Digital Marketing strategy, implementation	-	2016
2.	Dave Evans	Social Media Marketing: TheNext Generation of Business Engagement	Wiley Piblishing	2010

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Ryan, Damian	Understanding Digital Marketing:marketing strategies for engagingthe digital generation	Kogan Page	2014
2.	MoutsyMaiti	Internet Marketing	Oxford University Press	2014
3.	Eric Greenberg, and Kates, Alexander;	Strategic Digital Marketing: TopDigital Experts Share the Formula for TangibleReturns on Your Marketing Investment	McGraw-Hill Professional	2013

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23ITE42	Full Stack Development	L	T	P	C
		3	0	0	3

Course Objective:

- To Demonstrate knowledge on jQuery to control the behavior of different elements in web page.
- To Analyze Node.js syntax, NPM package management, MongoDB and Express.js syntaxes to build scalable and responsive web applications.
- To Develop components using templates, directives of AngularJS for designing single-page applications
- To Build applications by applying Node.js, CRUD applications using MongoDB and Express.js.
- To Develop components using templates, directives of AngularJS for testing single-page applications

Course Outcomes:

23ITE42.CO1	Demonstrate knowledge on jQuery to control the behavior of different elements in web page.
23ITE42.CO2	Analyze Node.js syntax, NPM package management, MongoDB and Express.js syntaxes to build scalable and responsive web applications.
23ITE42.CO3	Develop components using templates, directives of AngularJS for designing single-page applications
23ITE42.CO4	Build applications by applying Node.js, CRUD applications using MongoDB and Express.js.
23ITE42.CO5	Develop components using templates, directives of AngularJS for testing single-page applications

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITE42.CO1	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITE42.CO2	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITE42.CO3	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITE42.CO4	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X
23ITE42.CO5	X	X	X	X	X	-	-	X	-	-	X	X	X	X	X

Unit-I jQuery **9**

Introduction, jQuery selectors, jQuery event methods, jQuery effects, DOM manipulation using jQuery get/set content methods, Add/remove new HTML elements, Manipulating CSS.

Unit-II Node.js **9**

Understanding the web development framework, Understanding the Node.js-to-Angular stack components, Installing Node.JS, Node Package Manager (NPM), Creating Node.js application, Event model, Event queue, Callbacks, Buffer module, Stream module, Opening and closing files, Writing Files, Reading Files, Request, response and server objects, Implementing HTTP and HTTPS client-server.

Unit-III MongoDB **9**

Configuring MongoDB environment, Datatypes, Administering databases, Managing collections, Connecting to MongoDB from Node.js, Objects – Db, Admin, Collection, Cursor; Accessing and manipulating collections, Manipulating MongoDB documents from Node.js, Query objects, Query options objects, Limiting and sorting result sets, Grouping result, Applying MapReduce by aggregating results.

Unit-IV Express in Node.JS **9**

Configuring and starting Express server, configuring routes, Requests objects, Response objects, Implementing a template engine, Handling POST Body Data, Sending and Receiving Cookies, Implementing Sessions.

Unit-V Angular **9**

Introduction to Angular, Creating a basic Angular application, Component configuration, Building template, Using Constructors, Using external templates, Injecting directives, Data binding, Built-in directives

Total Periods: 45

Text Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Brad Dayley, BrendanDayley, Caleb Dayley	Node.js, MongoDB and AngularWeb Development	Pearson	2018
2.	DT Editorial Services	HTML 5 Black Book: CoversCSS3, JavaScript, XML, XHTML, AJAX, PHP and jQuery	Dreamtech Press	2016

Reference Books:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Simon Holmes, Clive Harber,	Getting MEAN with Mongo,Express, Angular, and Node	Manning Publishers	2016
2.	Amos Q Haviv, Adrian Mejia, Robert Onodi,	Web Application Development with MEAN,	Packt Publishers	2017

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23ITP01	PROJECT WORK PHASE - I	L	T	P	C
		0	0	6	3

Course Objective:

- To practical implementation of theoretical knowledge gained during the study from First year to Third year
- To 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 learnttheoretically.
- To identify the appropriate problem solving methodology
- To Analyze and process the experimental information

Course Outcomes:

23ITP01.CO1	Prepare a literature survey in a specific domain as a team / individual to motivate lifelong learning.
23ITP01.CO2	Identify the problem which needs to be provided a sustainable solution using modern tools
23ITP01.CO3	Analyze the problem definition and design its impact on the society and environment.
23ITP01.CO4	Document the literature and bindings.
23ITP01.CO5	Choose the domain of Information Technology and programming languages and apply to variety of real time problem scenario

