MUTHAYAMMAL ENGINEERING COLLEGE

(An Autonomous Institution)

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

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

Curriculum/Syllabus

Programme Code	:	**CS**
Programme Name	:	**B.E- COMPUTER SCIENCE AND ENGINEERING**
Regulation	:	**R-2016**

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INSTITUTION VISION & MISSION

INSTITUTION VISION

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

INSTITUTION MISSION

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

INSTITUTION MOTTO

Rural upliftment through Technical Education.

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DEPARTMENT VISION & MISSION

DEPARTMENT VISION

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

DEPARTMENT MISSION

- To impart knowledge in the state of art technologies in Computer Science and Engineering

- To inculcate the analytical and logical skills in the field of Computer Science and Engineering

- To produce the graduates to examine the issues and propose solutions with Ethical values

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DEPARTMENT PROGRAM EDUCATIONAL OBJECTIVES, PROGRAM OUTCOMES & PROGRAM SPECIFIC OUTCOMES

PROGRAM EDUCATIONAL OBJECTIVES

The Computer Science and Engineering Graduates should be able to

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

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

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

PROGRAM OUTCOMES

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

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

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

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

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

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

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

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

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

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

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

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

PROGRAM SPECIFIC OUTCOMES

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

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

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

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COMPUTER SCIENCE AND ENGINEERING

REGULATION 2016

GROUPING OF COURSES

HUMANITIES AND SOCIAL SCIENCES (HS)

S. No.	Course Code	Course Title	Category	Contact Hours	Instruction Hours/Week			C
					L	T	P	
1.	16SHA01	Technical English	HS	5	3	2	0	4
2.	16SHA02	Communicative English	HS	7	3	0	4	5
3.	16SHA03	Business English	HS	5	3	2	0	4
4.	16SHA04	Basics of Japanese	HS	5	3	2	0	4
5.	16SHA05	Functional Japanese	HS	5	3	2	0	4
6.	16SHA06	Basics of German	HS	5	3	2	0	4
7.	16SHA07	Functional German	HS	5	3	2	0	4
8.	16SHA08	Principles of Management and Engineering Ethics	HS	3	3	0	0	3

BASIC SCIENCES (BS)

S. No.	Course Code	Course Title	Category	Contact Hours	Instruction Hours/Week			C
					L	T	P	
1.	16SHB01	Matrices, Calculus and Ordinary Differential Equations	BS	5	3	2	0	4
2.	16SHB02	Complex variables, Laplace Transforms and Vector Calculus	BS	5	3	2	0	4
3.	16SHB03	Transforms and Partial Differential Equations	BS	5	3	2	0	4
4.	16SHB04	Random Processes	BS	5	3	2	0	4
5.	16SHB05	Probability and Queuing Theory	BS	5	3	2	0	4
6.	16SHB06	Numerical Methods	BS	5	3	2	0	4
7.	16SHB07	Statistics and Numerical Methods	BS	5	3	2	0	4
8.	16SHB08	Discrete Mathematics	BS	5	3	2	0	4
9.	16SHB09	Operations Research	BS	5	3	2	0	4
10.	16SHB21	Engineering Physics	BS	6	2	0	4	4
11.	16SHB22	Material Science	BS	3	3	0	0	3
12.	16SHB23	Physics for Electrical Engineering	BS	3	3	0	0	3

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13.	16SHB24	Physics for Mechanical Engineering	BS	3	3	0	0	3
14.	16SHB31	Engineering Chemistry	BS	6	2	0	4	4
15.	16SHB32	Environmental Science and Engineering	BS	3	3	0	0	3

ENGINEERING SCIENCES (ES)

S. No.	Course Code	Course Title	Category	Contact Hours	Instruction Hours/Week			C
					L	T	P	
1.	16CSC01	Fundamentals of Computing and Programming	ES	6	2	0	4	4
2.	16CSC02	Advanced C Programming	ES	6	2	0	4	4
3.	16CSC03	Basics of Civil and Mechanical Engineering	ES	4	4	0	0	4
4.	16CSC04	Basics of Electrical and Electronics Engineering	ES	3	3	0	0	3
5.	16CSC05	Engineering Graphics	ES	4	0	0	4	2
6.	16CSC06	Engineering Practices for Computer Sciences	ES	4	0	0	4	2
7.	16CSC07	Electrical Drives and Control	ES	5	3	0	2	4
8.	16CSC08	Engineering Mechanics	ES	5	3	2	0	4
9.	16CSC09	Microprocessor and Microcontrollers	ES	5	3	0	2	4
10.	16CSC10	Object Oriented Programming	ES	6	2	0	4	4
11.	16CSC11	Data Structures	ES	6	2	0	4	4
12.	16CSC12	Electron Devices	ES	6	2	0	4	4
13.	16CSC13	Circuit Theory	ES	6	2	0	4	4
14.	16CSC14	Digital Principles and System Design	ES	6	2	0	4	4
15.	16CSC15	Fundamentals of Nanoscience	ES	6	3	0	0	3

PROFESSIONAL CORE (PC)

S. No.	Course Code	Course Title	Category	Contact Hours	Instruction Hours/Week			C
					L	T	P	
1.	16CSD01	Advanced Java Programming	PC	5	3	0	2	4
2.	16CSD02	Design and Analysis of Algorithms	PC	3	3	0	0	3
3.	16CSD03	Database Management Systems	PC	5	3	0	2	4
4.	16CSD04	Object Oriented Software Engineering	PC	3	3	0	0	3
5.	16CSD05	Operating Systems	PC	5	3	0	2	4

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6.	16CSD06	Object Oriented Analysis and Design	PC	5	3	0	2	4
7.	16CSD07	Computer Networks	PC	5	3	0	2	4
8.	16CSD08	Principles of Compiler Design	PC	5	3	0	2	4
9.	16CSD09	Cryptography and Network Security	PC	5	3	2	0	4
10.	16CSD10	Open Source Software	PC	5	3	2	0	4
11.	16CSD11	Theory of Computation	PC	5	3	2	0	4
12.	16CSD12	Computer Architecture	PC	5	3	2	0	4
13.	16CSD13	Computer Graphics	PC	5	3	0	2	4
14.	16CSD15	Advanced Data Structure	PC	3	3	0	0	3
15.	16CSD16	Internet Programming	PC	5	3	0	2	4
16.	16CSD17	Python Programming	PC	5	3	0	2	4

PROFESSIONAL ELECTIVES (PE)

S. No.	Course Code	Course Title	Category	Contact Hours	Instruction Hours/Week			C
					L	T	P	
1.	16CSE01	C# and .Net Framework	PE	5	3	2	0	4
2.	16CSE02	Software Project Management	PE	3	3	0	0	3
3.	16CSE03	Software Testing	PE	5	3	2	0	4
4.	16CSE04	Artificial Intelligence	PE	3	3	0	0	3
5.	16CSE05	Ethical Hacking and Cyber Security	PE	3	3	0	0	3
6.	16CSE06	Soft computing	PE	3	3	0	0	3
7.	16CSE07	Real Time Systems	PE	3	3	0	0	3
8.	16CSE08	Information Storage Management	PE	3	3	0	0	3
9.	16CSE09	Advanced Computer Architecture	PE	3	3	0	0	3
10.	16CSE10	High Speed Networks	PE	3	3	0	0	3
11.	16CSE11	Graph Theory	PE	3	3	0	0	3
12.	16CSE12	Advanced Database Technology	PE	5	3	2	0	4
13.	16CSE13	Digital Image Processing	PE	4	4	0	0	4
14.	16CSE14	Machine Learning Techniques	PE	3	3	0	0	3

