MUTHAYAMMAL ENGINEERING COLLEGE

(An Autonomous Institution)

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

Estd. 2000

Programme Code : IT

Programme Name : B.Tech-Information Technology

Regulation : R-2021

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(Approved by AICTE, Accredited by NAAC & NBA, Affiliated to Anna University)

Rasipuram - 637 408, Namakkal Dt, Tamil Nadu.

Ph. No.: 04287-220837

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DEPARTMENT PROGRAM EDUCATIONAL OBJECTIVES, PROGRAM OUTCOMES & PROGRAM SPECIFIC OUTCOMES

PROGRAM OUTCOMES

Engineering Graduates will be able to:

PROGRAM EDUCATIONAL OBJECTIVES:

PEO1: Graduates will have successful career in IT and related industries or pursue higher education and research or evolve as entrepreneurs.

PEO2: Graduates will have the ability and attitude to adapt emerging technological changes in Information Technology.

PEO3: Graduates will excel as socially committed engineers with high ethical values, leadership qualities and empathy for the needs of society.

PROGRAMME OUTCOMES:

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

PO2: 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 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: 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: 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: 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: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

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

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

PO10: 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: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

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

PROGRAMME SPECIFIC OUTCOMES:

Graduate should be able to

PSO1: Excel in software development including mobile technologies to solve complex computation task with soft skills.

PSO2: Apply appreciable knowledge of IoT, Cloud Computing and Cyber Security to develop reliable IT solutions.

PSO3: Exhibit proficiency in Artificial Intelligence and Big Data Analytics for providing solutions to real world problems in Industry and Research establishments.

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B.Tech. –INFORMATION TECHNOLOGY

GROUPING OF COURSES

1. Humanities and Social Sciences (HSS)

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

1. Basic Sciences (BS)

S. No.	Course Code	Course Title	Category	Contact Hours	Instruction Hours/Week			C
					L	T	P	
1.	21BSS01	Engineering Physics	BS	3	3	0	0	3
2.	21BSS02	Physics and Chemistry Laboratory	BS	2	0	0	2	1
3.	21BSS03	Bio and Nano materials Sciences	BS	3	3	0	0	3
4.	21BSS04	Material Sciences	BS	3	3	0	0	3
5.	21BSS05	Physics for Mechanical Engineers	BS	3	3	0	0	3
6.	21BSS11	Engineering Chemistry	BS	3	3	0	0	3
7.	21BSS12	Environmental Science and Engineering	BS	3	3	0	0	3
8.	21BSS13	Applied Chemistry	BS	3	3	0	0	3
9.	21BSS21	Algebra and Calculus	BS	4	3	1	0	4

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10.	21BSS22	Advanced Calculus And Complex Analysis	BS	4	3	1	0	4
11.	21BSS23	Transform and Partial Differential Equations	BS	4	3	1	0	4
12.	21BSS24	Discrete Mathematics	BS	4	3	1	0	4
13.	21BSS25	Statistical and Queuing Model	BS	4	3	1	0	4
14.	21BSS26	Numerical Methods	BS	4	3	1	0	4
15.	21BSS27	Probability and Random Processes	BS	4	3	1	0	4
16.	21BSS28	Statistic and Numerical Methods	BS	4	3	1	0	4

3. General Engineering Science Courses (GES)

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

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21	21GES21	Electrical Drives and Control	GES	3	3	0	0	3
22	21GES22	Electrical Drives and Control Laboratory	GES	2	0	0	2	1
23	21GES23	Analog and Digital communication	GES	3	3	0	0	3
24	21GES24	Digital Principles and System Design	GES	3	3	0	0	3
25	21GES25	Digital Principles and System Design Laboratory	GES	2	0	0	2	1
26	21GES26	Engineering Drawing	GES	5	1	0	4	3
27	21GES27	Engineering Geology	GES	3	3	0	0	3
28	21GES28	Engineering Mechanics	GES	4	3	1	0	4
29	21GES29	Wireless Communication	GES	4	3	1	0	4
30	21GES30	Electronics and Microprocessor	GES	3	3	0	0	3
31	21GES31	Electronics and Microprocessor Laboratory	GES	2	0	0	2	1
32	21GES32	Data Structures using Python	GES	3	3	0	0	3
33	21GES33	Electronic Devices And Circuits	GES	3	3	0	0	3
34	21GES34	Electronic Simulation Laboratory	GES	2	0	0	2	1

4. Professional Core (PC)

Sl. No.	Course Code	Course Title	Category	Contact Hours	Instruction Hours/ Week			C
					L	T	P	
1.	21ITC01	Data Structures	PCC	3	3	0	0	3
2.	21ITC02	Data Structures in C++ Laboratory	PCC	2	0	0	2	1
3.	21ITC03	Database Management Systems	PCC	3	3	0	0	3
4.	21ITC04	Database Management Systems Laboratory	PCC	2	0	0	2	1
5.	21ITC05	Software Engineering	PCC	3	3	0	0	3
6.	21ITC06	Computer Organization and Architecture	PCC	3	3	0	0	3
7.	21ITC07	Object Oriented Programming in JAVA	PCC	3	3	0	0	3
8.	21ITC08	Object Oriented Programming in JAVA Laboratory	PCC	2	0	0	2	1
9.	21ITC09	Operating Systems	PCC	3	3	0	0	3
10.	21ITC10	Operating Systems Laboratory	PCC	2	0	0	2	1
11.	21ITC11	Design and Analysis of Algorithms	PCC	4	3	1	0	4
12.	21ITC12	Block chain Technology	PCC	3	3	0	0	3
13.	21ITC13	Mobile Communication	PCC	3	3	0	0	3
14.	21ITC14	Mobile Application Laboratory	PCC	2	0	0	2	1

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15.	21ITC15	Internet of Things	PCC	3	3	0	0	3
16.	21ITC16	Internet of Things Laboratory	PCC	2	0	0	2	1
17.	21ITC17	Artificial Intelligence	PCC	4	3	1	0	4
18.	21ITC18	Principles of Compiler Design	PCC	3	3	0	0	3
19.	21ITC19	Cloud Computing	PCC	3	3	0	0	3
20.	21ITC20	Cloud Computing Laboratory	PCC	2	0	0	2	1
21.	21ITC21	Data warehousing and Data Mining	PCC	3	3	0	0	3
22.	21ITC22	Information security and Management	PCC	3	3	0	0	3
23.	21ITC23	Computer Networks	PCC	3	3	0	0	3
24.	21ITC24	Web Technology	PCC	3	3	0	0	3
25.	21ITC25	Web Technology Laboratory	PCC	0	0	2	1	2
26.	21ITC26	Data Science And Data Analytics	PCC	3	3	0	0	3
27.	21ITC27	Data Analytics Lab	PCC	3	3	0	0	3
28.	21ITC28	Web Development Using Angular And Bootstrap	PCC	3	3	0	0	3
29.	21ITC29	Advanced Web Development Lab	PCC	2	0	0	2	1

5.Professional Elective Courses (PEC)

Sl. No.	Course Code	Course Title	Category	Contact Hours	Instruction Hours/ Week			C
					L	T	P	
1.	21ITE01	C# and .Net Framework	PEC	3	3	0	0	3
2.	21ITE02	Software Project Management	PEC	3	3	0	0	3
3.	21ITE03	Sales force CRM and Platform	PEC	3	3	0	0	3
4.	21ITE04	Sales force CRM and Platform Laboratory	PEC	2	0	0	2	1
5.	21ITE05	AWS Academy Cloud Developing	PEC	3	3	0	0	3
6.	21ITE06	AWS Academy Cloud Developing Lab	PEC	2	0	0	2	1
7.	21ITE07	AWS Academy Cloud Architecting	PEC	3	3	0	0	3
8.	21ITE08	AWS Academy Cloud Architecting Lab	PEC	2	0	0	2	1
9.	21ITE09	AWS Academy Cloud Foundation	PEC	2	0	0	2	1
10.	21ITE10	AWS Academy Cloud Foundation Lab	PEC	2	0	0	2	1
11.	21ITE11	Semantic Web	PEC	3	3	0	0	3
12.	21ITE12	Network Programming and Management	PEC	3	3	0	0	3
13.	21ITE13	Business Intelligence	PEC	3	3	0	0	3

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14.	21ITE14	Wireless Sensor Networks	PEC	3	3	0	0	3
15.	21ITE15	Information Retrieval Techniques	PEC	3	3	0	0	3
16.	21ITE16	Service Oriented Architecture	PEC	3	3	0	0	3
17	21ITE17	Agile Technology	PEC	3	3	0	0	3
18	21ITE18	Social Network Analysis	PEC	3	3	0	0	3
19	21ITE19	Game Programming	PEC	3	3	0	0	3
20	21ITE20	Natural Language Processing	PEC	3	3	0	0	3
21	21ITE21	Big data Analytics	PEC	3	3	0	0	3
22	21ITE22	Ad hoc and Sensor Networks	PEC	3	3	0	0	3
23	21ITE23	Management Information System	PEC	3	3	0	0	3
24	21ITE24	Software Quality Assurance	PEC	3	3	0	0	3
25	21ITE25	Bioinformatics	PEC	3	3	0	0	3
26	21ITE26	Docker and Kubernetes	PEC	3	3	0	0	3
27	21ITE27	Open Stack Essentials	PEC	3	3	0	0	3
28	21ITE28	User Centric Design	PEC	3	3	0	0	3
29	21ITE29	Software Testing	PEC	3	3	0	0	3
30	21ITE30	Ethical Hacking and Cyber Security	PEC	3	3	0	0	3
31	21ITE31	Soft computing	PEC	3	3	0	0	3
32	21ITE32	Real Time Systems	PEC	3	3	0	0	3
33	21ITE33	Machine Learning	PEC	3	3	0	0	3
34	21ITE34	High Speed Networks	PEC	3	3	0	0	3
35	21ITE35	Angular JS	PEC	3	3	0	0	3
36	21ITE36	Angular JS Laboratory	PEC	2	0	0	2	1
37	21ITE37	Digital And Social Media Marketing	PEC	3	3	0	0	3
38	21ITE38	Full Stack Development	PEC	3	3	0	0	3

6. EMPLOYABILITY ENHANCEMENT COURSES (EEC)

Sl. No.	Course Code	Course Title	Category	Contact Hours	Instruction Hours/ Week			C
					L	T	P	
1.	21ITP01	Project Work Phase I	EEC	10	0	0	10	5
2.	21ITP02	Project Work Phase II	EEC	20	0	0	20	10
3.	21ITP03	Comprehension	EEC	2	0	0	2	1
4.	21ITP04	Technical Seminar	EEC	4	0	4	0	2

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5.	21ITP05	Entrepreneurship Development	EEC	3	3	0	0	3
6.	21ITP06	Professional Practices	EEC	6	0	0	6	3
7.	21ITM01	NPTEL- Introduction to Industry 4.0 and Industrial Internet of Things	Mandatory Course	-	-	-	-	-
8.	21ITM02	NPTEL- Introduction to Machine Learning	Mandatory Course	-	-	-	-	-
9.	21ITM03	NPTEL- The Joy of Computing using Python	Mandatory Course	-	-	-	-	-
10.	21ITM04	NPTEL-Data Analytics with Python	Mandatory Course	-	-	-	-	-
11.	21ITA01	Indian Constitution	Audit Course	-	-	-	-	-
12.	21ITA02	Value Education	Audit Course	-	-	-	-	-
13.	21ITA03	Disaster Management	Audit Course	-	-	-	-	-
14.	21ITA04	Pedagogy Studies	Audit Course	-	-	-	-	-
15.	21ITA05	Stress Management by Yoga	Audit Course	-	-	-	-	-

7. OPEN ELECTIVE COURSES (OEC)

Sl. No.	Course Code	Course Title	Category	Contact Hours	Instruction Hours/ Week			C
					L	T	P	
1.	21MEE07	Industrial Robotics	OEC	3	3	0	0	3
2.	21MEE18	Power Plant Engineering	OEC	3	3	0	0	3
3.	21MEC26	Total Quality Management	OEC	3	3	0	0	3
4.	21ECE06	Telecommunication Switching Networks	OEC	3	3	0	0	3
5.	21ECE08	Mobile Ad-Hoc Networks	OEC	3	3	0	0	3
6.	21PCED11	Water Supply Engineering	OEC	3	3	0	0	3
7.	21PEEE05	Health Monitoring of Structures	OEC	3	3	0	0	3

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SEMESTER – I

Sl. No.	Course Code	Course Name	Category	Hours/ Week			Credit	Contact Hours
				L	T	P	C	
THEORY								
1.	21HSS01	Business English	HS	2	0	0	2	2
2.	21BSS21	Algebra and Calculus	BS	3	1	0	4	4
3.	21BSS01	Engineering Physics	BS	3	0	0	3	3
4.	21BSS11	Engineering Chemistry	BS	3	0	0	3	3
5.	21GES01	Programming for Problem Solving Using C	GES	3	0	0	3	3
6.	21GES06	Mechanical and Building Sciences	GES	3	0	0	3	3
PRACTICALS								
7.	21BSS02	Physics and Chemistry Laboratory	BS	0	0	2	1	2
8.	21GES03	Programming in C Laboratory	GES	0	0	2	1	2
9.	21HSS02	English Communicative Skills Laboratory	HS	0	0	2	1	2
			Total Credits				**21**	

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SEMESTER – II

Sl. No.	Course Code	Course Name	Category	Hours/ Week			Credit	Contact Hours
				L	T	P	C	
THEORY								
1.	21HSS03	Life Skill and Work Place Pyschology	HS	2	0	0	2	2
2.	21BSS22	Differential Equations and Vector Analysis	BS	3	1	0	4	4
3.	21BSS03	Bio and Nano materials Sciences	BS	3	0	0	3	3
4.	21BSS12	Environmental Science and Engineering	BS	3	0	0	3	3
5.	21GES19	Concepts in Product Design	GES	3	0	0	3	3
6.	21GES08	Python Programming	GES	3	0	0	3	3
PRACTICALS								
7.	21GES10	Soft Skills Lab	GES	0	0	2	1	2
8.	21GES09	Programming in Python Lab	GES	0	0	2	1	2
			Total Credits				**20**	