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITP01.CO1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
23ITP01.CO2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
23ITP01.CO3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
23ITP01.CO4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
23ITP01.CO5	X	X	X	X	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)

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

23ITP02	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:

23ITP02.CO1	Design an experiment to solve engineering / societal problems using modern tools.
23ITP02.CO2	Develop lifelong learning to keep abreast of latest technologies.
23ITP02.CO3	Implement the workflow to provide sustainable solutions.
23ITP02.CO4	Interpret the experimental results and the impact on society and environment.
23ITP02.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
23ITP02.CO1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
23ITP02.CO2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
23ITP02.CO3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
23ITP02.CO4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
23ITP02.CO5	X	X	X	X	X	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

Total Periods: 180

23ITP03	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:

23ITP03.CO1	Write a paragraph with a topic sentence, support, and concluding sentence.
23ITP03.CO2	Produce coherent and unified paragraphs with adequate support and detail of the topic.
23ITP03.CO3	Write an effective introduction thesis statement that addresses the writing prompt and conclusion.
23ITP03.CO4	Produce appropriate vocabulary and correct word forms.
23ITP03.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
23ITP03.CO1	X	-	-	-	X	X	X	X	X	X	-	X	-	X	-
23ITP03.CO2	X	-	-	-	-	X	-	X	X	X	-	X	-	-	X
23ITP03.CO3	X	X	X	X	X	X	-	-	X	X	X	X	-	X	-
23ITP03.CO4	X	-	-	-	-	X	-	-	X	X	X	X	X	-	X
23ITP03.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

23ITP04	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:

23ITP04.CO1 Develop a skill for work in actual working environment.

23ITP04.CO2 Utilize available technical resources in efficient manner.

23ITP04.CO3 Write technical documents and give oral presentations related to the work completed.

23ITP04.CO4 Prepare a presentation in latest trends in Information Technology.

23ITP04.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
23ITP04.CO1	X	-	X	-	-	X	X	-	-	-	-	-	X	-	-
23ITP04.CO2	-	-	X	-	X	-	-	X	X	X	-	-	-	-	X
23ITP04.CO3	X	-	X	-	X	-	-	-	-	X	X	-	-	X	-
23ITP04.CO4	-	-	X	X	X	-	-	-	X	-	X	-	X	X	-
23ITP04.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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23ITP05	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:

23ITP05.CO1	Identifying real problems and a solutions people want Pitching solutions, such as products and services.
23ITP05.CO2	Developing and managing early stage software.
23ITP05.CO3	Achieve high degree of productivity in a small team via agile, high quality practices and team organization approaches.
23ITP05.CO4	Create a production software development environment.
23ITP05.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
23ITP05.CO1	X	-	X	X	-	-	-	-	-	X	-	X	X	X	-
23ITP05.CO2	X	X	-	-	X	-	-	X	X	X	-	-	X	-	-
23ITP05.CO3	X	X	X	X	-	X	-	-	X	X	X	X	X	X	-
23ITP05.CO4	X	X	X	X	-	X	-	-	X	X	X	-	X	-	X
23ITP05.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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23ITP06	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:

23ITP06.CO1	Describe the various issues/factors an information technology professional.
23ITP06.CO2	Describe professional behavior in the information technology.
23ITP06.CO3	Recognize what are the current issues in IT and the emerging technology.
23ITP06.CO4	Write properly formatted and organized technical reports.
23ITP06.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
23ITP06.CO1	X	-	X	X	-	X	-	-	-	X	-	X	-	X	-
23ITP06.CO2	X	X	-	-	-	-	-	X	X	X	-	-	X	X	X
23ITP06.CO3	X	-	X	X	-	X	X	-	X	X	X	X	-	X	X
23ITP06.CO4	X	X	X	X	-	X	-	-	X	X	X	-	X	-	X
23ITP06.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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23ITP07	Data Structures Laboratory - Professional Skill II	L	T	P	C
		0	0	2	1

Course Objective:

- To understand the basic structure concept such as Abstract Data Types, Linear and Non Linear Data structures.
- To understand the behavior of data structures such as stacks, queues, trees, hash tables, search trees, Graph and their representations.
- To choose the appropriate data structure for a specified application
- To solve problems using data structures such as array, linked lists, queues, trees graphs, hash tables, search trees.
- To understand and analyze various searching and sorting algorithms.