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15.	16CSE15	4G Technologies	PE	3	3	0	0	3
16.	16CSE16	Total Quality Management	PE	3	3	0	0	3
17.	16CSE17	Cloud Computing	PE	3	3	0	0	3
18.	16CSE18	Mobile Computing	PE	3	3	0	0	3
19.	16CSE19	Salesforce CRM and Platform	PE	5	3	0	2	4
20.	16CSE20	Introduction to Internet of Things	PE	3	3	0	0	3
21.	16CSE21	Programming in JAVA	PE	3	3	0	0	3

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

S. No.	Course Code	Course Title	Category	Contact Hours	L	T	P	C
1.	16CSF01	Project work-Phase I	EEC	6	0	0	6	3
2.	16CSF02	Project work -Phase II	EEC	30	0	0	30	15
3.	16CSF03	Comprehension	EEC	4	0	0	4	2
4.	16CSF04	Design Project	EEC	4	0	0	4	2
5.	16CSF05	Technical Seminar	EEC	4	0	4	0	2
6.	16CSF06	Entrepreneurship Development	EEC	3	3	0	0	3
7.	16CSF07	Soft Skills	EEC	4	2	2	0	3
8.	16CSF08	Professional Practices	EEC	6	0	0	6	3

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Department	CSE
Programme	B.E.

SEMESTER - I

Sl. No.	Course Code	Course Name	Hours/ Week			Credit	Contact Hours
			L	T	P	C	
THEORY							
1.	16SHA02	Communicative English	3	0	4	5	7
2.	16SHB01	Matrices, Calculus and Ordinary Differential Equations	3	2	0	4	5
3.	16SHB21	Engineering Physics	2	0	4	4	6
4.	16SHB32	Environmental Science and Engineering	3	0	0	3	3
5.	16CSC01	Fundamentals of Computing and Programming	2	0	4	4	6
6.	16CSC04	Basics of Electrical and Electronics Engineering	3	0	0	3	3
7.	16CSC06	Engineering Practices for Computer Sciences	0	0	4	2	4
Total Credits						25	

SEMESTER – II

Sl. No.	Course Code	Course Name	Hours/ Week			Credit	Contact Hours
			L	T	P	C	
THEORY							
1.	16SHA01	Technical English	3	2	0	4	5
2.	16SHB02	Complex Variables, Laplace Transforms & Vector Calculus	3	2	0	4	5
3.	16SHB22	Material Science	3	0	0	3	3
4.	16SHB31	Engineering Chemistry	2	0	4	4	6
5.	16CSC05	Engineering Graphics	0	0	4	2	4
6.	16CSC02	Advanced C Programming	2	0	4	4	6
7.	16CSC14	Digital Principles and System Design	2	0	4	4	6
Total Credits						25	

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CURRICULUM UG R – 2016

Department	CSE
Programme	B.E.

SEMESTER – III

Sl. No.	Course Code	Course Name	L	T	P	C	Contact Hours
				Hours/ Week		Credit	
THEORY							
1.	16SHB03	Transforms and Partial Differential Equations	3	2	0	4	5
2.	16CSD05	Operating Systems	3	0	2	4	5
3.	16CSD12	Computer Architecture	3	2	0	4	5
4.	16CSC10	Object Oriented Programming	2	0	4	4	6
5.	16CSC11	Data Structures	2	0	4	4	6
6.	16CSD02	Design and Analysis of Algorithms	3	0	0	3	3
		Total Credits				23	

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CURRICULUM UG R – 2016

Department	CSE
Programme	B.E.

SEMESTER – IV

Sl. No.	Course Code	Course Name	L	T	P	C	Contact Hours
				Hours/ Week		Credit	
THEORY							
1.	16SHB05	Probability and Queuing Theory	3	2	0	4	5
2.	16CSD03	Database Management Systems	3	0	2	4	5
3.	16CSC09	Microprocessor and Microcontrollers	3	0	2	4	5
4.	16CSD04	Object Oriented Software Engineering	3	0	0	3	3
5.	16CSD07	Computer Networks	3	0	2	4	5
6.	16CSD11	Theory of Computation	3	2	0	4	5
		Total Credits				23	

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CURRICULUM UG R – 2016

Department	CSE
Programme	B.E

SEMESTER – V

Sl. No.	Course Code	Course Name	Hours/Week			Credit	Contact Hours
			L	T	P	C	
THEORY							
1.	16SHB08	Discrete Mathematics	3	2	0	4	5
2.	16CSD06	Object Oriented Analysis and Design	3	0	2	4	5
3.	16CSD17	Python Programming	3	0	2	4	5
4.	16CSD08	Principles of Compiler Design	3	0	2	4	5
5.	16CSD09	Cryptography and Network Security	3	2	0	4	5
6.	PE	Professional Elective - I	3	0	0	3	3
7.	PE	Professional Elective - II	3	0	0	3	3
Total Credits						**26**	

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CURRICULUM UG R – 2016

Department	CSE
Programme	B.E.

SEMESTER – VI

Sl. No.	Course Code	Course Name	Hours/Week			Credit	Contact Hours
			L	T	P	C	
THEORY							
1.	16CSD10	Open Source Software	3	0	2	4	5
2.	16CSD13	Computer Graphics	3	0	2	4	5
3.	16CSD15	Advanced Data Structures	3	0	0	3	3
4.	16SHA08	Principles of Management and Engineering Ethics	3	0	0	3	3
5.	PE	Professional Elective - III	3	0	0	3	3
6.	PE	Professional Elective - IV	3	0	0	3	3
7.	PE	Professional Elective - V	3	0	0	3	3
8.	16CSF04	Design Project	0	0	4	2	4
Total Credits						**26**	

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CURRICULUM UG R - 2016

Department	CSE
Programme	B.E.

SEMESTER – VII

Sl. No.	Course Code	Course Name	Hours/ Week			Credit	Contact Hours
			L	T	P	C	
THEORY							
1.	16CSD16	Internet Programming	3	0	2	4	5
2.	PE	Professional Elective – VI	3	0	0	3	3
3.	OE	Open Elective – I	3	0	0	3	3
4.	OE	Open Elective – II	3	0	0	3	3
5.	OE	Open Elective –III	3	0	0	3	3
6.	16CSF01	Project work – Phase I	0	0	6	3	6
		Total Credits				19	

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CURRICULUM UG R – 2016

Department	CSE
Programme	B.E.

SEMESTER – VIII

Sl. No.	Course Code	Course Name	Hours/ Week			Credit	Contact Hours
			L	T	P	C	
THEORY							
1.	16CSF02	Project work – Phase II	0	0	30	15	30
		Total Credits				15	

Total Credits to be earned for the award of the degree 180

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COMPUTER SCIENCE AND ENGINEERING

16CSD01	ADVANCED JAVA PROGRAMMING	L	T	P	C
		3	0	2	4

COURSE OBJECTIVES
- To understand the advanced concepts of java.
- Understand advanced java programming concepts like files, threads, Swings etc.
- To Understand advanced java networking concepts.
- To learn the concepts of web applications and multitier architecture.
- To understand the importance of advanced frameworks.