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SEMESTER – III

Sl. No.	Course Code	Course Name	Category	Hours/ Week L	T	P	Credit C	Contact Hours
THEORY								
1.	21BSS24	Discrete Mathematics	BS	3	1	0	4	4
2.	21GES24	Digital Principles and System Design	GES	3	0	0	3	3
3.	21ITC01	Data Structures	PCC	3	0	0	3	3
4.	21ITC03	Database Management Systems	PCC	3	0	0	3	3
5.	21ITC05	Software Engineering	PCC	3	0	0	3	3
6.	21ITC06	Computer Organization and Architecture	PCC	3	0	0	3	3
PRACTICALS								
7.	21ITC02	Data Structures Laboratory Using C++	PCC	0	0	2	1	2
8.	21ITC04	Database Management Systems Laboratory	PCC	0	0	2	1	2
9.	21GES25	Digital Principles and System Design Laboratory	GES	0	0	2	1	2
			Total Credits				**22**	

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SEMESTER – IV

Sl. No.	Course Code	Course Name	Category	Hours/ Week L	T	P	Credit C	Contact Hours
THEORY								
1.	21ITC23	Computer Networks	PCC	3	0	0	3	3
2.	21ITC24	Web Technology	PCC	3	0	0	3	3
3.	21BSS27	Probability & Random Processes	BS	3	1	0	4	4
4.	21ITC07	Object Oriented Programming in JAVA	PCC	3	0	0	3	3
5.	21ITC09	Operating Systems	PCC	3	0	0	3	3
6.	21ITC11	Design and Analysis of Algorithms	PCC	3	1	0	4	4
PRACTICALS								
7.	21ITC08	Object Oriented Programming Laboratory Using JAVA	PCC	0	0	2	1	2
8.	21ITC10	Operating Systems Laboratory	PCC	0	0	2	1	2
9.	21ITC25	Web Technology Laboratory	PCC	0	0	2	1	2
			Total Credits				**23**	

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SEMESTER – V

Sl. No.	Course Code	Course Name	Category	Hours/ Week			Credit	Contact Hours
				L	T	P	C	
THEORY								
1.	21ITC18	Principles of Compiler Design	PCC	3	0	0	3	3
2.	21ITE09	AWS Academy Cloud Foundation	PEC	3	0	0	3	3
3.	21ITE48	Full Stack Development	PEC	3	0	0	3	3
4.	21ITC17	Artificial Intelligence	PCC	3	0	0	3	4
5.	21ITE03	Elective I – Salesforce CRM and Platform	PEC	3	0	0	3	3
6.	21ITC28	Web Development Using Angular And Bootstrap	PCC	3	0	0	3	3
PRACTICALS								
7.	21ITC29	Advanced Web Development Lab	PCC	0	0	2	1	2
8.	21ITE10	AWS Academy Cloud Foundation Lab	PEC	0	0	2	1	2
9.	21ITE04	Elective I – Salesforce CRM and Platform Laboratory	PEC	0	0	2	1	2
			Total Credits				**21**	

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SEMESTER – VI

Sl. No.	Course Code	Course Name	Category	Hours/ Week			Credit	Contact Hours
				L	T	P	C	
THEORY								
1.	21ITC13	Mobile Communication	PCC	3	0	0	3	3
2.	21ITC15	Internet of Things	PCC	3	0	0	3	3
3.	21ITC21	Data Warehousing and Data Mining	PCC	3	0	0	3	3
4.	21ITE26	Elective III-Docker and Kubernetes	PEC	3	0	0	3	3
5.	21ITC26	Data Science And Data Analytics	PCC	3	0	0	3	3
6.	21MEE07	Open Elective I-Industrial Robotics	OEC	3	0	0	3	3
PRACTICALS								
7.	21ITC14	Mobile Application Laboratory	PCC	0	0	2	1	2
8.	21ITC16	Internet of Things Laboratory	PCC	0	0	2	1	2
9.	21ITC27	Data Analytics Laboratory	PCC	0	0	2	1	2
			Total Credits				**21**	

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Department	Information Technology
Programme	B.Tech. – Information Technology

SEMESTER – VII

Sl. No.	Course Code	Course Name	Category	Hours/ Week			Credit	Contact Hours
				L	T	P	C	
THEORY								
1.	21ITC12	Block chain Technology	PCC	3	0	0	3	3
2.	21ITC22	Information security and Management	PCC	3	0	0	3	3
3.	21ITE37	Digital And Social Media Marketing	PEC	3	0	0	3	3
4.	21ITE33	Elective V-Machine Learning	PEC	3	0	0	3	3
5.	21MEE18	Open Elective II-Power Plant Engineering	OEC	3	0	0	3	3
6.	21MEC26	Open Elective III-Total Quality Management	OEC	3	0	0	3	3
PRACTICALS								
7.	21ITP01	Project work – Phase I	ECC	0	0	10	5	10
			Total Credits				**23**	

MUTHAYAMMAL ENGINEERING COLLEGE

(An Autonomous Institution)

(Approved by AICTE, New Delhi, Accredited by NAAC & Affiliated to Anna University)

Rasipuram - 637 408, Namakkal Dist., Tamil Nadu

Estd.2000

CURRICULUM UG R – 2021

Department	Information Technology
Programme	B.Tech. – Information Technology

SEMESTER – VIII

Sl. No.	Course Code	Course Name	Category	Hours/ Week			Credit	Contact Hours
				L	T	P	C	
THEORY								
1.		Non Credit Course I						
PRACTICALS								
2.	21ITP02	Project Work II	EEC	0	0	20	10	20
			Total Credits				**10**	

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COURSE COMPONENT SUMMARY

S. No.	Subject Area	Credits Per Semester								Credits Total	AICTE Credits
		I	II	III	IV	V	VI	VII	VIII		
1	HS	3	2	-	-	-	-	-	-	**05**	**09**
2	BS	11	10	4	4	-	-	-	-	**29**	**24**
3	GES	7	8	4	-	-	-	-	-	**19**	**27**
4	PCC	-	-	14	19	10	15	6	-	**64**	**58**
5	PEC			-	-	11	3	6	-	**20**	**18**
6	OEC			-	-	-	3	6	-	**09**	**09**
7	PROJ			-	-	-	-	5	10	**15**	**15**
TOTAL		**21**	**20**	**22**	**23**	**21**	**21**	**23**	**10**	**161**	**160**

Total Credits: 161

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21ITC01 **DATA STRUCTURES**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

1. To understand the basic structure concept such as Abstract Data Types, Linear and Non Linear Data structures.
2. To understand the behavior of data structures such as stacks, queues, trees, hash tables, search trees, Graph and their representations.
3. To choose the appropriate data structure for a specified application
4. To solve problems using data structures such as array, linked lists, queues, trees graphs, hash tables, search trees.
5. To understand and analyze various searching and sorting algorithms.

COURSE OUTCOMES:

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

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												PSOs		
	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
21ITC01.CO2	x	x	X	x	-	-	-	-	-	-	x	x	x	x	X
21ITC01.CO3	x	x	X	x	-	-	-	-	-	-	x	x	x	x	X
21ITC01.CO4	x	x	X	x	-	-	-	-	-	-	x	x	x	x	X
21ITC01.CO5	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

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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: 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

Web Sites Link Reference:

1. www.tutorialspoint.com/data_structures_algorithms/
2. www.nptel.ac.in/courses/106102064/1
3. www.wiziq.com/tutorials/data-structure
4. www.freevideolectures.com/Subject/Data-Structures
5. www.studytonight.com/data-structures/introduction-to-data-structures

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21ITC02 **DATA STRUCTURES LABORATRORY**

L	T	P	C
0	0	2	1

COURSE OBJECTIVES:

1. To understand the basic structure concept such as Abstract Data Types, Linear and Non Linear Data structures.
2. To understand the behavior of data structures such as stacks, queues, trees, hash tables, search trees, Graph and their representations.
3. To choose the appropriate data structure for a specified application
4. To solve problems using data structures such as array, linked lists, queues, trees graphs, hash tables, search trees.
5. To understand and analyze various searching and sorting algorithms.

COURSE OUTCOMES:

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

21ITC02.CO1 Ability to identify the appropriate data structure for given problem.
21ITC02.CO2 Able to solve the problems using stack and queues.
21ITC02.CO3 Able to implement the application of Tree data structure.
21ITC02.CO4 Able to understand the application of Graph and hashing techniques.
21ITC02.CO5 Ability to solve the problems using various searching and sorting techniques

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITC02.CO1	x	x	X	x	-	-	-	-	-	-	x	x	x	x	X
21ITC02.CO2	x	x	X	x	-	-	-	-	-	-	x	x	x	x	X
21ITC02.CO3	x	x	X	x	-	-	-	-	-	-	x	x	x	x	X
21ITC02.CO4	x	x	X	x	-	-	-	-	-	-	x	x	x	x	X
21ITC02.CO5	x	x	X	x	-	-	-	-	-	-	x	x	x	x	X

S.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 QueueSort.
12. Implement a program to MergeSort.
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.

21ITC03 **DATABASE MANAGEMENT SYSTEMS**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

1. Analyze database requirements and determine the entities involved in the system and their relationships.
2. Formulate solutions to a broad range of query and data update problems using SQL.

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3. Understand the basic issues of transaction processing and concurrency control.
4. Explain and implement the fundamental concepts of a relational database system.
5. Understand the database security and access techniques

COURSE OUTCOMES:

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

21ITC03.CO1 Design ER diagrams for new databases and apply for database applications.
21ITC03.CO2 Implement a database schema for a given problem-domain.
21ITC03.CO3 Normalize a database with non-loss decomposition.
21ITC03.CO4 Apply concurrency control techniques for database transactions.
21ITC03.CO5 Implement different database access techniques

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITC03.CO1	x	x	X	x	-	-	-	-	-	-	x	x	x	x	X
21ITC03.CO2	x	x	X	x	-	-	-	-	-	-	x	x	x	x	X
21ITC03.CO3	x	x	X	x	-	-	-	-	-	-	x	x	x	x	X
21ITC03.CO4	x	x	X	x	-	-	-	-	-	-	x	x	x	x	X
21ITC03.CO5	x	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: 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

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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 Management Systems	Pearson Education	2013
4.	G.K.Gupta	Database Management Systems	Tata McGraw Hill	2011
5.	Rob Cornell	Database Systems Design and	Cengage Learning	2011

Web Sites Link Reference:

1. www.w3schools.in/dbms/l
2. www.tutorialspoint.com/sql/sql_tutorial.pdf
3. tutorialink.com/dbms/introduction-to-transaction-concepts.dbms
4. https://www.cse.iitb.ac.in/~sudarsha/db-book/slide-dir/ch12.pdf
5. www.edutechlearners.com/advance-database-management-system-notes/

21ITC04 DATABASE MANAGEMENT SYSTEMS LABORATORY

L	T	P	C
0	0	2	1

COURSE OBJECTIVES:

1. To understand the basic structure concept such as Abstract Data Types, Linear and Non Linear Data structures.
2. To understand the behavior of data structures such as stacks, queues, trees, hash tables, search trees, Graph and their representations.
3. To choose the appropriate data structure for a specified application
4. To solve problems using data structures such as array, linked lists, queues, trees graphs, hash tables, search trees.
5. To understand and analyze various searching and sorting algorithms.

COURSE OUTCOMES:

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

21ITC04.CO1 Ability to identify the appropriate data structure for given problem.
21ITC04.CO2 Able to solve the problems using stack and queues.
21ITC04.CO3 Able to implement the application of Tree data structure.
21ITC04.CO4 Able to understand the application of Graph and hashing techniques.
21ITC04.CO5 Ability to solve the problems using various searching and sorting techniques

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Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITC04.CO1	x	x	X	x	-	-	-	-	-	-	x	x	x	x	X
21ITC04.CO2	x	x	X	x	-	-	-	-	-	-	x	x	x	x	X
21ITC04.CO3	x	x	X	x	-	-	-	-	-	-	x	x	x	x	X
21ITC04.CO4	x	x	X	x	-	-	-	-	-	-	x	x	x	x	X
21ITC04.CO5	x	x	X	x	-	-	-	-	-	-	x	x	x	x	X

S.No LIST OF EXPERIMENTS

1. Data Definition Language commands in RDBMS
2. Data Manipulation Language and Data control Language commands
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. Design and Implementation of Banking System
10. Design and Implementation of Student Information System
11. Design and Implementation of Payroll Processing System

21ITC05 SOFTWARE ENGINEERING

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

1. Understand the phases in a software project
2. Understand fundamental concepts of requirements engineering and Analysis Modelling.
3. Understand the major considerations for enterprise integration and deployment.
4. Learn various testing and maintenance measures
5. Apply different techniques to measure software performance

COURSE OUTCOMES:

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

21ITC05.CO1 Identify the key activities in managing a software project.
21ITC05.CO2 Compare different process models.
21ITC05.CO3 Concepts of requirements engineering and Analysis Modeling.
21ITC05.CO4 Apply systematic procedure for software design and deployment.
21ITC05.CO5 Compare and contrast the various testing and maintenance

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITC05.CO1	x	x	X	x	-	-	-	-	-	-	x	x	x	x	X
21ITC05.CO2	x	x	X	x	-	-	-	-	-	-	x	x	x	x	X
21ITC05.CO3	x	x	X	x	-	-	-	-	-	-	x	x	x	x	X
21ITC05.CO4	x	x	X	x	-	-	-	-	-	-	x	x	x	x	X
21ITC05.CO5	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 – Software Project Management: Estimation – LOC and FP Based Estimation, COCOMO Model – Project Scheduling – Scheduling, Earned Value Analysis - Risk Management

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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 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: 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	Mc Graw-Hill International Edition	2010
2.	Ian Sommerville	Software Engineering	Pearson Education Asia	2011

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Rajib Mall	Fundamentals of Software Engineering	PHI Learning Private Limited,	2009
2.	Pankaj Jalote	Software Engineering- A Precise Approach	Wiley India	2010

21ITC06 COMPUTER ORGANIZATION AND ARCHITECTURE

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

21ITC06.CO1 Analyze the abstraction of various components of a computer.
21ITC06.CO2 Design arithmetic and logical unit.
21ITC06.CO3 Analyze pipelined control units.