Course Outcomes:

23ITP07.CO1	Ability to identify the appropriate data structure for given problem.
23ITP07.CO2	Able to solve the problems using stack and queues.
23ITP07.CO3	Able to implement the application of Tree data structure.
23ITP07.CO4	Able to understand the application of Graph and hashing techniques.
23ITP07.CO5	Ability to solve the problems using various searching and sorting techniques

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITP07.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	X
23ITP07.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	X
23ITP07.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	X
23ITP07.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	X
23ITP07.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	X

Sl.No.	List of Experiments
1.	Implement a menu driven program to implement operations on the singly linked list.
2.	Implement a menu driven program to implement operations on the doubly linked list
3.	Implement a menu driven program to implement operations on the circular linked list
4.	Implement a program for stack that performs operations using array
5.	Implement a program to convert infix notation to postfix notation using stack.
6.	Implement a program to QUEUE using arrays that performs operations
7.	Implement a program to stack using linked list.
8.	Implement a program to queue using linked list.
9.	Implement recursive and non-recursive tree traversing methods inorder, preorder and post-order traversal
10.	Implement a program to create and operation on binary search tree.
11.	Implement a program to Queue Sort.
12.	Implement a program to Merge Sort.

13. Implement a program to Bubble Sort.
14. Implement a program to Binary Search and sequential search.
15. Implement a program to Breadth First search using linked representation of graph
16. Implement a program to Depth first search using linked representation of graph.

Total Periods: 30

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23ITP09	Advanced Web Development Lab	L	T	P	C
		0	0	2	1

Course Objective:

- To Apply the HTML5, CSS3 and Bootstrap concepts in front-end development of modern web applications
- To Design Web applications using Bootstrap
- To Create and deploy scalable web-based system using Angular JS.
- To Implement Directives and Controllers for front-end development
- To Demonstrate knowledge on the usage of Keys and Values Create Forms, validate and use Filters.

Course Outcomes:

23ITP09.CO1	Develop front-end applications using Node.js framework and React JS
23ITP09.CO2	Develop server-side Framework using Django
23ITP09.CO3	Building web application and Host web application using front-end and back-end tools.
23ITP09.CO4	Work independently or in teams to solve problems with effective communication.
23ITP09.CO5	The ability to work with both client-side and server-side technologies, creating full-featured web applications.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITP09.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	X
23ITP09.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	X
23ITP09.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	X
23ITP09.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	X
23ITP09.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	X

Sl.No.	List of Experiments
1.	Front-endWeb Application Library Library: React Experiments: 1. Installing Node.js framework and configuring Visual Studio (VS) Code Integrated DevelopmentEnvironment (IDE), and its dependencies. 2. Create and Run ―Hello World‖ Application in VS Code. 3. Create a React application that includes simple functional components. 4. Create a React application that includes simple class components. 5. Develop a React application to insert and access props (properties) and state of components. 6. Create a React application to demonstrate event handling. 7. Develop a React application for list rendering. 8. Implement a React application for form handling.
2.	Server-side Development Framework.side Framework: Django Experiments: 1. Installing Python, Django framework and configuring PyCharm Integrated Development Environment(IDE), and its dependencies.

2. Creating workspace, project and setting up the necessary environment.
3. Implement a simple view to handle http response (displayHello World) in Django Application.
4. Create a simple model for storing student details.
5. Implement a Django application for form creation and storage of form data into model.
6. Write simple test cases and test any Django application.
7.Create a Django application to include static files such as images, CSS and JavaScript.

3. Hosting Web Applications

Building web application and Hosting web application using WAMP/XAMPP Server.

Total Periods: 30

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23ITP10	Mini Project - Mobile Application	L	T	P	C
		0	0	2	1

Course Objective:

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

Course Outcomes:

23ITP10.CO1	Demonstrate knowledge on Mobile platforms and Mobile User Interface, Android Activities and Intents, Messaging, Networking, Location based Services, Android Services IOS.
23ITP10.CO2	Analyze the context of complex problems and identify user interface design requirements
23ITP10.CO3	Design and develop mobile applications as per societal needs.
23ITP10.CO4	Use Android studio and iOS tools to develop mobile applications.
23ITP10.CO5	Work independently or in teams to solve problems with effective communication.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23ITP10.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	X
23ITP10.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	X
23ITP10.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	X
23ITP10.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	X
23ITP10.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	X

Sl.No.	List of Experiments
1.	Develop an application that uses GUI components, Font and Colours
2.	Develop an application that uses Layout Managers and event listeners.
3.	Write an application that draws basic graphical primitives on the screen.
4.	Develop an application that makes use of databases.
5.	Develop an application that makes use of Notification Manager.
6.	Implement an application that uses Multi-threading.
7.	Develop a native application that uses GPS location information
8.	Implement an application that writes data to the SD card.
9.	Implement an application that creates an alert upon receiving a message
10.	Write a mobile application that makes use of RSS feed
11.	Develop a mobile application to send an email.
12.	Develop a Mobile application for simple needs

Total Periods: 30