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

16CSD01.CO1	Distinguish the basic concepts and principles of structured, object oriented and graphics programming.
16CSD01.CO2	Work with Java I/O streams, networking and GUI based application development.
16CSD01.CO3	Work with Web application development using Java Server Faces.
16CSD01.CO4	Write web applications using Servelet and JSP.
16CSD01.CO5	Develop web services using REST/SOAP/JSON

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16CSD01.CO1	X	X	-	-	X	X	-	X	X	-	X	X	X	X	-
16CSD01.CO2	X	X	X	X	X	X	-	X	-	X	X	X	X	X	X
16CSD01.CO3	X	X	-	X	-	X	-	X	X	X	X	-	X	-	X
16CSD01.CO4	X	X	X	X	X	-	X	X	-	X	X	X	-	X	X
16CSD01.CO5	X	X	X	X	-	-	X	X	X	-	X	X	X	X	X

UNIT I   JAVA BASICS   9
Review of java basics - Java String Handling – Recursion - Files – streams – Working with Streams - File and I/O Handling - Threads – multithreading - object serialization – Swing components – Graphics and Java2D.

UNIT II   NETWORK PROGRAMMING IN JAVA   9
Sockets – secure sockets – custom sockets – UDP datagrams – multicast sockets – URL classes – Reading Data from the server – writing data – configuring the connection – Reading the header – telnet application – Java Messaging services.

UNIT III   WEB APPLICATION DEVELOPMENT   9
Overview of servlets – Servlet API – Servlet life cycle – Servlet configuration – Running Servlet with database connectivity - Servlet support for cookies – Session tracking – Basics of JSP –Java Server Faces – Multitier application Architecture – MVC architecture of JSF Apps – common JSF components – Session tracking –Cookies – Accessing databases in Web Apps – Java Beans component.

UNIT IV   SOFTWARE COMPONENTS   9
Distributed objects – RMI programming model – Parameters and return values in remote methods – Remote object activation - Web services and JAX-WS - Publishing and consuming SOAP based web services – REST-based web services – REST-based JSON web services.

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COMPUTER SCIENCE AND ENGINEERING

UNIT V   ADVANCED FRAMEWORK   9

Advanced Frameworks – Understanding Struts – MVC framework – Struts control flow – Building model view controller component - Hibernate – Architecture – Understanding O/R mapping – Query language – Spring framework – Architecture – Case studies.

TOTAL: L: 45

LIST OF EXPERIMENTS

1. Write a java program to store, delete and update data in a database with the support of jdbc- odbc connectivity.
2. Write a java program with servlets to create a dynamic html form to accept and display user name and password with the help of 'get ()' and 'post ()' methods.
3. Write a java program with servlets to store only valid data in a database with the support of jdbc-odb cconnectivity.
4. Write java servlet program for 'auto refreshing' the webpage after given period of time.
5. Write a java servlet program to demonstrate the use of cookies.
6. Write JSP program to implement form data validation to accept correct data.
7. Writeajspscripttodemonstratetheuseof<jsp:include…..>bydisplayinganexternalwebpageand<jsp:
    a. plugin ……> to run anapplet.
8. Write a jsp program for demonstrating creation and accessing javabeans.
9. Write a java program to demonstrate the use of java swing components.

TOTAL: P: 30

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Herbert Schildt	Java 2 - Complete Reference	Tata Mc Graw Hill	2011
2.	Bogdan Ciubotaru & Gabriel-Miro Muntean	Advanced Network Programming Principles & Techniques, Network Application Programming with Java	Springer Verlag	2013

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Elliotte Rusty Harold	Java Network Programming	O'Reilly Media	2013
2.	David Turner and Jinseok Chae	Java Web Programming with Eclipse	Create Space	2010
3.	Andrew Lee Rubinger, Bill Burke	Enterprise Java Beans 3.1	O'Reilly Media	2010
4.	Kiet T. Tran	Introduction to web services with Java	BI Publisher	2013
5.	Amuthan G	Spring MVC: Beginner's Guide	Packt Publishing	2014

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COMPUTER SCIENCE AND ENGINEERING

WEB URLs

1. http://java.sun.com/developer/onlineTraining/Programming/JDCBook
2. https://www.javatpoint.com/servlet-tutorial
3. http://java.sun.com/docs/books/tutorial/networking/TOC.html
4. http://my.execpc.com/~gopalan/java/java_tutorial.html
5. http://www.apl.jhu.edu/~hall/java/Servlet-Tutorial/

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COMPUTER SCIENCE AND ENGINEERING

16CSD02	DESIGN AND ANALYSIS OF ALGORITHMS	L	T	P	C
		3	0	0	3

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

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

16CSD02.CO1	Analyze the asymptotic performance of algorithm
16CSD02.CO2	Evaluate the performance of divide and conquer algorithm
16CSD02.CO3	Implement the various optimal solution using various algorithm
16CSD02.CO4	Apply pattern matching algorithm to find particular pattern
16CSD02.CO5	Differentiate polynomial and non-polynomial problems

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16CSD02.CO1	X	X	X	X	X	X	-	X	X	-	-	X	X	X	X
16CSD02.CO2	X	X	X	X	X	-	-	X	X	X	-	-	X	X	X
16CSD02.CO3	X	X	X	X	-	X	-	-	X	X	-	X	-	X	-
16CSD02.CO4	X	X	X	X	X	X	-	X	X	X	-	X	X	X	-
16CSD02.CO5	X	X	X	X	X	X		X	X	-	-	X	-	X	X

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 FORCEANDDIVIDE-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 PROGRAMMING AND GREEDY TECHNIQUE   9
Overview of servlets – Servlet API – Servlet life cycle – Servlet configuration – Running Servlet with database connectivity - Servlet support for cookies – Session tracking – Basics of JSP –Java Server Faces – Multitier application Architecture – MVC architecture of JSF Apps – common JSF components – Session tracking –Cookies – Accessing databases in Web Apps – Java Beans component.

UNIT IV   ITERATIVE IMPROVEMENT AND LIMITATIONOFALGORITHM   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

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UNIT V **BACKTRACKING, BRANCH AND BOUND AND APPROXIMATION** **9**
ALGORITHM

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: L: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Anany Levitin	Introduction to the Design and Analysis of Algorithms	Third Edition, Pearson Education,.	2012
2.	Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein	Introduction to Algorithms	Third Edition, PHI Learning Private Limited,	2012

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	Volumes 1& 3 Pearson Education,	2009
3.	A I. Chandra Mohan	Design and Analysis of Algorithms	PHI Learning Pvt. Ltd, 2nd Edition	2012
4.	Steven S. Skiena	The Algorithm Design Manual	Second Edition, Springer,	2008
5.	Manas Ranjan Kabat	Design And Analysis Of Algorithms	PHI Learning Pvt. Ltd, 2nd Edition	2013

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

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COMPUTER SCIENCE AND ENGINEERING

16CSD04	OBJECT ORIENTED SOFTWARE ENGINEERING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES
- To understand the basic concepts of System Engineering.
- To know the Architectural design and modal.
- To understand and analyze the design interactive system
- To implement the quality assurance using testing
- To examine the security to the software.