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21ITC06.CO4 Evaluate the performance of memory systems.
21ITC06.CO5 Understanding the I/O devices and interfaces

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITC06.CO1	x	x	X	x	-	-	-	-	-	-	x	x	x	x	x
21ITC06.CO2	x	x	X	x	-	-	-	-	-	-	x	x	x	x	x
21ITC06.CO3	x	x	X	x	-	-	-	-	-	-	x	x	x	x	x
21ITC06.CO4	x	x	X	x	-	-	-	-	-	-	x	x	x	x	x
21ITC06.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: Su bword 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- Virtual Memory-Secondary storage-Redundant Arrays of Inexpensive Disks-Implementing Cache Controllers

UNIT V INPUT&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: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	David A. Patterson and John L.Hennessey	Computer Organization and design	Morgan auffman / Isevier	2014
2.	Smruti Ranjan Sarangi	Computer Organization and Architecture	Tata McGraw Hill	2015

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	V.Carl Hamacher, Zvonko G. Varanesic and Safat G. Zaky	Computer Organisation	McGraw-Hill Inc	2012
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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4.	Carl Hamacher, Zvonko Vranesic, Safwat Zaky, and Naraig Manjikian	Computer Organization and Embedded Systems	McGraw Hill Higher Education	2011
5.	John P. Hayes	Computer Architecture and Organization	Tata McGraw Hill	2014

Web Sites Link Reference:

1. www.ics.p.lodz.pl/~dpuchala/CompArch/Lecture_6.pdf
2. www.dauniv.ac.in/downloads/CArch_PPTs/
3. www.nptel.ac.in/Computer organization
4. www.cse.iitk.ac.in/users/karkare/courses/2011/cs220/html/notes.html
5. www.freevideolectures.com/Course/2277/Computer-Organization

21ITC07 OBJECT ORIENTED PROGRAMMING IN JAVA

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

21ITC07.CO1 Apply object oriented programming constructs to solve programming problems..
21ITC07.CO2 Design solutions to the problems by using control statements, interfaces, utility classes and Packages
21ITC07.CO3 Solve real time problems using object oriented programming features polymorphism, inheritance, exception handling and multithreading
21ITC07.CO4 Apply multithreading mechanism to enhance the performance of a system
21ITC07.CO5 Develop user interfaces using GUI programming techniques.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITC07.CO1	x	X	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC07.CO2	x	X	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC07.CO3	x	X	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC07.CO4	x	X	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC07.CO5	x	X	x	x	-	-	-	-	-	-	x	x	x	x	x

UNIT I INTRODUCTION 9

Introduction to Object Oriented Programming, Java Buzzwords, Java Environment, Java Components, Programming Paradigms, Naming Conventions.

Classes and Objects: Introduction to classes, objects, Constructors, Garbage Collection, this keyword, Access Control, Features of Object Oriented Programming.

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UNIT II DATA TYPES, CONTROL STATEMENTS, POLYMORPHISM 9

Data Types, Variables, Type Conversions (Boxing and Unboxing/Wrapping and Unwrapping) and Casting, Arrays, Operators, Decision Making Statements, Looping Statements, Methods, Recursion, Method Overloading, Constructor Overloading, Parameter Passing, String Class, Final Keyword.

Utility Classes: String Tokenizer, Scanner, Random, Bit Set.

UNIT III INHERITANCE, PACKAGES, INTERFACES 9

Inheritance: Introduction, Classification, Abstract Classes, Final keyword with Inheritance.

Packages: Basics, Creating and Accessing a package, CLASSPATH, Importing packages.

Lambda Package: Lambda Expression Fundamentals, Functional Interfaces, Block Lambda Expressions, Generic Functional Interfaces, Passing Lambda Expression as Arguments.

Interfaces: Definition, Implementing Interfaces, Extending Interfaces, Nested Interfaces,Applying Interfaces, Variables in Interfaces.

UNIT IV EXCEPTION HANDLING, MULTITHREADING, COLLECTION FRAMEWORK 9

Exception Handling: Exception, Types of Exception, Keywords: try, catch, throw, throws and finally, Built-in Exceptions, User Defined Exceptions.

Multithreading: Process, Thread, Thread Model, Creating a thread, Priorities, Thread Synchronization, Inter-thread Communication.

Collection Framework: Framework Hierarchy, ArrayList, LinkedList, HashSet.

UNIT V SWINGS, EVENT HANDLING 9

Swings: Introduction, Features, Hierarchy, Swing GUI Components, Packages in Swings, Swing Control Classes and Methods.

Event Handling: Event Classes, Event Listener Interfaces - Mouse and Key, Adapter Classes.

TOTAL: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Herbert Schildt	Java the Complete Reference, 9th edition	Oracle Press	2014
2.	Sachin Malhotra and Saurab Choudhary	Programming in Java, 2nd Edition ,	Oxford University press	2014

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Y. Daniel Liang	Introduction to Java Programming	Pearson Education	2012
2.	T. Budd	Understanding Object-Oriented Programming with Java	Pearson Education	2010
3.	Cay S. Horstmann and Gary Cornell	Core Java: Volume I – Fundamentals	Sun Microsystems Press	2008

Web Sites Link Reference:

1. https://docs.oracle.com/javase/tutorial/index.html
2. www.java2s.com/Tutorial/Java/CatalogJava.html

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21ITC08 OBJECT ORIENTED PROGRAMMING IN JAVA LABORATORY

L	T	P	C
0	0	2	1

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

21ITC08.CO1	Apply syntactic constructs of JAVA to solve logic based problems
21ITC08.CO2	Develop application programs using object oriented programming features
21ITC08.CO3	Solve real time problems using interfaces, packages, Exception Handling, Collection framework and Multithreading
21ITC08.CO4	Develop GUI Applications using Swings, Event handling mechanisms.
21ITC08.CO5	Work independently and in team to solve problems with effective communication.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITC08.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC08.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC08.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC08.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC08.CO5	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x

S.No LIST OF EXPERIMENTS

COMMAND-LINE ARGUMENTS:

1. 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.

RECURSIVE FUNCTIONS AND OVERLOADING:

2. 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.

DATA TYPES (ARRAYS AND STRINGS):

3. 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.

SCANNER AND ABSTRACT CLASSES:

4. 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 number Of Sides( ) that shows the number of sides in the given geometrical figures.

5. PACKAGES AND INTERFACES:

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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 greater than 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 - Welcome for 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 —Bookl 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 on at 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 of the window when mouse event is fired (Use Adapter classes).

21ITC09 **OPERATING SYSTEMS**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

1. To understand the basic concepts Operating System.
2. To understand the fundamental Operating System abstractions such as processes, process scheduling
3. To understand the principles of concurrency and synchronization, and apply them to write concurrent programs/software
4. To Implement basic resource management
5. To describe the types of I/O management, disk scheduling, disk management and swap space management

COURSE OUTCOMES:

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

21ITC09.CO1	Explain structures of Operating System.
21ITC09.CO2	Apply fundamental Operating System abstractions such as processes, process scheduling, Semaphores, IPC abstractions, shared memory regions, deadlock and threads.
21ITC09.CO3	Explain the principles of concurrency and synchronization and apply them to write concurrent programs/software.
21ITC09.CO4	Implement basic resource management techniques (scheduling or time management, space

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management) and principles.

21ITC09.CO5 Describe the types of I/O management, disk scheduling, disk management and swap space management

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITC09.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC09.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC09.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC09.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC09.CO5	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x

UNIT I INTRODUCTION 9

Introduction – What Operating System Do – Operating System Structure – Operating system Operations – Operating System Components: Process Management – Memory Management – Storage Management – I/O Management – Network Management - Protection and Security.

Classes of Operating Systems: Mainframe Systems – Single Processor System - Multiprocessor Systems - Desktop Systems — Distributed Systems – Clustered Systems – Real-Time Systems – Handheld Systems - Open Source Operating Systems.

Operating System Structures: Operating System Services – User and Operating System Interface – System Calls– Types of System Calls.

UNIT II PROCESS MANAGEMENT AND THREADING 9

Processes: Process concept – Process scheduling – Operation on Processes - Inter-process Communication: Shared Memory Systems - Message Passing Systems.

Process Scheduling: Basic Concepts – Scheduling Criteria – Scheduling Algorithms: First-Come, First-Served – Priority – Round-Robin – Multilevel Queue – Multilevel Feedback Queue.

Threads: Overview – Multithreading models - Threading issues.

UNIT III PROCESS SYNCHRONIZATIONAND DEADLOCKS 9

Process Synchronization: Background - The critical-section problem (Software based solution and hardware based solution) – Semaphores – Classic Problems of Synchronization – Monitors.

Deadlocks: System model - Deadlock Characterization – Methods for Handling Deadlocks -Deadlock Prevention – Deadlock Avoidance – Deadlock Detection – Recovery from Deadlocks.

UNIT IV MEMORY MANAGEMENT 9

Management Strategies: Background – Swapping – Memory allocation: Contiguous Memory Allocation –Non-Contiguous Memory Allocation: Segmentation - Paging – Segmentation with Paging - Structure of the Page Table.

Virtual Memory: Background - Demand Paging – Page Replacement – Allocation of Frames – Thrashing.

UNIT V FILE SYSTEM AND STORAGE MANGEMENT 9

System Interface: File Concept – Access Methods – Directory and Disk Structure – Protection.

File System Implementation: File System Structure – File System Implementation – Directory Implementation - Allocation Methods – Free Space Management.

Mass Storage Structure: Overview of Mass Storage Structure – Disk Structure - Disk Scheduling – Disk Management - Swap Space Management.

Case Study: Windows, Linux and Android operating Systems

TOTAL: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Abraham Silberschatz, Peter Baer Galvin and Greg Gagne,	Operating System Concepts	John Wiley & Sons (ASIA) Pvt. Ltd,	2015

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2.	Harvey M. Deitel	Operating Systems	Pearson Education,	2007

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Andrew S. Tanenbaum	Modern Operating Systems	Prentice Hall of India,	2009
2.	William Stallings	Operating Systems: Internals and Design Principles	Prentice Hall of India	2009
3.	D M Dhamdhere	Operating Systems: A Concept-Based Approach	Tata Mc-graw Hill Publishing	2012
4.	Charles Crowley	Operating System: A Design-Oriented Approach	Tata Mc-graw Hill Publishing,	2009
5.	Evi Nemeth , Garth Snyder, Trent R. Hein , Ben Whaley , Dan Mackin	UNIX and Linux System Administration Handbook	Prentice Hall of India,	2010

Web Sites Link Reference:

1. www.onlinecourses.nptel.ac.in/noc16_cs10
2. www.udacity.com/course/introduction-to-operating-systems--ud923
3. www.cs140.stanford.edu/
4. www.ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-828-operating- system-engineering-fall-2012/
5. www.tutorialspoint.com/operating_system

21ITC10 OPERATING SYSTEMS LABORATORY

L	T	P	C
0	0	2	1

COURSE OBJECTIVES:

1. To understand the basic concepts Operating System.
2. To understand the fundamental Operating System abstractions such as processes, process scheduling
3. To understand the principles of concurrency and synchronization, and apply them to write concurrent programs/software
4. To Implement basic resource management
5. To describe the types of I/O management, disk scheduling, disk management and swap space management

COURSE OUTCOMES:

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

21ITC10.CO1 Explain structures of Operating System.

21ITC10.CO2 Apply fundamental Operating System abstractions such as processes, process scheduling, Semaphores, IPC abstractions, shared memory regions, deadlock and threads.

21ITC10.CO3 Explain the principles of concurrency and synchronization and apply them to write concurrent programs/software.

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21ITC10.CO4 Implement basic resource management techniques (scheduling or time management, space management) and principles.

21ITC10.CO5 Describe the types of I/O management, disk scheduling, disk management and swap space management

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITC10.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC10.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC10.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC10.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC10.CO5	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x

S.No LIST OF EXPERIMENTS

1. File exploring basic commands under Linux Operating systems
2. Program using Shell scripts.
3. Basic process management algorithms.
4. Process synchronization algorithms.
5. Implementing various memory allocation methods.
6. Implementing paging and segmentation.
7. Implementing various page replacement policies.
8. Implementation of file system calls.
9. Implementation of Pattern matching.
10. Implementation of disk scheduling algorithms

21ITC11 DESIGN AND ANALYSIS OF ALGORITHMS

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

1. To learn how to develop efficient algorithms for simple computational tasks.
2. To learn reasoning and correctness of algorithms.
3. To learn the complexity measures, different range of behaviors of algorithms and the notion of tractable and intractable problems will be understood.
4. To design the algorithms for real time problems.
5. To solve the problems by using different types of algorithms techniques

COURSE OUTCOMES:

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

21ITC11.CO1 Design algorithms for various computing problems.

21ITC11.CO2 Analyze the time and space complexity of algorithms.

21ITC11.CO3 Critically analyze the different algorithm design techniques for a given problem.

21ITC11.CO4 Modify existing algorithms to improve efficiency

21ITC11.CO5 Solve the real time problems by using backtracking and branch and bound techniques

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITC11.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC11.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC11.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC11.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC11.CO5	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x

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UNIT I INTRODUCTION 9

Notion of an Algorithm – Fundamentals of Algorithmic Problem Solving – Important Problem Types – Fundamentals of the Analysis of Algorithm Efficiency – Analysis Framework – Asymptotic Notations and its properties – Mathematical analysis for Recursive and Non-recursive algorithms

UNIT II BRUTE FORCE AND DIVIDE-AND-CONQUER 9

Brute Force - Closest-Pair and Convex-Hull Problems-Exhaustive Search - Traveling Salesman Problem - Knapsack Problem - Assignment problem. Divide and conquer methodology – Merge sort – Quick sort – Binary search – Multiplication of Large Integers – Strassen's Matrix Multiplication-Closest-Pair and Convex-Hull Problems.

UNIT III DYNAMIC PROGRAMMINGAND GREEDY TECHNIQUE 9

Computing a Binomial Coefficient – Warshall's and Floyd' algorithm – Optimal Binary Search Trees –Knapsack Problem and Memory functions. Greedy Technique– Prim's algorithm- Kruskal's Algorithm-Dijkstra's Algorithm-Huffman Trees.

UNIT IV ITERATIVE IMPROVEMENT AND LIMITATION OF ALGORITHM 9

The Simplex Method-The Maximum-Flow Problem – Maximum Matching in Bipartite Graphs- the Stable marriage Problem. Limitations of Algorithm Power-Lower-Bound Arguments-Decision Trees-P, NP and NP Complete Problems.

UNIT V BACKTRACKING, BRANCH AND BOUND AND APPROXIMATION ALGORITHM 9

Backtracking – n-Queens problem – Hamiltonian Circuit Problem – Subset Sum Problem-Branch and Bound – Assignment problem – Knapsack Problem – Traveling Salesman Problem- Approximation Algorithms for NP – Hard Problems – Traveling Salesman problem – Knapsack problem

TOTAL: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Abraham Silberschatz, Peter Baer Galvin and Greg Gagne,	Operating System Concepts	John Wiley & Sons (ASIA) Pvt. Ltd,	2015
2.	Harvey M. Deitel	Operating Systems	Pearson Education,	2007

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman	Data Structures and Algorithms	Pearson Education, Reprint	2006
2.	Donald E. Knuth,	The Art of Computer Programming	Pearson Education,	2009
3.	A I. Chandra Mohan	Design and Analysis of Algorithms	PHI Learning Pvt. Ltd,	2012
4.	Steven S. Skiena	The Algorithm Design Manual	Springer	2008
5.	Manas Ranjan Kabat	Design And Analysis Of Algorithms	PHI Learning Pvt. Ltd.	2013

Web Sites Link Reference:

1. www.nptel.ac.in/ algorithms

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2. www.tutorialspoint.com/design_and_analysis_of_algorithms/index.htm

3. www.personal.kent.edu/~rmuhamma/Algorithms/algorithm.html

4. www.ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-046j-design-and-analysis-of-algorithms-spring-2015/lecture-videos/

5. www.khanacademy.org/computing/computer-science/algorithm

21ITC12 BLOCKCHAIN TECHNOLOGY

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

1. To study Basic cryptographic primitives and Block chain Technology.
2. To study about Distributed computing basics and the issues related to it.
3. To know about Bitcoin and ethereum crypto- currencies.
4. To learn about Hyper ledger and other advancement in Block chain.
5. To learn about privacy and security issues in Block chain

COURSE OUTCOMES:

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

21ITC12.CO1 Explore Block chain Technology and cryptographic primitives.
21ITC12.CO2 Tell about Distributed Computing and various Cryptographic Techniques.
21ITC12.CO3 Solve Bitcoin and Ethereum puzzles to include blocks into Blockchain.
21ITC12.CO4 Tell about Hyper ledger and its uses.
21ITC12.CO5 Address the privacy and security issues In Block chain Technology

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITC12.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC12.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC12.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC12.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC12.CO5	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x

UNIT I INTRODUCTION 9

Introduction- Distributed systems- Architecture- Need for Distributed Record Keeping- Modeling faults and adversaries- Byzantine Generals problem-Consensus algorithms and their scalability problems- Cryptcurrency-Technologies Borrowed in Blockchain – hash pointers, consensus, byzantine fault-tolerant distributed computing and digital cash

UNIT II DISTRIBUTED COMPUTING AND CRYPTOGRAPHY BASICS 9

Introduction- Distributed Computing- issues in Distributed Computing- Atomic Broadcast, Consensus, Byzantine Models of fault tolerance- Hash functions, Puzzle friendly Hash, Collision resistant hash, digital signatures, public key crypto, verifiable random functions, Zero-knowledge system

UNIT III BITCOIN AND ETHEREUM 9

Bitcoin- blockchain, the challenges, and solutions, proof of work, Proof of stake, alternatives to Bitcoin consensus, Bitcoin scripting language and their use- Ethereum and Smart Contracts, The Turing Completeness of Smart Contract Languages and verification challenges.

UNIT IV HYPERLEDGER 9

Using smart contracts to enforce legal contracts, comparing Bitcoin scripting vs. Ethereum Smart Contracts-Hyperledger fabric, the plug and play platform and mechanisms in permissioned blockchain.

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UNIT V PRIVACY AND SECURITY ISSUES IN BLOCKCHAIN 9

Pseudo-anonymity vs. anonymity, Zcash and Zk-SNARKS for anonymity preservation, attacks on Blockchains – suchas Sybil attacks, selfish mining, 51% attacks - -advent of algorand, and Sharding based consensus algorithms to prevent these

TOTAL: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	S. Shukla, M. Dhawan, S. Sharma, S. Venkatesan	Blockchain Technology: Cryptocurrency and Applications	Oxford University Press	2019
2.	Josh Thompson	Blockchain: The Blockchain for Beginnings, Guild to Blockchain Technology and Blockchain Programming	Create Space Independent Publishing Platform	2017

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	William Mougayar, Vitalik Buterin	The Business Blockchain: Promise, Practice, and Application of the Next Internet Technology	Wiley	2016
2.	Joseph J. Bambara, Paul R. Allen	Blockchain. A practical Guide to Developing Business, Law and Technology Solutions	McGrawHill	2018
3.	Mohsen Attaran, Angappa Gunasekaran	Applications of Blockchain Technology in Business: Challenges and Opportunities	Springer International Publishing	2019

21ITC13 MOBILE COMMUNICATION

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

21ITC13.CO1 State the basics of mobile telecommunication system
21ITC13.CO2 Illustrate the generations of telecommunication systems in wireless network
21ITC13.CO3 Understand the architectures, the challenges and the Solutions of Wireless Communication
21ITC13.CO4 Identify solution for each functionality at each layer
21ITC13.CO5 Analyze the functionality of Transport and Application layer

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITC13.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x

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21ITC13.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC13.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC13.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC13.CO5	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 – Cellular Wireless Networks

UNIT II TELECOMMUNICATION NETWORKS **9**

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

UNIT III WIRLESS 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 – Classical TCP improvements – WAP- Introduction to 4G mobile networks- Case study – Mobile multimedia networks

TOTAL: 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 and Networks	PHI/Pearson Education	2002

REFERENCE BOOKS:

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

Web Sites Link Reference:

1. http://www.wirelesscommunication.nl/reference/chaptr01/wrlscomp/wcompute.htm
2. https://en.wikipedia.org/wiki/Telecommunications_network

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3. https://www.javatpoint.com/wireless-lan-introduction

4. https://www.cisco.com/c/en/us/td/docs/ios/solutions_docs/mobile_ip/mobil_ip.html

5. https://www.omicsonline.org/scholarly/multimedia-network-journals-articles-ppts-list.php

21ITC14 MOBILE APPLICATION LABORATORY

L	T	P	C
0	0	2	1

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

21ITC14.CO1	Demonstrate knowledge on: • Mobile platforms and Mobile User Interface • Android Activities and Intents • Messaging, Networking, Location based Services, Android Services • iOS.
21ITC14.CO2	Analyze the context of complex problems and identify user interface design requirements
21ITC14.CO3	Design and develop mobile applications as per societal needs.
21ITC14.CO4	Use Android studio and iOS tools to develop mobile applications.
21ITC14.CO5	Work independently or in teams to solve problems with effective communication.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITC14.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC14.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC14.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC14.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC14.CO5	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x

S.No LIST OF EXPERIMENTS

1. Test the android development environment by performing the following operations.
   a. Add the sample application to a project in Android studio.
   b. Create an Android Virtual Device (AVD) for sample project.
   c. Create a launch configuration for sample project.
   d. Run a sample application in Android Emulator.
2. Develop a program which will implement Sub menu in android application..
3. Develop a program to implement Context menu (Floating List of Menu Items) in android application.
4. Develop a program to implement Email service by using Relative Layout Views with different attributes.
5. Develop GMaps application by using Linear Layout Views with different attributes.
6. Develop a program to implement a Custom Button and handle the displayed message on button press.
7. Develop a program to implement the Table layout in View Group that displays child View elements in rows and columns.
8. Develop a program to implement the List View in android application.
9. Develop a program to show how to use Date picker control of ADK in android applications

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10. Develop a program to insert, delete, display, and update the employee details using Android SQLite.
11. Design and develop a program to create sign-up and sign-in pages and maintain the user details with SQLite
    Mini project: Develop the following applications using Android.
    a. Alarm b. Calculator c. Weather application d. Video Player

21ITC15 INTERNET OF THINGS

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

1. To understand Smart Objects and IoT Architectures
2. To learn about various IOT-related protocols
3. To be exposed to web, cloud in the context of IoT
4. To develop different models for network dynamics
5. To analyze applications of IoT in real time scenario

COURSE OUTCOMES:

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

21ITC15.CO1 Explain the underlying architectures and models in IoT.
21ITC15.CO2 Analyze various protocols for IoT at the different layers for IoT
21ITC15.CO3 Apply the web of things and cloud of things Models
21ITC15.CO4 Develop different models for network dynamics
21ITC15.CO5 Study the needs and suggest appropriate solutions for Industrial applications

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITC15.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC15.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC15.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC15.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC15.CO5	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

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

UNIT III WEB OF THINGS 9

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

UNIT IV IOT BUSINESS MODELS 9

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

UNIT V APPLICATIONS 9

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

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TOTAL: 45

TEXT BOOKS:

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

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	David Easley and Jon Kleinberg	Networks, Crowds, and Markets: Reasoning About a Highly Connected World	Cambridge University Press	2010
2.	Olivier Hersent, David Boswarthick, Omar Elloumi	The Internet of Things	A John Wiley & Sons, Ltd	2012
3.	Honbo Zhou	The Internet of Things in the Cloud: A Middleware Perspective	CRC Press	2012
4.	Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds)	Architecting the Internet of Things	Springer	2011
5.	Olivier Hersent, Omar Elloumi and David Boswarthick	The Internet of Things: Applications to the Smart Grid and Building Automation	Wiley	2012
6.	Adrian McEwen and HakinCassimally	Designing the Internet of Things	Wiley India	
7.	Massimo Banzi and Michael Shiloh	Getting Started with Arduino, 3	Maker Media.	
8.	Matt Richardson and Shawn Wallace	Getting Started with Raspberry Pi .	O'Reilly	2014

Web Sites Link Reference:

1. http://www.wirelesscommunication.nl/reference/chaptr01/wrlscomp/wcompute.htm
2. https://en.wikipedia.org/wiki/Telecommunications_network
3. https://www.javatpoint.com/wireless-lan-introduction
4. https://www.cisco.com/c/en/us/td/docs/ios/solutions_docs/mobile_ip/mobil_ip.html
5. https://www.omicsonline.org/scholarly/multimedia-network-journals-articles-ppts-list.php

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21ITC16 IoT APPLICATION DEVELOPMENT LAB

L	T	P	C
0	0	2	1

COURSE OBJECTIVES:

1. To understand Smart Objects and IoT Architectures
2. To learn about various IOT-related protocols
3. To be exposed to web, cloud in the context of IoT
4. To develop different models for network dynamics
5. To analyze applications of IoT in real time scenario

COURSE OUTCOMES:

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

21ITC16.CO1 Demonstrate hands-on experience on IoT.
21ITC16.CO2 Use Sensors, Arduino microcontroller and Raspberry Pi microprocessor for the development of IoT applications.
21ITC16.CO3 Analyze the user requirements for the development of IoT applications
21ITC16.CO4 Develop IoT applications to solve societal problems using cloud environment.
21ITC16.CO5 Work independently or in teams to solve problems with effective communication

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITC16.CO1	x	x	x	x	-	-	-	-	-	-	x	X	x	x	x
21ITC16.CO2	x	x	x	x	-	-	-	-	-	-	x	X	x	x	x
21ITC16.CO3	x	x	x	x	-	-	-	-	-	-	x	X	x	x	x
21ITC16.CO4	x	x	x	x	-	-	-	-	-	-	x	X	x	x	x
21ITC16.CO5	x	x	x	x	-	-	-	-	-	-	x	X	x	x	x

S.No LIST OF EXPERIMENTS

1. Develop an IoT application to control servo motor using Arduino/Raspberry Pi
2. Develop an IoT application using Arduino/Raspberry Pi for fire alarm.
3. Develop an IoT application to measure temperature, humidity, light and distance using Arduino/Raspberry Pi
4. Develop an IoT application to control home appliances using a smart phone.
5. Develop an IoT application to measure soil moisture, air and water quality using Arduino/Raspberry Pi
6. Develop an IoT application to control and monitor Street lightsusing Arduino/Raspberry Pi.
7. Develop an IoT application to detect obstacles using Arduino/Raspberry Pi.
8. Develop an IoT application using Arduino/Raspberry Pi to monitor heartbeat, blood pressure, etc. of a person and to upload health information to thingspeak cloud
9. Develop an Alexa based Home Automation System using IoT.

21ITC17 ARTIFICIAL INTELLIGENCE

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

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

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COURSE OUTCOMES:

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

21ITC17.CO1 Apply different searching strategies for problem solving

21ITC17.CO2 Represent planning problems and find the sequence of actions to achieve goals by using knowledge representation.

21ITC17.CO3 Comprehends the various machine learning techniques.

21ITC17.CO4 Demonstrate different techniques to represent Genetic Algorithms

21ITC17.CO5 Develop the expert system for the real time problems

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITC17.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC17.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC17.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC17.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC17.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: 45

TEXT BOOKS:

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

REFERENCE BOOKS:

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Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Russell, Peter Norvig	Artificial Intelligence – A Modern Approach	Prentice Hall of India	2009
2.	Dan W. Patterson	Introduction to AI and ES	Pearson Education	2007
3.	AndriesP.Engelbrecht,	Computational Intelligence: An 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

Web Sites Link Reference:

1. www.artint.info/html/ArtInt.html
2. www.aima.cs.berkeley.edu
3. www-formal.stanford.edu/jmc/whatisai/
4. www.nptel.ac.in/courses/106106126
5. www.sciencedaily.com/news/computers_math/artificial_intelligence/.