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

16CSD04.CO1	Choose the software modeling for various real time problems.
16CSD04.CO2	Examine the modal and framework for real-time applications
16CSD04.CO3	Illustrate interactive system for various applications.
16CSD04.CO4	Determine the quality of the software.
16CSD04.CO5	Design the effective software security management

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16CSD04.CO1	X	X	X	X	-	-	X	-	-	-	X	-	X	-	-
16CSD04.CO2	-	-	X	-	X	-	X	-	X	X	X	X	-	X	-
16CSD04.CO3	X	-	X	X	X	X	X	-	X	-	X	-	X	-	-
16CSD04.CO4	X	-	X	X	-	X	X	-	-	-	-	X	-	X	-
16CSD04.CO5	X	-	X		X	-	-	X	X	-	X	-	-	-	X

UNIT I   INTRODUCTION AND SYSTEM ENGINEERING   9

Introduction: Software Life-Cycle Activities - Object-Oriented Software Engineering - Software Process and Methodology: Software Process - Software Process Models- Software Development Methodology- Agile Methods – System Engineering: - Requirements - Architectural Design

UNIT II   ANALYSIS AND ARCHITECTUREAL DESIGN   9

Software Requirements Elicitation - Domain Modeling - Object Orientation and Class Diagram- Steps for Domain Modeling- Architectural Design: Process-Style and Package Diagram –Applying software Design Principles

UNIT III   MODELING AND DESIGN OF INTERATIVE SYSTEMS   9

Deriving Use Cases from Requirements - Actor-System Interaction Modeling - Object Interaction Modeling - Applying Responsibility-Assignment Patterns : Specification –Controller-expert-creator patterns- Deriving a Design Class Diagram - User Interface Design: GUI widgets-Process.

UNIT IV   IMPLEMENTATION AND QUALITY ASSURANCE   9

Implementation Considerations - Software Quality Assurance : Quality Measurements and Metrics- Software Verification and validation Techniques- Functions- Software Testing: Black box and white box testing- OO software testing – Testing Web Applications – Testing for Non Functional Requirements- Testing Life Cycle –Regression Testing

UNIT V   MAINTENANCE CONFIGURATION AND PROJECT MANAGEMENT   9

Software Maintenance- Software Configuration Management- Software Project Management : Project Organization   -Effort Estimation Methods - Project Planning and Scheduling -Risk Management – Process improvement -Software Security : Software Security in the Life Cycle - Applying Agile Principles- Software Tools

TOTAL: L: 45

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TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	David Kung	Object-Oriented Software Engineering: An Agile Unified Methodology	McGraw-Hill Education	2013
2.	Bernd Bruegge & Allen H. Dutoit	Object-Oriented Software Engineering Using UML, Patterns, and Java	Prentice Hall	2010

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Timothy C. Lethbridge	Object-Oriented Software Engineering	McGraw-Hill Education	2005
2.	Ivar Jacobson	Object-oriented software engineering: a use case driven approach	ACM Press	2007
3.	Stephen R. Schach	Object-oriented Software Engineering	McGraw-Hill Education	2007
4.	Stephen R. Schach	Object-Oriented and Classical Software Engineering - Irwin Computer Science	McGraw-Hill Education	2010
5.	Bernd Bruegge & Allen H. Dutoit	Object-Oriented Software Engineering Conquering Complex and Changing Systems	Prentice Hall.	1997

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2. http://www.tutorialspoint.com/software_engineering/
3. https://sites.google.com/site/atulkg/courses/cs-504-object-oriented-software-engineering-2012
4. http://www.cse.lehigh.edu/~glennb/oose/oose06.htm
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COMPUTER SCIENCE AND ENGINEERING

16CSD05	OPERATING SYSTEMS	L	T	P	C
		3	0	2	4

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

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

16CSD05.CO1	Define structures of Operating System
16CSD05.CO2	Interpret Process Management and Threading.
16CSD05.CO3	Assess Synchronization and Deadlock.
16CSD05.CO4	Adapt Memory Management techniques.
16CSD05.CO5	Determine File system and Storage Management

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16CSD05.CO1	X	X	X	X	-	-	X	-	-	X	-	X	X	-	X
16CSD05.CO2	X	-		X	X	-		X	X	X	X	X	-	-	X
16CSD05.CO3	X	X	X	X	-	X	X	-	X	X	X	X	X	-	X
16CSD05.CO4	X	-	X	X	X	-		X	-	-	X	X	X	-	-
16CSD05.CO5	X	X	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 SYNCHRONIZATION AND 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
File System Interface: File Concept – Access Methods – Directory and Disk Structure – Protection. **File System Implementation:** File System Structure – File System Implementation – Directory

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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: L: 45

LIST OF EXPERIMENTS

1. 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.
11. Exploring basic commands under Linux Operating systems

TOTAL : P : 30

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, 9th Edition	2015
2.	Harvey M. Deitel	Operating Systems	Pearson Education,3rd Edition.	2007

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Andrew S. Tanenbaum	Modern OperatingSystems	Prentice Hall of India, 3rd Edition	2009
2.	William Stallings	Operating Systems: Internalsand Design Principles	Prentice Hall of India, 6th Edition	2009
3.	D M Dhamdhere	Operating Systems: AConcept-Based Approach	Tata Mc-graw Hill Publishing3rd Edition	2012
4.	Charles Crowley	Operating System: ADesign-Oriented	Tata Mc-graw Hill Publishing, 1st edition	2009
5.	Evi Nemeth , Garth Snyder, Trent R.Hein,Ben Whaley , Dan Mackin	UNIX and Linux System Administration Handbook	Prentice Hall of India, 4th Edition	2010

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3. cs140.stanford.edu/
4. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-828-operating-system-engineering-fall-2012/
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16CSD06	OBJECT ORIENTED ANALYSIS AND DESIGN	L	T	P	C
		3	0	2	4

COURSE OBJECTIVES
- To develop background knowledge as well as core expertise in object oriented system.
- To learn the basics of OO analysis and design skills.
- To create the UML design diagrams.
- To learn to map design to code.
- To be exposed to the various testing techniques

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

16CSD06.CO1	Design a projects using Object Oriented concepts.
16CSD06.CO2	Recognize Design patterns using UML.
16CSD06.CO3	Analyze the case studies using UML diagrams.
16CSD06.CO4	Summarize the use case Logical architecture and UML Package diagram
16CSD06.CO5	Demonstrate various OOAD diagrams for real time problems.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16CSD06.CO1	X	X	X	X	X	-	X	-	-	-	X	-	X	-	-
16CSD06.CO2	-	X	X	X	X	X	-	-	X	-	X	-	-	X	-
16CSD06.CO3	-	X	-	X	X	X	X	-	-	X	X	-	-	-	-
16CSD06.CO4	-	X	-	-	-	-	X	-	-	-	-	-	X	-	-
16CSD06.CO5	X	-	-	X	X	X	-	X	X	-	X	X	-	-	X

UNIT I   UML DIAGRAMS   9
Introduction to OOAD – Unified Process – UML diagrams – Use Case – Class Diagrams– Interaction Diagrams – State Diagrams Activity Diagrams – Package, component and Deployment Diagrams.

UNIT II   DESIGN PATTERNS   9
GRASP: Designing objects with responsibilities – Creator – Information expert – Low Coupling – High Cohesion –Controller–Design Patterns – creational – factory method – structural – Bridge – Adapter – behavioural – Strategy– Observer.

UNIT III   CASE STUDY   9
Case study – the Next Gen POS system, Inception -Use case Modelling – Relating Use cases – include, extend and generalization – Elaboration – Domain Models – Finding conceptual classes and description classes – Associations – Attributes – Domain model refinement – Finding conceptual class Hierarchies – Aggregation and Composition.

UNIT IV   APPLYING DESIGN PATTERNS   9
System sequence diagrams – Relationship between sequence diagrams and use cases Logical architecture and UML Package diagram – Logical architecture refinement – UML class diagrams – UML interaction diagrams

UNIT V   CODING AND TESTING   9
Applying GoF design patterns. Mapping design to code – Testing: Issues in OO Testing – Class Testing – OO Integration Testing –GUI Testing – OO System Testing.

TOTAL: L: 45

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LIST OF EXPERIMENTS

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

TOTAL : P : 30

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	David Kung	Object-Oriented SoftwareEngineering: An Agile Unified Methodology	McGraw-Hill Education	2013
2.	Bernd Bruegge & Allen H. Dutoit	Object-Oriented Software Engineering Using UML, Patterns, andJava	Prentice Hall	2010

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Martin Fowler	UML Distilled	PHI/Pearson Education	2007
2.	James Rumbaugh Ivar Jacobson Grady Booch	The Unified Modelling Language Reference Manual	Addison Wesley,	2005
3.	Grady Booch, Robert Maksimchuk, MichaelEngle, Jim Conallen, Kelli Houston, Bobbi Young Ph.D.	Object-Oriented Analysis and Design with Applications	Pearson Education	2007
4.	Brett McLaughlin, GaryPollice, David West	Head First Object-OrientedAnalysis and Design	O'Reilly Media	2006
5.	Brahma Dathan, Sarnath Ramnath	Object-Oriented Analysis, Design and Implementation	Springer	2015

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16CSD07	COMPUTER NETWORKS	L	T	P	C
		3	0	2	4

COURSE OBJECTIVES

To understand the state-of-the-art in network protocols, architectures and applications.
- To gain knowledge about the functions of error detection and flow control mechanism.
- To be familiar with the address mapping using various protocols.
- To learn about routing algorithms in computer networking.
- To get familiarized with different protocols in application layer.

COURSE OUTCOMES:

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

16CSD07.CO1	Understand the different aspects of networks, protocols and design models.
16CSD07.CO2	Analyze various Error detection and Flow Control mechanism
16CSD07.CO3	Construct the functions of network layer in internetworking
16CSD07.CO4	Select appropriate routing algorithms for a network.
16CSD07.CO5	Design the internal functionalities of protocols in Application Layer Security

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16CSD07.CO1	X	-	X	-	X	-	-	X	-	-	X	X	X	-	X
16CSD07.CO2	X	X	X	X	-	-	-	-	X	X	-	-	-	X	-
16CSD07.CO3	X	-	X	X	X	-	-	-	X	X	-	-	-	-	X
16CSD07.CO4	X	-	-	X	X	-	-	X	-	X	X	-	X	-	X
16CSD07.CO5	-	X	X	-	X	-	X	-	-	-	-	X	-	X	-

UNIT I   INTRODUCTION, PHYSICAL LAYER   9

Overview: Data Communication - Network Types - Internet History –Topology- Network model: OSI Model , TCP/IP ProtocolSuite - Digital Signals - Data rate limits - Performance - Transmission Media: Guided Media- Unguided Media.

UNIT II   DATA LINK LAYER   9

Error Detection and Correction - Flow Control- Data Link Control - Data Link Layer Protocols - HDLC - PPP - Media AccessControl - Ethernet - Wireless LANs: IEEE 802.11, Bluetooth –Switching - Connecting Devices.

UNIT III   NETWORK LAYER   9

Logical Addressing: IPv4 Addresses – subnetting – CIDR - IPv6 Addresses – Internetworing - IPv4 - IPv6 - Transition from IPv4to IPv6 –Address Mapping: ARP- RARP- DHCP- Error Reporting: ICMP- Multicating: IGMP.

UNIT IV   ROUTING AND TRANSPORT LAYER   9

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

UNIT V   APPLICATION LAYER AND SECURITY   9

World Wide Web and HTTP - FTP - Electronic Mail - Telnet - Secure Shell - Domain Name System - Cryptographic Algorithms - Authentication Protocols - Message Integrity   Protocols   -

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Public Key Distribution(X.509) - Network Layer Security - Transport Layer Security - Application
Layer Security - Firewalls.

TOTAL: L: 45

LIST OF EXPERIMENTS

1. Demonstrate various network commands.
2. Develop client server based TCP applications using UNIX socket programming functions.
3. Develop client server based UDP applications using UNIX socket programming functions.
4. Implementation of HTTP/DNS/ARP/RARP protocols.
5. Implementation of sliding window and CRC protocols.
6. Implementation of Distance Vector and Link state routing protocols.
7. Study of network simulation tool - NS2.
8. Performance analysis of TCP/UDP protocol using simulation tool
9. Performance analysis of routing protocols using simulation tool.
10. Analyze the network traffic using Wire shark tool.

TOTAL: P: 30

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Behrouz A.Foruzan	Data communication and Networking	Tata McGraw-Hill	2013
2.	Larry L. Peterson and Bruce S. Davie	Computer Networks: Asystems approach	Morgan Kaufmann Publishers	2010

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Mani Subramanium	Network Management Principles and practices	Pearson Education	2010
2.	Andrew S Tanenbaum, David J. Wetherall	Computer Networks	Prentice Hall of India/ Pearson Education	2010
3.	William Stallings	Data and Computer Communications	Pearson Education	2013
4.	James F. Kurose, Keith W. Ross	Computer Networking, A Top–Down Approach Featuring the Internet	Pearson Education	2012
5.	Ying-Dar Lin, Ren-Hung Hwang, Fred Baker	Computer Networks: An Open Source Approach	McGraw Hill Publisher	2011

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2. http://compnetworking.about.com/od/basicnetworkingconcepts/a/network_t ypes.htm
3. http://www.protocols.com/pbook/tcpip1.htm
4. http://docs.oracle.com/cd/E23824_01/html/821-1453/ipv6-troubleshoot-2.html
5. http://searchsecurity.techtarget.com/tip/Get-ready-for-IPv6-Five-security-issues-to-consider

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COMPUTER SCIENCE AND ENGINEERING

16CSD08	PRINCIPLES OF COMPILER DESIGN	L	T	P	C
		3	0	2	4

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

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

16CSD08.CO1	Apply automata theory concepts to Regular Expression.
16CSD08.CO2	Design a lexical analyzer for Tokenization
16CSD08.CO3	Implement the various types of Parsers.
16CSD08.CO4	Generate Intermediate code for different statements.
16CSD08.CO5	Formulate target program using optimization techniques

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16CSD08.CO1	X	X	X	-	-	-	-	-	X	-	-	-	X	X	-
16CSD08.CO2	X	X	X	-	-	-	-	X	X	-	X	X	X	X	-
16CSD08.CO3	X	X	X	X	-	-	-	X	X	-	-	-	X	X	X
16CSD08.CO4	X	X	X	-	-	-	-	-	X	-	-	X	-	X	-
16CSD08.CO5	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 Lexical Analyzer – 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.