21ITC18 PRINCIPLES OF COMPILER DESIGN

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

1. To learn the basic concepts of Automata theory.
2. To know the basic concepts of compilers.
3. To learn the functions of Lexical Analyzer and Syntax Analyzer.
4. To understand the process of Intermediate Code Generation.
5. To understand the concepts of Code Generation and Code Optimization

COURSE OUTCOMES:

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

21ITC18.CO1 Design a lexical analyzer for compiler.
21ITC18.CO2 Implement a parser such as a bottom– up SLR parser without using YACC.
21ITC18.CO3 Implement semantic rules into a parser.
21ITC18.CO4 Implement intermediate code generator for compiler design.
21ITC18.CO5 Implement code generator and code optimizer

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITC18.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC18.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC18.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC18.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x

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21ITC18.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: 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, Priti Shankar,	*The Compiler Design Handbook: Optimizations and Machine Code Generation*	CRC Press	2007

REFERENCE BOOKS:

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

Web Sites Link Reference:

1. www.personal.kent.edu/~rmuhamma/Compilers/compiler.html
2. www.cs.rpi.edu/~moorthy/Courses/compiler98/Lectures/lecturesinppt/
3. www.cse.iitd.ernet.in/~sak/courses/cdp/slides.pdf
4. www.cs.nyu.edu/courses/fall06/G22.2130-001/lectures/lectures.html

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5. www.nptel.ac.in/courses/Webcourse-contents/IIT-KANPUR/30Oct/sanjeev/power- system/ui/TOC.html

21ITC19 CLOUD COMPUTING

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

21ITC19.CO1 Construct three cloud deployment models, and Overview of AWS Global infrastructure.
21ITC19.CO2 Implement the different AWS compute services.
21ITC19.CO3 Create virtual firewalls with security groups.
21ITC19.CO4 Construct the availability of different alternative database solutions.
21ITC19.CO5 Implement AWS Shared Responsibility Model, Examine IAM users, groups, and roles.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITC19.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC19.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC19.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC19.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC19.CO5	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 Cloud Front,. Database - Amazon Relational Database Service (RDS), Amazon Dynamo DB, Amazon Redshift, Amazon Aurora. Balancing, Scaling, Monitoring - Elastic Load Balancing (ELB), Amazon Cloud Watch, Auto Scaling

UNIT III CLOUD SECURITY 9

AWS Shared Responsibility Model, AWS Identity and Access Management (IAM), AWS Trusted Advisor, AWS Cloud Trail, 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: 45

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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

Web Sites Link Reference:

1. www.cloud-standards.org/wiki/index.php?title=Main_Page
2. www.nptel.ac.in/courses/106105033/41
3. www.courses.cs.ut.ee/2011/cloud/Main/Lectures
4. www.cloudbus.org/cloudsim/
5. www.hadoop.apache.org/docs/stable/hdfs_design.html 6.www.eucalyptus.com/

21ITC20 CLOUD COMPUTING LABORATORY

L	T	P	C
0	0	2	1

COURSE OBJECTIVES:

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

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COURSE OUTCOMES:

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

21ITC20.CO1 Describe three cloud deployment models, and Overview of AWS Global infrastructure.
21ITC20.CO2 Understand the different AWS core services.
21ITC20.CO3 Formulate virtual firewalls with security groups.
21ITC20.CO4 Review the availability differences of alternative database solutions.
21ITC20.CO5 Summarize the AWS Shared Responsibility Model, Examine IAM users, groups, and roles.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITC20.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC20.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC20.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC20.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC20.CO5	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x

S.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

21ITC21 DATA WAREHOUSING AND DATA MINING

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

1. To study the concepts of data warehousing architecture
2. To understand data mining principles and techniques
3. To learn to use association rule mining for handling large data
4. To study classification and clustering for better organization and retrieval of data
5. To expose business applications and recent trends of Data mining

COURSE OUTCOMES:

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

21ITC21.CO1 Identify the components of data warehousing architecture
21ITC21.CO2 Implement data preprocessing for mining applications
21ITC21.CO3 Apply the association rules for mining the data
21ITC21.CO4 Deploy appropriate classification and clustering techniques
21ITC21.CO5 Use recent trends of Data mining in business applications

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITC21.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC21.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC21.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x

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21ITC21.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC21.CO5	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x

UNIT I DATA WAREHOUSING **9**

Introduction to Data warehousing - Data warehousing Components - Building a Data Warehouse - Mapping the Data Warehouse to Multiprocessor Architecture - DBMS Schemas for Decision Support - Data Extraction, Cleanup, and Transformation Tools - Multidimensional Data Model-On Line Analytical Processing and tools - Need for OLAP- OLAP Operations – Types of OLAP servers

UNIT II DATA MINING **9**

Data Mining-Motivation and Importance of Data mining – Evolution of Database systems – Data mining functionalities – Steps in KDD process- Architecture of a typical data mining system - Classification of data mining systems – Data mining task primitives - Major issues in data mining

UNIT III ASSOCIATION RULE MINING **9**

Introduction - Association rule mining - Mining frequent item sets with and without candidate generation – Pattern evaluation methods - Mining various kinds of association rules: Pattern mining - Mining multilevel association - Mining multidimensional association - Constraint based mining

UNIT IV CLASSIFICATION AND CLUSTERING **9**

Basic concepts - Decision tree induction - Bayesian classification - Rule based classification - Classification by back propagation - Model Evaluation and Selection - Techniques to improve classification – Case study.

UNIT V EVALUATION OF CLUSTERING **9**

Cluster analysis - Clustering techniques: Partitioning methods - Hierarchical methods - Evaluation of clustering Outlier detection: Outliers and Outlier analysis - Outlier detection methods- Case study

TOTAL: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Jiawei Han and Micheline Kamber,	Data Mining: Concepts and Techniques	Morgan Kaufmann Publishers	2011.
2.	Alex Berson and Stephen J. Smith	Data Warehousing, Data Mining & OLAP	Tata McGraw Hill Edition	2011

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	G. K. Gupta	Introduction to Data Mining with Case Studies	Prentice Hall of India	2014
2.	Ian Witten, Eibe Frank	Data Mining: Practical Machine Learning Tools and Techniques	Morgan Kaufmann	2011
3.	Alex Berson and Stephen J. Smith	Data Warehousing, Data Mining & OLAP	Tata McGraw – Hill Edition	2007
4.	K.P. Soman, ShyamDiwakar and V. Ajay	Insight into Data mining Theory and Practice	Prentice Hall of India	2006
5.	George M Marakas	Modern Data Warehousing, Mining and Visualization	Prentice Hall	2003

Web Sites Link Reference:

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1. www.nptel.ac.in
2. www.gtbit.org/downloads/dwdmsem6/dwdmsem6lman.pdf
3. www.abbottanalytics.com/data-mining-resources-websites.php
4. www.gephi.org
5. www.ocw.mit.edu/courses/sloan-school-of-management/15-062-data-mining-spring-2003

21ITC22 INFORMATION SECURITY AND MANAGEMENT

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

21ITC22.CO1 Understand key characteristics and planning of information security and management
21ITC22.CO2 Understand set of contingency plans and information security policy using business impact analysis
21ITC22.CO3 Identify security models and strategies for the implementation of security measures.
21ITC22.CO4 Evaluate risk controls and formulate cost-benefit analysis using risk management.
21ITC22.CO5 Identify access control mechanisms to develop secure systems.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITC22.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC22.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC22.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC22.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC22.CO5	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x

UNIT I INTRODUCTION TO MANAGEMENT SECURITY AND SECURITY PLANNING 9

Introduction to Management Security: CNSS Security Model, Key Concepts of Information Security, Behavioral Types of Leaders, Management Characteristics, Solving Problems, Principles of Information Security Management, Project Management, Applying Project Management to Security, Project Management Tools.

Planning for Security: Role of Planning, Precursors to Planning, Strategic Planning, Information Security Governance, Planning for Information Security Implementation

UNIT II PLANNING FOR CONTINGENCIES AND INFORMATION SECURITY POLICY 9

Planning for Contingencies: Fundamentals of Contingency Planning, Components of Contingency Planning, Business Resumption, Testing Contingency Plans.

Information Security Policy: Introduction, Enterprise Information Security Policy, Issue Specific Security Policy, System Specific Security Policy, Guidelines for Effective Policy.

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UNIT III SECURITY MANAGEMENT MODELS AND SECURITY MANAGEMENT PRACTICES 9

Security Management Models: Blueprints, Frameworks and Security Models, Access Control Models, Security Architecture Models, Security Management Models.

Security Management Practices: Benchmarking, Performance Measurement in InfoSec Management

UNIT IV RISK MANAGEMENT 9

Risk Management, Risk Identification, Risk Assessment, Risk Control Strategies, Managing Risk, Feasibility and Cost Benefit Analysis

UNIT V PROTECTION MECHANISMS AND PERSONNEL AND SECURITY 9

Protection Mechanisms: Access Controls, Firewalls, Intrusion Detection and Prevention Systems, Remote Access Protection, Wireless Networking Protection, Scanning and Analysis Tools

Personnel and Security: Staffing the Security Function, Information Security Professional Credentials, Employment Policies and Practices.

TOTAL: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Michael E.Whitman and Herbert J.Mattord, ,	Management of Information Security	Cengage Learning	2016
2.	Nina GodBole	Information Systems Security: Security Management, Metrics, Frameworks and Best Practices,	Wiley Publications	2009

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Jack Freund, Jack Jones,	Measuring and Managing Information Risk: A FAIR Approach	Elsevier	2015
2.	Michael E Whitman and Herbert J Mattord	Principles of Information Security	Thomson Indian	2016
3.	Mark Rhodes-Ousley	Information Security: The Complete Reference	Pearson/PHI	2013
4.	Stuart Mc Clure, Joel Scrambray, George Kurtz	Hacking Exposed	Tata McGraw-Hill	2003
5.	Micki Krause, Harold F. Tipton	Handbook of Information Security Management	CRC Press LLC	2004

Web Sites Link Reference:

1. www.nptel.ac.in/courses/106106129/
2. www.vssut.ac.in/lecture_notes/lecture1423183198.pdf
3. www.course.cs.tau.ac.il/infosec15/lectures
4. www.caislab.kaist.ac.kr/lecture/2009/summer/ice1212/Data/Lect1-introduction.ppt

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5. www.iiscs.wssu.edu/drupal/node/2991

21ITC23 COMPUTER NETWORKS

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

1. Understanding the basic concepts of computer networking
2. Describe the MAC protocols
3. Appraise the switching concepts and Routing Techniques
4. Distinguish about UDP & TCP
5. Formulate the Application Layer

COURSE OUTCOMES:

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

21ITC23.CO1 Analyze the types of network topologies, layers and protocols.
21ITC23.CO2 Evaluate sub netting and routing algorithms for finding optimal paths in networks
21ITC23.CO3 Solve problems related to flow control, error control and congestion control in data transmission.
21ITC23.CO4 Assess the impact of wired and wireless networks in the context of network protocols Like DNS, SMTP, HTTP, and FTP.
21ITC11.CO5 Apply ethical principles and standards for developing network-based solutions.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITC23.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC23.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC23.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC23.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC23.CO5	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

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overview, HTTP, FTP.

TOTAL: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	. Andrew S. Tanenbaum and 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 and Keith W. Ross	Computer Networking: A Top-Down Approach,	Pearson	2017
2.	Larry L. Peterson, Bruce S. Davie	Computer Networks: A Systems Approach	Morgan Kaufmann	2003
3.	Jie Wang	Computer Networks	Prentice Hall	2002

Web Sites Link Reference:

1. https://www.cisco.com/c/en/us/solutions/small-business/resourcecenter/networking/networking-basics.html
2. https://memberfiles.freewebs.com/00/88/103568800/documents/Data.And.Computer.Communications.8e.WilliamStallings.pdf

21ITC24 WEB TECHNOLOGY

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

21ITC24.CO1 Demonstrate knowledge on web page design elements, dynamic content and database connection
21ITC24.CO2 Analyze user requirements to develop web applications.
21ITC24.CO3 Design client-server applications using web technologies.
21ITC24.CO4 Demonstrate problem solving skills to develop enterprise web applications.
21ITC24.CO5 Apply HTML, CSS, JavaScript, JQuery, Bootstrap and PHP technologies for device independent web application development.

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Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITC24.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC24.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC24.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC24.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC24.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: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Kogent	Learning Solutions Inc, HTML 5 Black 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.	1. Snig Bahumik	Bootstrap Essentials	PACKT Publishing	2015
2.	Thomas A. Powell,	. The Complete Reference: HTML and CSS	Tata McGraw Hill	2010

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3.	Andrea Tarr	PHP and MySQL,	Willy India	2012

21ITC25 WEB TECHNOLOGIES LABORATORY

L	T	P	C
0	0	2	1

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

21ITC25.CO1 Demonstrate knowledge on web page design elements, dynamic content and database connection.
21ITC25.CO2 Analyze user requirements to develop web applications
21ITC25.CO3 Design client-server applications using web technologies
21ITC25.CO4 Demonstrate problem solving skills to develop enterprise web applications
21ITC25.CO5 Apply HTML, CSS, JavaScript, JQuery, Bootstrap and PHP technologies for device independent web application development

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITC25.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC25.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC25.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC25.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC25.CO5	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x

S.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. a. Design a web page to store username and password information using the local storage concept.
   b. Design a web page to store employee information including Name, Emp. Id, Department, Salary and Address on a client's 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

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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 8 characters.
b. Username - It should contain combination of alphabets, numbers and underscore. It should not allow spaces and special symbols.
c. Password - It should not less than 8 characters in length and it contains one uppercase letter and one special symbol.
d. Date of Birth - It should allow only valid date; otherwise display a message stating that entered date is invalid. 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.
g. 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
e. 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 of the 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 into MySQL 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.