UNIT III SYNTAX 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 INTERMEDIATE CODE GENERATION 9
Intermediate languages – Declarations – Assignment Statements – Boolean Expressions – Case Statements – Back patching –Procedure calls.

UNIT V CODE OPTIMIZATION AND CODE GENERATION 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: L: 45

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LIST OF EXPERIMENTS

1. Implementation of lexical analyzer in C.
2. Implementation of lexical analyzer using LEX tool.
3. Implementation of the recursive descent parser for an expression grammar that generates arithmetic expressions with digits, + and *.
4. Implementation of a parser for the same grammar as given in problem using YACC and LEX.
5. Write semantic rules to the YACC program in problem 5 and implement a calculator that takes an expression with digits, + and * and computes and prints its value.
6. Implementation of the front end of a compiler that generates the three address code for a simple language with: one data type integer, arithmetic operators, relational operators, variable declaration statement, one conditional construct, one iterative construct and assignment statement.
7. Implementation of back end of a compiler using C.
8. Stack implementation of LR parser using C.

TOTAL : P : 30

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Alfred AhoRavi Sethi Jeffrey D Ullman	Compilers Principles Techniques and Tools	Pearson Education	2014
2.	J.E.Hopcroft, R.Motwani and J.DUllman	Introduction to Automata Theory, Languages and computation	Pearson Education	2003

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Fischer C NLeBlanc R J	Crafting a compiler with C	Benjamin Cummings	2003
2.	Bennet J P	Introduction to Compiler Techniques	Tata McGraw Hill	2003
3.	Kenneth C Louden	Compiler Construction Principles andPractice	Thompson Learning	2003
4.	Henk Alblas and Albert Nymeyer	Pract ice and Principles of Compiler Building with C	PH.	2001
5.	Alfred V. Ahoet.al	Compilers Principles, Techniques and Tools	Pearson Education	2007

WEB URLs

1. http://www.personal.kent.edu/~rmuhamma/Compilers/compiler.html
2. http://www.cs.rpi.edu/~moorthy/Courses/compiler98/Lectures/lecturesinppt/
3. http://www.cse.iitd.ernet.in/~sak/courses/cdp/slides.pdf
4. http://www.cs.nyu.edu/courses/fall06/G22.2130-001/lectures/lectures.html
5. http://www.nptel.ac.in/courses/Webcourse-contents/IIT-KANPUR/30Oct/sanjeev/power-system/ui/TOC.htm

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COMPUTER SCIENCE AND ENGINEERING

16CSD09	CRYPTOGRAPHY AND NETWORK SECURITY	L	T	P	C
		3	2	0	4

COURSE OBJECTIVES
- To understand Mathematical Logics behind Cryptography.
- To know the principles and methods of conventional and advanced encryption algorithms..
- To understand the standard algorithms used to provide confidentiality, integrity and authenticity.
- To learn the techniques used for message authentication and confidentiality maintenance
- To understand security issues in the wireless networks.

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

16CSD09.CO1	Understand the security issues and cipher techniques in networks.
16CSD09.CO2	Examine the different cryptographic operations of symmetric cryptographic algorithms and public key cryptosystems.
16CSD09.CO3	Apply the protocols for hash functions and make use of it to solve problems.
16CSD09.CO4	Contrast the Authentication schemes to simulate different applications.
16CSD09.CO5	Compose various Security practices and System security standards.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16CSD09.CO1	x	x	x	x	-	x	-	-	-	-	x	-	-	x	-
16CSD09.CO2	x	x	x	x	-	-	-	x	-		x	-	x	-	x
16CSD09.CO3	x	x	x	-	x	x	x	-	-	-	x	x	-	x	-
16CSD09.CO4	x	-	x	x	-	x	x	-	x	-	x	x	x	x	-
16CSD09.CO5	x	-	x	-	x	x		-	-	-	-	x	x	-	x

UNIT I   INTRODUCTION   9+6
Computer Security Concepts - OSI Security Architecture - Security Attacks – Services – Mechanisms - Model for Network Security - Classical Encryption Techniques - Substitution – Transposition Techniques - LFSR sequences - Basic Concepts in Number Theory and Finite Fields - Euclidean Algorithm- Fermat and Euler's theorem - continued fractions.

UNIT II   SYMMETRIC CIPHERS & PUBLIC KEY CRYPTOGRAPHY   9+6
Classical Encryption Techniques - Block Ciphers: Modes of operation - Block Cipher Principles - Data Encryption Standard-DES Example- Strength of DES - Triple DES- the Origins AES - **PUBLIC KEY CRYPTOGRAPHY**- Principles of public key cryptosystems-The RSA algorithm-Key management - Diffie Hellman Key exchange- Elliptic curve arithmetic - Elliptic curve cryptography.

UNIT III   DATA INTEGRITY ALGORITHMS & DIGITAL SIGNATURES   9+6
Hash Functions - Applications - Requirements - Secure Hash Algorithm (SHA) - SHA-3 - Message Authentication Codes (MAC) - MACs based on Hash Functions: HMAC– CMAC–MD5 – Digital Signatures - Digital Signature Standard (DSS).

UNIT IV   AUTHENTICATION, E-MAIL & WEB SECURITY   9+6
Authentication applications – Kerberos version4, X.509-Electronic Mail security: Pretty Good Privacy (PGP), S/MIME – IP security – Web Security: SSL, TLS, SET: SET for E-Commerce Transactions.

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UNIT V   SYSTEM LEVEL SECURITY, MALICIOUS SOFTWARE   9+6

System Security: Intruders – viruses – Firewalls – Security Standards. Malicious Software: Types of Malicious Software - Viruses – Worms.

TOTAL: L: 45 + T : 30 = 75

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	William Stallings	Cryptography and Network Security	Prentice Hall	2014
2.	AtulKahate	Cryptography and Network Security	Tata McGraw Hill	2013

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Charles B. Pfleeger, Shari Lawrence Pfleeger	Security in Computing	Pearson Education	2011
2.	William Stallings	Cryptography andNetwork Security	Pearson Education	2013
3.	William Stallings	Cryptography and Network security Principles and Practices	Pearson Education	2010
4.	Javier López,Gene Tsudik	Applied Cryptography and Network Security	Springer	2011
5.	Niels Ferguson	Cryptography Engineering: Design Principles and Practical Applications	John Wiley	2010

WEB URLs

1. http://tolearnsecurity.blogspot.in/2012/08/the-osi-security-architecture.html
2. http://searchsecurity.techtarget.com/definition/RSA
3. http://www.iet.unipi.it/g.dini/Teaching/sanna/lecturenotes/applied-cryptography-digital-signature.pdf
4. https://ssd.eff.org/en/module/introduction-public-key-cryptography-and-pgp
5. http://www.webopedia.com/TERM/F/firewall.html

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16CSD10	OPEN SOURCE SOFTWARE	L	T	P	C
		3	0	2	4

COURSE OBJECTIVES
- To be exposed to the context and operation of free and open source software communities and development with Linux.
- To be familiar with participating in MySQL project
- To learn scripting language PHP
- To learn List, tuple, dictionaries using programming language like Python
- To learn some important FOSS tools and techniques