21ITC26 DATA SCIENCE AND DATA ANALYTICS

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

21ITC26.CO1	Use Analytical Architecture and its life cycle in Data Analytics
21ITC26.CO2	Analyze and Visualize the Data Analytics Methods using R.
21ITC26.CO3	Apply Advanced Analytical Methods for Text Analysis and Time –Series Analysis
21ITC26.CO4	Develop Analytical Report for given Analytical problems

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21ITC26.CO5 Analyze and Design Data Analytics Application on Societal Issues.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITC26.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC26.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC26.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC26.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC26.CO5	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: 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.	João Moreira, Andre Carvalho, André Carlos Ponce de Leon Ferreira Carvalho, Tomás Horvath	A General Introduction to Data Analytics	John Wiley and Sons	2019

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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 in Data Analytics	Create Space Independent Publishing Platform	2017

21ITC27 DATA ANALYTICS LABORATORY

L	T	P	C
0	0	2	1

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

21ITC27.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.
21ITC27.CO2	Apply Classification, clustering and Regression algorithms for Data Analysis
21ITC27.CO3	Develop solution for Text Analysis and Time Series Analysis problems
21ITC27.CO4	Analyze and Visualize data using R programming
21ITC27.CO5	Work independently or in teams to solve problems with effective communication.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITC27.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC27.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC27.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC27.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC27.CO5	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x

S.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 randomForest 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

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21ITC28 WEB DEVELOPMENT USING ANGULAR AND BOOTSTRAP

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

21ITC28.CO1	Apply the HTML5, CSS3 and Bootstrap concepts in front-end development of modern web applications
21ITC28.CO2	Design Web applications using Bootstrap
21ITC28.CO3	Create and deploy scalable web-based system using Angular JS.
21ITC28.CO4	Implement Directives and Controllers for front-end development
21ITC28.CO5	Demonstrate knowledge on the usage of Keys and Values Create Forms, validate and use Filters.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITC28.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC28.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC28.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC28.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC28.CO5	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: 45

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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 Chodorow and Michael Dirolf	Mongo DB – The Definitive Guide	O'Reilly Media	2010
2.	Jake Spurlock	Responsive Web Development – Bootstrap	O'Reilly Media	2013

21ITC29 ADVANCED WEB DEVELOPMENT LAB

L	T	P	C
0	0	2	1

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

21ITC29.CO1 Develop front-end applications using Node.js framework and React JS
21ITC29.CO2 Develop server-side Framework using Django
21ITC29.CO3 Building web application and Host web application using front-end and back-end tools.

21ITC29.CO4 Work independently or in teams to solve problems with effective communication.
21ITC29.CO5

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITC29.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC29.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC29.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC29.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITC29.CO5	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x

S.No LIST OF EXPERIMENTS

Front-endWeb Application Library
Library: React

1. Experiments:

1. Installing Node.js framework and configuring Visual Studio (VS) Code Integrated Development Environment (IDE), and its dependencies.

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2. Create and Run —Hello Worldl 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.

Server-side Development Framework.

side Framework: Django

Experiments:

1. Installing Python, Django framework and configuring PyCharm Integrated Development Environment (IDE), and its dependencies.

2. 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.

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21ITE01 C# AND .NET FRAMEWORK

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

21ITE01.CO1 Discuss the concepts of NET Framework and C# language
21ITE01.CO2 Design and develop real-time applications using object oriented concepts in C#
21ITE01.CO3 Design and develop real-time applications using.NET
21ITE01.CO4 Develop the web based applications using ADO.NET in C#
21ITE01.CO5 Implement the network application by using .Net framework.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITE01.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE01.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE01.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE01.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE01.CO5	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: 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

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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

Web Sites Link Reference:

1. www.tutorialspoint.com/net_framework_online_training/index.asp
2. www.csharp.net-tutorials.com/basics/visual-csharp-express/
3. www.lynda.com/C-sharp-training-tutorials/1022-0.html.
4. www.learncs.org \
5. www.msdn.microsoft.com/en-us/library/aa288436(v=vs.71).aspx

21ITE02 SOFTWARE PROJECT MANAGEMENT

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

21ITE02.CO1	Able to practice the process of project management and its application in delivering successful projects
21ITE02.CO2	Evaluate the risks and hazards in the project management
21ITE02.CO3	Apply cost monitoring and control strategies for software projects
21ITE02.CO4	Identify desirable characteristics of effective project managers and manage the organizational behavior of people working in teams
21ITE02.CO5	Evaluate a project to develop the scope of work, provide accurate cost estimates and to plan the various activities

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Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITE02.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE02.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE02.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE02.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE02.CO5	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 by Software Project Management – Setting objectives – Stakeholders - Management Control – Overview of Project Planning – Stepwise Project Planning – Project evaluation - Strategic Assessment – Technical Assessment – Cost Benefit Analysis – Cash Flow Forecasting – Cost Benefit Evaluation Techniques

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

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

UNIT III PROJECT MANAGEMENT AND CONTROL **9**

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

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

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

UNIT V SOFTWAREEFFORT 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: 45

TEXT BOOKS:

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

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Adolfo Villafiorita	Introduction to Software Project Management	CRC Press	2014
2.	Jalote	Software Project Management in Practice	Pearson Education	2010

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3.	Murali k. chemuturi, Thomas m cagly	Mastering software project management- best practices tools and Techniques	J Rose Publication	2010
4.	Richard E. Fairly	Managing and Leading Software projects	Weilly and sons	2009
5.	Ramesh, Gopalaswamy	Managing Global Projects	Tata McGraw Hill	2001

Web Sites Link Reference:

1. www.cs.ox.ac.uk/people/michael.wooldridge/teaching/soft-eng/lect05.pdf
2. www.at-web1.comp.glam.ac.uk/staff/dwfarthi/projman.html
3. www.tutorialspoint.com/management_concepts/project_management_softwares.htm
4. www.projectmanagement.com/wikis/233034/Cost-Benefit-Analysis
5. www.abebooks.com/book-search/kw/software-project-management-5th-edition-bob-hughes-mike-cotterell/

21ITE03 SALESFORCE CRM AND PLATFORM

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

21ITE03.CO1 Understand the basics of Sales force platform
21ITE03.CO2 Leverage configurable aspects of Sales force for business process automation
21ITE03.CO3 Understand Apex Programming and Visual force
21ITE03.CO4 Develop Apex program with SOQL & DML
21ITE03.CO5 Testing and Execution of triggers in Apex

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITE03.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE03.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE03.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE03.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE03.CO5	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 force Objects - Standard Objects - Custom Objects & Fields - Field Types - Master Detail - Lookup Relationship - Schema

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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 Impiementation: 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: 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

21ITE04 SALESFORCE CRM AND PLATFORM LABORATORY

L	T	P	C
0	0	2	1

COURSE OBJECTIVES:

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

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COURSE OUTCOMES:

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

21ITE04.CO1 Understand the basics of Sales force platform
21ITE04.CO2 Leverage configurable aspects of Sales force for business process automation
21ITE04.CO3 Understand Apex Programming and Visual force
21ITE04.CO4 Develop Apex program with SOQL & DML
21ITE04.CO5 Testing and Execution of triggers in Apex

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITE04.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE04.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE04.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE04.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE04.CO5	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x

S.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

21ITE05 AWS ACADEMY CLOUD DEVELOPING

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

21ITE05.CO1 Create on AWS.
21ITE05.CO2 Develop AWS Identity and Access Management for programmatic access.
21ITE05.CO3 Implement Container with AWS Lambda.
21ITE05.CO4 Organize solutions with Amazon API Gateway.
21ITE05.CO5 Build secure applications and deploying applications.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

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21ITE05.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE05.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE05.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE05.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE05.CO5	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: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Nassim Khaled, Bibin Pattel, 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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21ITE06 AWS ACADEMY CLOUD DEVELOPING LAB

L	T	P	C
0	0	2	1

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

21ITE06.CO1 Create on AWS.
21ITE06.CO2 Develop AWS Identity and Access Management for programmatic access.
21ITE06.CO3 Implement Container with AWS Lambda.
21ITE06.CO4 Organize solutions with Amazon API Gateway.
21ITE06.CO5 Build secure applications and deploying applications.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITE06.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE06.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE06.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE06.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE06.CO5	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x

S.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)

21ITE07 AWS ACADEMY CLOUD ARCHITECTING

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

1. Illustrate how cloud adoption transforms the way IT systems work.
2. Identify the benefits of Infrastructure as Code.
3. Summarize database services for storing and deploying web-accessible applications.
4. Describe how the AWS Well-Architected Framework improves cloud-based architectures.
5. Evaluate the most important performance metrics for applications

COURSE OUTCOMES:

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

21ITE07.CO1 Implement IT related work and access Amazon Web Services
21ITE07.CO2 Develop code
21ITE07.CO3 Construct real time database application using current techniques
21ITE07.CO4 Populate Cloud based architectures

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21ITE07.CO5 Design real time application with performance metrics.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITE07.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE07.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE07.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE07.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE07.CO5	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: 45

21ITE08 AWS ACADEMY CLOUD ARCHITECTING LAB

L	T	P	C
0	0	2	1

COURSE OBJECTIVES:

1. Illustrate how cloud adoption transforms the way IT systems work.
2. Identify the benefits of Infrastructure as Code.

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3. Summarize database services for storing and deploying web-accessible applications.
4. Describe how the AWS Well-Architected Framework improves cloud-based architectures.
5. Evaluate the most important performance metrics for applications

COURSE OUTCOMES:

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

21ITE08.CO1 Implement IT related work and access Amazon Web Services
21ITE08.CO2 Develop code
21ITE08.CO3 Construct real time database application using current techniques
21ITE08.CO4 Populate Cloud based architectures
21ITE08.CO5 Design real time application with performance metrics.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITE08.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE08.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE08.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE08.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE08.CO5	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x

S.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

21ITE09 AWS ACADEMY CLOUD FOUNDATIONS

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

21ITE09.CO1 Construct three cloud deployment models, and Overview of AWS Global infrastructure.
21ITE09.CO2 Implement the different AWS compute services.
21ITE09.CO3 Create virtual firewalls with security groups.
21ITE09.CO4 Construct the availability of different alternative database solutions.
21ITE09.CO5 Implement AWS Shared Responsibility Model, Examine IAM users, groups, and roles.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITE09.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE09.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x

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21ITE09.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE09.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE09.CO5	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: 45

21ITE10 AWS ACADEMY CLOUD FOUNDATION LAB

L	T	P	C
0	0	2	1

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

21ITE10.CO1 Construct three cloud deployment models, and Overview of AWS Global infrastructure.
21ITE10.CO2 Implement the different AWS compute services.
21ITE10.CO3 Create virtual firewalls with security groups.
21ITE10.CO4 Construct the availability of different alternative database solutions.
21ITE10.CO5 Implement AWS Shared Responsibility Model, Examine IAM users, groups, and roles.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITE10.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE10.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE10.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE10.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE10.CO5	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x

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S.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

21ITE11 SEMANTIC WEB

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

1. To learn Web Intelligence
2. To learn Knowledge Representation for the Semantic Web
3. To learn Ontology Engineering
4. To learn Semantic Web Applications, Services and Technology
5. To learn Social Network Analysis and semantic web

COURSE OUTCOMES:

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

21ITE11.CO1	Understand the concept structure of the semantic web technology and how this technology revolutionizes the World Wide Web.
21ITE11.CO2	Understand the concepts of Web Science, semantics of knowledge and resource, ontology.
21ITE11.CO3	Describe logic semantics and inference with OWL.
21ITE11.CO4	Use ontology engineering appreaches in semantic applications
21ITE11.CO5	To perform social network k analysis for different applications

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITE11.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE11.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE11.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE11.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE11.CO5	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 9

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OPPORTUNITIES

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

TOTAL: 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., and Hart.P.E	Pattern Classification and Scene Analysis	Wiley, New York	2009

Web Sites Link Reference:

1. https://www.cambridgesemantics.com/blog/semantic-university/intro-semantic-web/
2. https://semantic-web.com/
3. https://www.w3.org/2001/sw/
4. https://www.w3.org/standards/semanticweb/
5. https://ontotext.com/documents/SemTech-intro.pdf

21ITE12 NETWORK PROGRAMMING AND MANAGEMENT

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

21ITE12.CO1 Apply socket structure and functions to client server applications
21ITE12.CO2 Design applications using TCP and UDP sockets
21ITE12.CO3 Implement socket options and advanced sockets to applications
21ITE12.CO4 Compare number of variations of the network management architecture
21ITE12.CO5 Configure and manage network services and network architecture

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Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITE12.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE12.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE12.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE12.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE12.CO5	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 FEATURESAND RMON 9

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

TOTAL: 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/IP Vol- III	Pearson Education	2015
3.	Brijendra Singh	Network Security and Management	PHI	2012

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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

Web Sites Link Reference:

1. www.tutorialspoint.com/unix_sockets/
2. www.csd.uoc.gr/~hy556/material/tutorials/cs556-3rd-tutorial.pdf
3. www.codeproject.com › General Programming › Internet / Network
4. www.cs.rpi.edu/~moorthy/Courses/os98/Pgms/socket.html
5. www.cisco.com/networkers/nw04/presos/docs/NMS-1N01.pdf

21ITE13 BUSINESS INTELLIGENCE

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

21ITE13.CO1 Explain about business intelligence architectures.
21ITE13.CO2 Summarize various knowledge delivery methods
21ITE13.CO3 Summarize data envelopment analysis
21ITE13.CO4 Implement the business intelligent system for real time application.
21ITE13.CO5 Explain the management and future of business intelligent system

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITE13.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE13.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE13.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE13.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE13.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 – Business Intelligence architectures: Cycle of a business intelligence analysis – Enabling factors in business intelligence projects – Development of a business intelligence system – Ethics and business intelligence..

UNIT II KNOWLEDGE DELIVERY 9

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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: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	David Loshin Morgan, Kaufman	Business Intelligence: TheSavy Managers Guide	Wiley Publications	2012
2.	Efraim Turban, Ramesh Sharda, 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 Business Intelligence Systems	Pearson	2013
2.	Rajiv Sabherwal, Irma Becerra- Fernandez	Business Intelligence Practices, Technologies, and Management	Wiley	2011
3.	Carlo Vercellis	Business Intelligence: Data Mining and Optimization for Decision Making	Wiley Publications	2009

Web Sites Link Reference:

1. www.nptel.ac.in/courses/110106050/
2. www.dea-analysis.com/
3. www.youtube.com/watch?v=SE7IpYJ77Dg
4. www.nptel.ac.in/courses/106106093/31
5. www.youtube.com/watch?v=-GKpYTLRFbQ.

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21ITE14 WIRELESS SENSOR NETWORKS

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

21ITE14.CO1 Explain the basic concepts of wireless sensor networks.
21ITE14.CO2 Describe the structure physical and medium access layer of wireless sensor networks.
21ITE14.CO3 Apply structure of network and transport layer in wireless sensor networks (WSN) to various application areas.
21ITE14.CO4 Implement and manage the Wireless Sensor Network.
21ITE14.CO5 Implement the middleware for Wireless Sensor Network

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITE14.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE14.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE14.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE14.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE14.CO5	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 WIRELESSSENSOR 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: 45

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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 university press	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

21ITE15 INFORMATION RETRIEVAL TECHNIQUES

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

21ITE15.CO1 Explain the factors which optimize the information retrieval process
21ITE15.CO2 Understand web based information retrieval techniques
21ITE15.CO3 Identify the techniques of Information Retrieval modeling
21ITE15.CO4 Apply parallel information retrieval models and distributed information retrieval models in real time problem.
21ITE15.CO5 Summarize various steps involved in XML and multimedia information retrieval techniques

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITE15.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE15.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE15.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE15.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE15.CO5	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x

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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: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Ricardo Baeza -Yates and Berthier Ribeiro - Neto	Modern Information Retrieval: The Concepts and Technology behind search	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 Information Retrieval	Neal- Schuman Publishers	2010
2.	Mark Levene	An Introduction to Search Engines and Web Navigation	Wiley	2010
3.	Bruce Croft, Donald Metzler and Trevor Strohman	Search Engines: Information Retrieval in Practice	1st Edition Addison Wesley	2009
4.	Christopher D. Manning, PrabhakarRaghavan, Hinrich Schütze	An Introduction to Information Retrieval	Cambridge University Press, Cambridge, England	2008
5.	David A. Grossman, Ophir Frieder	Information Retrieval: Algorithms, and Heuristics	Academic Press	2008

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Web Sites Link Reference:

1. www.viveksingh.in/ir/ir.htm
2. www.gib.fi.upm.es/sites/default/files/irmodeling.pdf
3. www.mir2ed.org/
4. www.itracs.com.
5. www.gib.fi.upm.es/sites/default/files/irmodeling.pdf

21ITE16 SERVICE ORIENTED ARCHITECTURE

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

21ITE16.CO1 Explain the fundamental principles of SOA
21ITE16.CO2 Develop a simple XML services using SOA principles
21ITE16.CO3 Develop a simple web services using SOA principles
21ITE16.CO4 Model and analyze the JAVA web services and architecture.
21ITE16.CO5 Implement the various advanced web services using J2EE

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITE16.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE16.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE16.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE16.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE16.CO5	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 service design.

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

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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: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Eric Newcomer, Greg Lomow	Understanding SOA with Web Services	Pearson Education	2005
2.	James McGovern, Sameer Tyagi, Michael E Stevens, Sunil Mathew	Java Web Services Architecture	Elsevier	2003

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, Vamsi Mohun,	Mastering Enterprise SOA	Wiley	2007
4.	Eric Pulier, Hugh Taylor	Understanding Enterprise SOA	Dreamtech Press	2007
5.	Sandeep Chatterjee, James Webber	"Developing Enterprise Web Services	Pearson Education	2004.

Web Sites Link Reference:

1. http://www. W3.orh/TR/soap12-part1/
2. http://www.w3.org/TR/ws-arch/
3. http://xml.coverpages.org/Burdett-WSChoreographyJune032003.pdf
4. http://java.sun.com/developer/technicalArticles/xml/jaxb/

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5. http://java.ociweb.com/mark/JavaUserGroup/JAXB.pdf

21ITE17 AGILE TECHNOLOGY

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

21ITE17.CO1 Apply agile principles and practices in an actual project.
21ITE17.CO2 Prepare the Document and assess an agile project.
21ITE17.CO3 Apply Extreme Programming in agile technology.
21ITE17.CO4 Explain the steps of releasing agile product.
21ITE17.CO5 Demonstrate the advanced techniques of Agile Methods

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITE17.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE17.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE17.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE17.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE17.CO5	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

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TOTAL: 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 Distributed Scrum	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 Software Engineering: Applying the Theory of Constraints for Business Results	Prentice Hall	2003

Web Sites Link Reference:

1. wwwagilemainfesto.org
2. www.satisfice.com/articles/sbtm.pdf
3. www.dx.doi.org/10.1109/ADC.2005
4. www.informit.com/articles/article.aspx?p=405514
5. www.cio.com/archive/090103/money.html

21ITE18 SOCIAL NETWORK ANALYSIS

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

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

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COURSE OUTCOMES:

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

21ITE18.CO1 Develop semantic web related applications.
21ITE18.CO2 Represent knowledge using ontology.
21ITE18.CO3 Predict human behaviour in social web and related communities.
21ITE18.CO4 Handle privacy related issues
21ITE18.CO5 Visualize social networks

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITE18.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE18.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE18.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE18.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE18.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 VISUALISATION 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: 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, John Yen	Advances in Social Network Mining and Analysis	Springer	2010

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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 and Lin 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

Web Sites Link Reference:

1. https://www.sagepub.com/sites/default/files/upm-binaries/35208_Chapter1.pdf
2. https://www.researchgate.net/publication/324575362_Social_network_analysis_An_overview
3. http://www.mjdenny.com/workshops/SN_Theory_I.pdf
4. https://www.youtube.com/watch?v=d6bi0QTaX5Y
5. https://en.wikipedia.org/wiki/Social_network_analysis

21ITE19 GAME PROGRAMMING

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

21ITE19.CO1 Understand the concepts of Game design and development.
21ITE19.CO2 Learn the processes, mechanics and issues in Game Design.
21ITE19.CO3 Be exposed to the Core architectures of Game Programming.
21ITE19.CO4 Know about Game programming platforms, frame works and engines.
21ITE19.CO5 Learn to develop games

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

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21ITE19.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE19.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE19.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE19.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE19.CO5	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, Fragment Processing 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: 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

Web Sites Link Reference:

1. https://www.gamefromscratch.com/page/Game-Development-Tutorial-Series.aspx
2. http://gamecodeschool.com/
3. https://www.studytonight.com/game-development-in-2D/
4. https://www.raywenderlich.com/2795-beginning-game-programming-for-teens-with-python
5. https://canvas.projekti.info/ebooks/Game%20Coding%20Complete%20-%204th%20Edition.pdf

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21ITE20 NATURAL LANGUAGE PROCESSING

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

21ITE20.CO1 Understand the basic concepts of Natural Language Processing.
21ITE20.CO2 Describe the tag a given text with basic language processing features,
21ITE20.CO3 Implement a rule based system to tackle morphology/syntax of a language
21ITE20.CO4 Design a tag set to be used for statistical processing keeping an application in mind
21ITE20.CO5 To Compare and contrast use of different statistical approaches for different types of applications

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITE20.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE20.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE20.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE20.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE20.CO5	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: 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

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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 with Python	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

Web Sites Link Reference:

1. www.nltk.org/
2. www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_natural_language_processing.htm
3. www.analyticsvidhya.com/blog/2017/01/ultimate-guide-to-understand-implement-natural-language-processing-codes-in-python/
4. www.kdnuggets.com/2015/12/natural-language-processing-101.html
5. www.youtube.com/watch?v=w9OUpjiu_zg

21ITE21 BIG DATA ANALYTICS

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

21ITE21.CO1 Understand the basic concepts of Big Data.
21ITE21.CO2 Explain the basics of Hadoop.
21ITE21.CO3 Describe the architecture of Hadoop.
21ITE21.CO4 Design Hadoop Ecosystem and yarn.
21ITE21.CO5 Explain the techniques of HIVE AND HIVEQL, HBASE

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Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITE21.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE21.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE21.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE21.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE21.CO5	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: 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 Guide Everything	O Reilly	2012
2.	Vignesh Prajapati	Big Data Analytics with R and Haoop	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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Web Sites Link Reference:

1. www.bigdatauniversity.com/
2. www.tutorialspoint.com/big_data_tutorials.htm
3. www.intellipaat.com › Big Data
4. www.lynda.com/Big-Data-training-tutorials/2061-0.html
5. www.edureka.co/blog/big-data-tutorial

21ITE22 AD-HOC AND SENSOR NETWORKS

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

21ITE22.CO1	Explain the concepts, network architectures and applications of ad hoc and wireless sensor networks.
21ITE22.CO2	Analyze the protocol design issues of ad hoc and sensor networks
21ITE22.CO3	Design routing protocols for ad hoc and wireless sensor networks with respect to some protocol design issues
21ITE22.CO4	Evaluate the QoS related performance measurements of ad hoc and sensor networks.
21ITE22.CO5	Explain the techniques of protocols networks

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITE22.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE22.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE22.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE22.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE22.CO5	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-

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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: 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 and Applications	World Scientific Publishing Company	2006.

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Feng Zhao and Leonides Guibas	Wireless Sensor Networks	Elsevier Publication	2002
2.	Holger Karl and Andreas Willig	Protocols and Architectures for Wireless Sensor Networks	Wiley	2005
3.	Kazem Sohraby, Daniel Minoli, & Taieb Znati	Wireless Sensor Networks-Technology, Protocols, and Applications	John Wiley	2007
4.	Anna Hac	Wireless Sensor Network Designs	John Wiley,	2003
5.				

Web Sites Link Reference:

1. www.bigdatauniversity.com/
2. www.tutorialspoint.com/big_data_tutorials.htm
3. www.intellipaat.com › Big Data
4. www.lynda.com/Big-Data-training-tutorials/2061-0.html
5. www.edureka.co/blog/big-data-tutorial

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21ITE23 MANAGEMENT INFORMATION SYSTEM

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

1. 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.
2. To introduce the fundamental principles of computer-based information systems analysis and design and develop an understanding of the principles and techniques used.
3. 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.
4. 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.
5. To provide the theoretical models used in database management systems to answer business questions

COURSE OUTCOMES:

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

21ITE23.CO1	Relate the basic concepts and technologies used in the field of management information systems;
21ITE23.CO2	Compare the processes of developing and implementing information systems.
21ITE23.CO3	Outline the role of the ethical, social, and security issues of information systems.
21ITE23.CO4	Translate the role of information systems in organizations, the strategic management processes, with the implications for the management.
21ITE23.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												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITE23.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE23.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE23.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE23.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE23.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: 45

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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

21ITE24 SOFTWARE QUALITY ASSURANCE

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

21ITE24.CO1 Utilize the concepts in software development life cycle.
21ITE24.CO2 Demonstrate their capability to adopt quality standards.
21ITE24.CO3 Assess the quality of software product.
21ITE24.CO4 Apply the concepts in preparing the quality plan & documents.
21ITE24.CO5 Demonstrate testing a software and apply management principles on decision making

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITE24.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE24.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE24.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE24.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE24.CO5	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

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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: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	William E. Lewis	Software Testing and Continuous Quality 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, Isabel Evans, 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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21ITE25 BIOINFORMATICS

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COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

21ITE25.CO1 Develop bioinformatics tools with programming skills.
21ITE25.CO2 Apply computational based solutions for biological perspectives.
21ITE25.CO3 Able to understand phylogenetics and its applications
21ITE25.CO4 Able to apply engineering techniques in the field of molecular biology
21ITE25.CO5 Able to create RNA models using various algorithms

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITE25.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE25.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE25.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE25.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE25.CO5	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 life cycle, 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: 45

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TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Lesk, A. K.	Introduction to Bioinformatics	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 proteins and nucleic acids	Cold Spring Harbor Laboratory Press	2004
2.	Baldi, P. and Brunak, S	Bioinformatics: The Machine Learning Approach	Cambridge University Press	1998

21ITE26 DOCKER AND KUBERNETES

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

1. To Understand Kubernetes Architecture
2. To Know the Principles of cluster And Image Management
3. To Define Network And data Management using containers
4. To Develop a Docker Essentials
5. To deploy stateful and stateless apps on the cluster

COURSE OUTCOMES:

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

21ITE26.CO1 Installing & creating an account with docker Hub
21ITE26.CO2 Develop interactive Scaling control and Networking Services using docker
21ITE26.CO3 Expose the Build Comprehensive Hands-on with Kubernetes Components
21ITE26.CO4 Kubernetes Cluster installation on Virtualbox, AWS & Google Cloud Platforms
21ITE26.CO5 Develop interactive app outside the cluster and to autoscale apps

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITE26.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE26.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE26.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE26.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE26.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

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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: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Deepak Vohra	Kubernetes Microservices with Docker	Apress	2016
2.	Neependra Khare	Docker Cookbook	Packt Publishing	2015

REFERENCE BOOKS:

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

Web Sites Link Reference:

1. https://www.google.co.in/books/edition/Docker_Up_Running/IDvcCQAAQBAJ?hl=en&gbpv
2. https://www.google.co.in/books/edition/Kubernetes_on_AWS/bC59DwAAQBAJ?hl=en&gbpv=0&kptab=sideways
3. https://www.knowledgehut.com/devops/kubernetes
4. https://azure.microsoft.com/en-us/topic/kubernetes-vs-docker/
5. https://www.coursera.org/lecture/cloud-computing-basics/vms-docker-and-kubernetes-LgZKo

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21ITE27 OPEN STACK ESSENTIALS

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

1. To Understand Open Stack Architecture
2. To Know The Principles Of Identity And Image Management
3. To Define Network And Instance Management
4. To Develop A Block And Object Storage
5. To Design And Build Simple Nodes

COURSE OUTCOMES:

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

21ITE27.CO1 Installing Pack stack and generating an answer file
21ITE27.CO2 Develop Glance as a Registry of images
21ITE27.CO3 Build Web Interface External Network Setup
21ITE27.CO4 Develop Object file management in the web interface
21ITE27.CO5 Develop interactive Scaling control and Networking Services

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITE27.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE27.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE27.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE27.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE27.CO5	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: 45

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TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Dan Radez	OpenStack Essentials, Second Edition	Packt Publishing	2015
2.	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 Openstack Networking - Third Edition	Packt Publishing	2014
2.	Cody Bumgardner	Open Stack in Action	Packt Publishing	2011
3.	Tom Fifield	Open stack Operations Guide	Packt Publishing	2000

Web Sites Link Reference:

1. https://superuser.openstack.org/articles/openstack-basics-beginner/
2. https://www.coursera.org/lecture/networking-security-architecture-vmware-nsx/process-evolution-vmware-integrated-openstack-and-nsx-2-of-5-T2Ncr
3. https://www.oreilly.com/library/view/openstack-essentials/9781783987085/
4. https://books.google.co.in/books/about/OpenStack_Essentials.html?id=lqGrCQAAQBAJ&redir_esc=y
5. https://www.packtpub.com/product/openstack-essentials-second-edition/9781786462664

21ITE28 USER CENTRIC DESIGN

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

21ITE28.CO1	Develop an appreciation for the theory and sensibilities of user-centered design
21ITE28.CO2	Develop skills in the use and application of a variety of design methods, specifically Applicable to user- centered design
21ITE28.CO3	Improve individual and collaborative skills in design-based problem solving
21ITE28.CO4	Develop UCD is an Iterative process
21ITE28.CO5	Develop Multidisciplinary Design Teams for User Centered Design.