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

16CSD10.CO1	Install and run open-source operating systems
16CSD10.CO2	Analyze the information about free and open source software projects using MySQL
16CSD10.CO3	Construct one or more free and open source software packages using PHP
16CSD10.CO4	Develop a program using List, tuples, dictionaries for real time problems
16CSD10.CO5	Implement the software tools to interact with open source software projects

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16CSD10.CO1	x	-	x	-	x	-	-	x	x	-	x	-	-	-	x
16CSD10.CO2	x	x	-	x	x	x	-	-	-	x	-	-	-	x	-
16CSD10.CO3	x	-	x	x	x	-	x	-	-	-	x	-	x	-	-
16CSD10.CO4	x		x	x	x	x	-	-	x	-	-	x	-	x	-
16CSD10.CO5	x	x	x	-	x	-	-	x	-	-	x	-	-	-	x

UNIT I   INTRODUCTION   9
Introduction to Open sources - Need of Open Sources - Advantages of Open Sources - Application of Open Sources. Open source operating systems: LINUX: Introduction - General Overview - Kernel Mode and user mode - Process - Advanced Concepts - Scheduling - Personalities - Cloning – Signals - Development with Linux.

UNIT II   OPEN SOURCE DATABASE   9
MySQL: Introduction - Setting up account - Starting, terminating and writing your own SQL programs - Record selection Technology - Working with strings - Date and Time - Sorting Query Results - Generating Summary - Using sequences - MySQL and Web

UNIT III   OPEN SOURCE PROGRAMMING LANGUAGES   9
PHP: Introduction - Programming in web environment - variables - constants - data types - operators - Statements - Functions - Arrays - OOP - String Manipulation and regular expression - File handling and data storage - PHP and SQL database - PHP and LDAP - PHP Connectivity

UNIT IV   PYTHON   9
Syntax and Style - Python Objects - Numbers - Sequences - Strings - Lists and Tuples - Dictionaries - Conditionals and Loops - Files - Input and Output - Errors and Exceptions - Functions - Modules - Classes and OOP.

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UNIT V   OPEN SOURCE TOOLS AND TECHNOLOGIES   9
MDA: Introduction to MDA - Genesis of MDA - Meta Object Facility - UML - UML Profiles - MDA Applications.

TOTAL: L: 45

LIST OF EXPERIMENTS

1. Installation of Linux.
2. Basics of Linux commands
3. Installation of MySQL
4. Connection establishment with PHP and MySQL database
5. Installation of PHP
6. String manipulation using PHP
7. Implementation of PHP cookies
8. Installation of Python
9. Implementation of dictionary operation using Python
10. Online ticket reservation using Python with MySQL Database

TOTAL: P: 30

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Remy Card, Eric Dumas and Frank Mevel	The Linux Kernel Book	Wiley Publications	2003
2.	Paul DuBois	MySQL CookBook	Second Edition, O' Reilly	2006
3.	Rasmus Lerdorf and Levin Tatroe	Programming PHP	O'Reilly	2002
4.	Stephen J. Mellor, Marc Balces	Executable UMS: A foundation for MDA	Addison Wesley	2002
5.	Wesley J. Chun	Core Phython Programming	Second Edition, Prentice Hall	2006

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Steven Holzner	PHP: The Complete Reference	Tata McGraw-Hill Publishing Company Limited	2009
2.	Vikram Vaswani	MYSQL: The Complete Reference	Tata McGraw-Hill Publishing Company Limited	2009
3.	Wesley J. Chun	Core Python Programming	Prentice Hall	2001

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WEB URLs

1. https://www.w3schools.com/php/
2. https://www.tutorialspoint.com/python3/
3. https://www.tutorialspoint.com/php/
4. https://en.wikipedia.org/wiki/Open-source_software
5. https://www.tutorialspoint.com/mysql/

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COMPUTER SCIENCE AND ENGINEERING

16CSD11	THEORY OF COMPUTATION	L	T	P	C
		3	2	0	4

COURSE OBJECTIVES
- To have an understanding of finite automata
- To understand the Regular languages.
- To understand the context free grammar and languages
- To know the design and implementation of pushdown automata
- To know the design and implementation of turing machines.

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

16CSD11.CO1	Understand the finite automata for different type of problems
16CSD11.CO2	Apply the grammar for regular languages.
16CSD11.CO3	Analyze the properties of Context free languages.
16CSD11.CO4	Develop the pushdown automata.
16CSD11.CO5	Implementation of Turing machines.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16CSD11.CO1	x	x	x	x	-	-	-	-	-	x	-	-	-	x	-
16CSD11.CO2	x	x	-	x	x	-	-	-	x	-	x	-	x	-	x
16CSD11.CO3	-	x	x	-	x	x	x	-	x	-	-	-	x	-	-
16CSD11.CO4	x	x	x	-	x	x	-	-	x	-	-	x	x	-	-
16CSD11.CO5	-	-	x	-	x	-	x	-	x	x	-	-	-	x	-

UNIT I   FINITE AUTOMATA   9+6
Introduction- Basic Mathematical Notation and techniques- Finite State systems – Basic Definitions – Finite Automaton – DFA & NDFA – Finite Automaton with €- moves — Equivalence of NFA and DFA – Equivalence of NDFA's with and without €-moves – Minimization of DFA.

UNIT II   REGULAR LANGUAGES   9+6
Chomsky hierarchy of languages.- Regular Languages- Regular Expression- Equivalence of finite Automaton and regular expressions - Pumping Lemma for Regular sets – Problems based on Pumping Lemma-Closure Properties of Regular Languages.

UNIT III   CONTEXT FREE GRAMMARS   9+6
Grammar Introduction– Types of Grammar - Context Free Grammars and Languages– Derivations and Languages – Ambiguity- Relationship between derivation and derivation trees – Simplification of CFG – Elimination of Useless symbols - Unit productions - Null productions – Greiback Normal form –Chomsky normal form – Problems related to CNF and GNF.

UNIT IV   PUSHDOWN AUTOMATA   9+6
Pushdown Automata- Definitions – Moves – Instantaneous descriptions – Deterministic pushdown automata – Equivalence of Pushdown automata and CFL - pumping lemma for CFL – problems based on pumping Lemma. Closure Properties of Context free Languages.

UNIT V   TURING MACHINES   9+6
Definitions of Turing machines – Models – Computable languages and functions –Techniques for Turing

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machine construction – Multi head and Multi tape Turing Machines -Universal Turing machine - The Halting problem – Partial Solvability – Problems about Turing machine- Recursive and recursively enumerable languages.