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Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITE28.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE28.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE28.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE28.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE28.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 ESTABLISISHING 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: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Travis Lowdermilk	User-Centered Design: A Developer's Guide to Building User-Friendly Applications, First Edition_	O'Reilly Media	2013
2.	Brian Still and Kate Crane	Fundamentals of User-Centered Design: A Practical Approach	CRC Press	2016

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Elizabeth F. Churchill, Frank Ritter, and Gordon D. Baxter	Foundations for Designing User-Centered Systems: What System Designers Need to Know about People	Springer	2014

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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

Web Sites Link Reference:

1. https://www.google.co.in/books/edition/User_Centered_Design/nklr2hZ_wsYC?hl=en&gbpv=1&printsec=front cover
2. https://www.google.co.in/books/edition/UX_for_Beginners/6LhRCwAAQBAJ?hl=en&gbpv=1&printsec=front cover
3. https://www.youtube.com/watch?v=dKziavNRuis
4. https://www.google.co.in/books/edition/Designed_for_Use/mA9QDwAAQBAJ?hl=en&gbpv=1&printsec=front cover
5. https://www.justinmind.com/blog/user-centered-design

21ITE29 SOFTWARE TESTING

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

1. To understand the basic software testing principles.
2. To understand the working principles of various testing methodologies.
3. To Understand knowledge of techniques for system testing and functional testing
4. To understand the ways and means of controlling and monitoring testing activity.
5. To understand the concept of modern software testing tools./

COURSE OUTCOMES:

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

21ITE29.CO1 Explain the basic software testing principles.
21ITE29.CO2 Classify the types of testing
21ITE29.CO3 Differentiate operation of system testing & functional testing
21ITE29.CO4 Analyze the techniques in testing in planning, automation & execution management.
21ITE29.CO5 Implement the testing using modern software testing tools

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITE29.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE29.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE29.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE29.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE29.CO5	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

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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 & 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 & 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 M O D E R N SOFTWARE TESTING TOOLS 9

Evolution of Automated Testing Tools-Variable Capture/Replay Tools-Extreme Programming-Software Testing Trends-Taxonomyof Testing Tools-Methodologyto Evaluate Automated Testing Tools-Case Study

TOTAL: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Kshirsagar Naik, Priyadarshi Tripathy	Software Testing & Quality Assurance	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 and Practices	Pearson Education	2009
3.	Ron Patton	Software testing	Pearson Education	2007
4.	William E. Perry	Effective Methods for Software Testing	Wiley India	2006
5.	Renu Rajani and Pradeep Oak	Software Testing – Effective Methods, Tools and Techniques	Tata McGraw Hill Publishing Company Limited	2005

Web Sites Link Reference:

1. www.tutorialspoint.com/software_testing/software_testing_qa_qc_testing.htm
2. www.etestinghub.com/introduction_to_testing.php
3. www.guru99.com/automation-testing.html

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4. www.softwaretestinghelp.com/automation-testing-tutorial-1/

5. www.softwaretestingtimes.com/2010/04/software-testing- tutorials-for.html.

21ITE30 ETHICAL HACKING AND CYBER SECURITY

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

1. To understand the concept of Hacking.
2. To understand the Hacking methods and types.
3. To understand the Hacking tools.
4. To understand the Concept of Cyber Security
5. To understand the Cyber Security tools

COURSE OUTCOMES:

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

21ITE30.CO1 Explain the basic concept of Ethical hacking.
21ITE30.CO2 Implement the techniques for system hacking wireless hacking and web server hacking.
21ITE30.CO3 Explain the basic concept of Cyber Security and Penetration testing.
21ITE30.CO4 Implement the Cyber Security by using its tools.
21ITE30.CO5 Implement the cyber Forensic analysis

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITE30.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE30.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE30.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE30.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE30.CO5	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

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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: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Michael T. Simpson	Hands-On Ethical Hacking and Network 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 y 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

Web Sites Link Reference:

1. www.tutorialspoint.com/ethical_hacking/
2. www.tutorialspoint.com/ethical_hacking/
3. www.breakthesecurity.cysecurity.org/category/ethical-hacking /
4. www.cybrary.it

21ITE31 SOFT COMPUTING

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

1. To understand thebasic concepts of soft computing,
2. To understand the fundamentals of artificial and neural networks
3. To understand the fundamentals Unsupervised Learning Network
4. To understand the fuzzy sets and fuzzy logic and genetic algorithms.
5. To understand the fuzzy Fuzzy Arithmetic and Fuzzy Measures

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COURSE OUTCOMES:

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

21ITE31.CO1 Build intelligent machines using soft computing techniques.
21ITE31.CO2 Design a Neural Networks for the real time problems.
21ITE31.CO3 Implement various learning techniques
21ITE31.CO4 Apply fuzzy logic and Develop fuzzy sets for real time problems.
21ITE31.CO5 Develop genetic algorithms for various real time applications

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITE31.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE31.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE31.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE31.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE31.CO5	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: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	S N Sivanandam, S N Deepa	Principles of Soft Computing	Wiley India	2007
2.	Fakhreddine 0 Karray, Clarence D Silva	Soft Computing and Intelligent System 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 Cognitive Modeling of the Human Brain	CRC press	2000

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2.	Elaine Rich and Kevin Knight	Artificial Intelligence	TMH	2008
3.	Stuart J. Russell and Peter 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 Intelligent Systems	Oxford University Press	2005

Web Sites Link Reference:

1. www.slideshare.net/ganeshpaul6/soft-computing-14879490
2. www.myreaders.info/html/soft_computing.html
3. www.nptel.ac.in/courses/106106046/41
4. www2.cs.uh.edu/~ceick/6367/Soft-Computing.pdf
5. www.soft-computing.de/def.html

21ITE32 REAL TIME SYSTEMS

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

21ITE32.CO1 Apply the knowledge of operating system concepts to understand real time system.
21ITE32.CO2 Implement the tasks scheduling of Real time systems.
21ITE32.CO3 Define various protocols for effective resource sharing.
21ITE32.CO4 Find out the fault in real time system by using various techniques.
21ITE32.CO5 Design real time system for various real time applications

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITE32.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE32.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE32.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE32.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE32.CO5	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x

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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: 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 Soft Computing- Behavioral and Cognitive Modeling of the Human Brain	CRC press	2000
2.	Elaine Rich and Kevin Knight	Artificial Intelligence	TMH	2008
3.	Stuart J. Russell and Peter 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 Intelligent Systems	Oxford University Press	2005

Web Sites Link Reference:

1. www.freevideolectures.com/Course/3049/Real-Time-Systems
2. www.nptel.ac.in/courses/106105036/
3. www.bogotobogo.com/cplusplus/embeddedSystemsProgramming.php

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4. www.cse.unsw.edu.au/~cs9242/08/lectures/09-realtimex2.pdf

5. www.youtube.com/watch?v=BxYwjdrdnQg

21ITE33 MACHINE LEARNING

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

1. To learn about learning systems
2. To understand Decision Tree Learning and Ensemble Learning
3. To understand Computational Learning Theory
4. To understand ANN
5. To differentiate Supervised and Unsupervised learning

COURSE OUTCOMES:

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

21ITE33.CO1 Knowledge about learning systems
21ITE33.CO2 Differentiate Decision tree and ensemble learning
21ITE33.CO3 Analyze the performance of various learning systems.
21ITE33.CO4 Design an learning system
21ITE33.CO5 Distinguish Supervised and Unsupervised learning

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITE33.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE33.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE33.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE33.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE33.CO5	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x

UNIT I INTRODUCTION 9

Definition of learning systems- Goals and applications of machine learning- Aspects of developing a learning system: training data, concept representation and function approximation- Inductive Classification- Version spaces and the candidate elimination algorithm- Learning conjunctive concepts

UNIT II DECISION TREE LEARNING AND ENSEMBLE LEARNING 9

Representing concepts as decision trees- Recursive induction of decision trees- Picking the best splitting attribute: entropy and information gain- Searching for simple trees and computational complexity- Occam's razor- Overfitting, noisy data, and pruning- Ensemble Learning- Active learning with ensembles- Measuring the accuracy of learned hypotheses- Comparing learning algorithms: cross-validation- learning curves and statistical hypothesis testing.

UNIT III COMPUTATIONAL LEARNING THEORY 9

Models of learn ability: learning in the limit; probably approximately correct (PAC) learning. Sample complexity: quantifying the number of examples needed to PAC learn. Computational complexity of training. Sample complexity for finite hypothesis spaces. PAC results for learning conjunctions, kDNF, and kCNF. Sample complexity for infinite hypothesis spaces, Vapnik-Chervonenkis dimension.

UNIT IV ARTIFICIAL NEURAL NETWORKS 9

Neurons and biological motivation. Linear threshold units. Perceptrons: representational limitation and gradient descent training. Multilayer networks and backpropagation. Hidden layers and constructing intermediate, distributed representations. Overfitting, learning network structure, recurrent networks

UNIT V CLUSTERING AND UNSUPERVISED LEARNING 9

Learning from unclassified data. Clustering. Hierarchical Aglomerative Clustering. k-means partitional clustering. Expectation maximization (EM) for soft clustering. Semi-supervised learning with EM using labeled and unlabeled

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data

TOTAL: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Tom Mitchell	Machine Learning	Tata Mc Grill	1997
2.	Nilsson N.J.	Introduction to machine learning		1996

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Ethem Alpaydin	Introduction to machine learning	MIT Press	2004
2.	Peter Flach	Machine Learning: The Art and Science of Algorithms that Make Sense of Data	Cambridge University Press	2012

21ITE34 HIGH SPEED NETWORKS

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

1. To learn High speed networks and ATM Architecture
2. To understand resource allocation and s congestion management approaches
3. To understand ATM Congestion control management
4. To understand the integrated and differentiated services
5. To learn protocols for QOS support

COURSE OUTCOMES:

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

21ITE34.CO1 Summarize the mechanisms to provide high speed networking through case studies of ATM and frame relay networks

21ITE34.CO2 Construct queuing system with different arrival and service rates

21ITE34.CO3 Analyze the performance of various congestion controls in ATM.

21ITE34.CO4 Design the integrated and differentiated services Explain the protocols needed for QoS support

21ITE34.CO5

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITE34.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE34.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE34.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE34.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE34.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

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ethernet - Gigabit ethernet - Fiber channel

UNIT II QUEUINGMODELS 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 INTEGATED 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: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	William Stallings	High Speed Networks and	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

21ITE35 ANGULAR JS

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

21ITE35.CO1 Develop Angular Components, Web components and Custom Elements

21ITE35.CO2 Design dynamic Web sites using SystemJS and Webpack

21ITE35.CO3 Build applications using Angular framework and Directives

21ITE35.CO4 Create pipes and forms using model driven approach

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21ITE35.CO5 Test Angular applications and Services

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITE35.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE35.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE35.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE35.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE35.CO5	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: 45

TEXT BOOKS:

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

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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

Web Sites Link Reference:

1. http://tutorial.techaltum.com/angularjs-tutorial.html
2. https://www.w3schools.com/angular/
3. https://docs.angularjs.org/tutorial
4. https://thinkster.io/a-better-way-to-learn-angularjs
5. https://jasonwatmore.com/

21ITE36 ANGULAR JS LABORATORY

L	T	P	C
0	0	2	1

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

21ITE36.CO1 Develop Angular Components, Web components and Custom Elements
21ITE36.CO2 Design dynamic Web sites using SystemJS and Webpack
21ITE36.CO3 Build applications using Angular framework and Directives
21ITE36.CO4 Create pipes and forms using model driven approach
21ITE36.CO5 Test Angular applications and Services

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITE36.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE36.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE36.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE36.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE36.CO5	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x

S.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

21ITE37 DIGITAL AND SOCIAL MEDIA MARKETING

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

21ITE37.CO1	Demonstrate knowledge on digital Marketing Strategies
21ITE37.CO2	Analyze the marketing potential of digital technologies and social media platforms for a particular real-life marketing challenge
21ITE37.CO3	Analyze digital marketing strategies for improving digital marketing
21ITE37.CO4	Identify the Scope of Social Interaction, Customer Relationships
21ITE37.CO5	Design social business Techniques for business analysis.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITE37.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE37.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE37.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE37.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE37.CO5	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,

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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: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	1. Dave chaffey and Fiona ellis-chadwick,	Digital Marketing strategy, implementation	-	2016
2.	Dave Evans	Social Media Marketing: The Next 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 engaging the digital generation	Kogan Page	2014
2.	MoutsyMaiti	Internet Mareting	Oxford University Press	2014
3.	Eric Greenberg, and Kates, Alexander;	Strategic Digital Marketing: Top Digital Experts Share the Formula for Tangible Returns on Your Marketing Investment	McGraw-Hill Professional	2013

21ITE38 FULL STACK DEVELOPMENT

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

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

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COURSE OUTCOMES:

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

21ITE38.CO1	Demonstrate knowledge on jQuery to control the behavior of different elements in web page.
21ITE38.CO2	Analyze Node.js syntax, NPM package management, MongoDB and Express.js syntaxes to build scalable and responsive web applications.
21ITE38.CO3	Develop components using templates, directives of AngularJS for designing single-page applications
21ITE38.CO4	Build applications by applying Node.js, CRUD applications using MongoDB and Express.js.
21ITE38.CO5	Develop components using templates, directives of AngularJS for testing single-page applications

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
21ITE38.CO1	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE38.CO2	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE38.CO3	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE38.CO4	x	x	x	x	-	-	-	-	-	-	x	x	x	x	x
21ITE38.CO5	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: 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	Pearson	2018
2.	-	HTML 5 Black Book: Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP and jQuery	Dreamtech Press	2016

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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
3.				
4.				
5.				

Web Sites Link Reference:

1. https://www.udemy.com/topic/mean-stack/

2. https://www.coursera.org/learn/building-modern-node-applications-on-aws/

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