TOTAL: L: 45 + T : 30 = 75

TEXT BOOKS:

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

REFERENCE BOOKS:

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

WEB URLs

1. https://www.youtube.com/watch?v=nqvDdT4h4iQ
2. https://www.youtube.com/watch?v=eqCkkC9A0Q4
3. https://www.youtube.com/watch?v=al4AK6ruRek
4. https://www.youtube.com/watch?v=rnGpW6RRAcw
5. https://www.youtube.com/watch?v=-aIRqNnUvEg

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COMPUTER SCIENCE AND ENGINEERING

16CSD12	COMPUTER ARCHITECTURE	L T P C
		3 2 0 4

COURSE OBJECTIVES
- To understand the basic structure of a digital computer
- To discuss the operation of various components of computing systems
- To enhance the processor operation by employing pipelining
- To study the different memory system and its performance.
- To understand the Peripherals and I/O Organization

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

16CSD12.CO1	Understand the organization and working principle of computer hardware component
16CSD12.CO2	Analyzing various metrics of performance
16CSD12.CO3	Implement the operation of a pipelining processor
16CSD12.CO4	Examine the hierarchical memory system and data transfer in a digital computer
16CSD12.CO5	Formulate the ways of communication between a processor and I/O devices

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16CSD12.CO1	X	X	X		X	-	-	X	X	-	-	-	X	-	X
16CSD12.CO2	X	X	-	X	-	-	-	-	-	-	-	-	X	X	-
16CSD12.CO3	X	-	-	X	-	-	-	-	-	-	X	-	-	X	X
16CSD12.CO4	X	X	-	-	-	X	X	X	-	-	-	-	X	-	-
16CSD12.CO5	X	-	X	-	X	-	-	-	-	-	-	X	X	X	-

UNIT I   BASIC STRUCTURE OF COMPUTERS   9+6
Functional Units–Basic Operational Concepts–Bus Structures–Software Performance – Memory Locations and Addresses–Memory Operations–Instruction and Instruction Sequencing–Addressing Modes– Assembly Language – Basic I/O Operations – Stacks and Queues.

UNIT II   ARITHMETIC AND LOGIC UNIT   9+6
Addition and Subtraction of Signed Numbers – Design of Fast Adders –Multiplication of Positive Numbers – Signed Operand Multiplication and Fast Multiplication– Integer Division – Floating Point Numbers and Operations

UNIT III   BASIC PROCESSING UNIT AND PIPELINING   9+6
Fundamental Concepts–Execution of a Complete Instruction–Multiple Bus Organization–Hardwired Control – Microprogrammed Control – Pipelining– Basic Concepts– Data Hazards – Instruction Hazards – Influence on Instruction Sets- Datapath and control considerations- Superscalar operation.

UNIT IV   MEMORY SYSTEM   9+6
Basic Concepts– Semiconductor RAM– ROM– Speed, Size and Cost– Cache Memories– Performance Considerations – Virtual Memory– Memory Management Requirements Secondary Storages.

UNIT V   PERIPHERALS AND I/O ORGANIZATION   9+6
Input and output devices- Serial communication links – Accessing I/O Devices – Interrupts – Direct Memory Access– Buses– Standard I/O Interfaces (PCI, SCSI, and USB).

TOTAL: L: 45 + T : 30 = 75

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TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Carl Hamacher, ZvonkoVranesic andSafwatZaky	Computer Organization	5th Edition, McGraw-Hill	2002
2.	Sivarama P. Dandamudi	Fundamentals of Computer organizationand Design	Springer International Edition	2003

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	William Stallings	Computer Organization and Architecture - Designing for Performance	Ninth Edition, Prentice Hall	2012
2.	David A.Patterson and John L.Hennessy	Computer Organization and Design: The hardware/ softwareinterface	Fourth Edition, Morgan Kaufmann	2012
3.	John P.Hayes	Computer Architecture andOrganization	Third Edition, McGrawHill	2012
4	Govindarajalu	Computer Architecture and organization: Design Principles andApplications	TMH Publishing CompanyLtd.,	2004
5	M Morris Mano	Computer System Architecture	Prentice Hall of India	2001

WEB URLs

1. https://www.youtube.com/watch?v=sUARoBQRGco
2. https://www.youtube.com/watch?v=UsK5KV1FPmA
3. https://www.youtube.com/watch?v=pIBwr7Rx-1M
4. https://www.youtube.com/watch?v=3YHAOib_7K8
5. http://freevideolectures.com/Course/2277/ComputerOrganization/15

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COMPUTER SCIENCE AND ENGINEERING

16CSD13	COMPUTER GRAPHICS	L	T	P	C
		3	0	2	4

COURSE OBJECTIVES
- To understand computational development of graphics with mathematics and to learn 2D concepts.
- To provide in-depth knowledge of display systems, image synthesis, shape modeling of 3D application.
- To understand basic concepts related to Multimedia including data interface standards, database and software.
- To study different compression and decompression techniques, file formats and Multimedia I/O technologies.
- To understand the hypermedia applications.

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

16CSD13.CO1	Understand the concept of 2D transformation and clipping
16CSD13.CO2	Develop applications using 3D transformation and clipping
16CSD13.CO3	Construct design multimedia system architecture
16CSD13.CO4	Apply different types of coding and compression techniques in multimedia
16CSD13.CO5	Create a hypermedia message for multimedia system application

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16CSD13.CO1	X	X	-	-	-	-	-	X	-	-	-	X	X	-	-
16CSD13.CO2	X	X	X	-	-	-	X	X	-	-	-	-	X	-	X
16CSD13.CO3	X	X	X	-	X	-	-	-	-	X	X	X	X	X	-
16CSD13.CO4	X	X	X	X	-	X	-	X	-	-	-	X	-	X	-
16CSD13.CO5	X	X	X	-	-	-	-	-	X	-	-	X	-	X	X

UNIT I   INTRODUCTION   9
Introduction - Data representation techniques - Line - Curve and ellipse drawing algorithms – Attributes – Two Dimensional geometric transformations - Two-dimensional clipping and viewing.

UNIT II   TWO DIMENSIONAL GRAPHICS   9
Three-dimensional object representations - Three-dimensional geometric and modelling transformations - Three Dimensional viewing - Color models – Animation – Multimedia applications.

UNIT III   MULTIMEDIA   9
Multimedia system architecture   Evolving technologies for multimedia - Defining objects for multimedia systems - Multimedia data interface standards - Multimedia databases.

UNIT IV   NETWORK SECURITY IN MULTIMEDIA   9
Compression and decompression techniques - Data and file format standards - Multimedia I/O technologies - Digital voice and audio - Video image and animation - Full motion video - Storage and retrieval technologies - Multimedia authoring and user interface.

UNIT V   REAL WORLD APPLICATIONS IN MULTIMEDIA   9
Hypermedia messaging - Mobile messaging - Hypermedia message component Creating hypermedia message - Integrated multimedia message standards - Integrated document management - Distributed multimedia systems applications.

TOTAL: L: 45

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LIST OF EXPERIMENTS

1. Implement Bresenham's algorithms for line, circle and ellipse drawing.
2. Perform 2D Transformations such as translation, rotation, scaling, reflection and sharing.
3. Implement Cohen-Sutherland 2D clipping and window-view port mapping.
4. Perform 3D Transformations such as translation, rotation and scaling.
5. Visualize projections of 3D images.
6. Color model conversion.
7. Implement text compression algorithm.
8. Implement image compression algorithm.
9. Perform animation using any animation software.
10. Perform basic operations on image using any image editing software

TOTAL : P : 30

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Donald Hearn Pauline Baker M	Computer Graphics C Version	Pearson Education	2011
2.	Prabat K Andleigh Kiran Thakrar	Multimedia Systems and Design	PHI	2009

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	James D Foley Andriesvan Dam Feiner K John F Hughes	Computer Graphics: Principlesand Practice	Pearson Education	2013
2.	Judith Jeffcoate	Multimedia in practice technology and Applications	PHI	2007
3.	Foley, van Dam, Feiner, andHughes	Computer Graphics: Principles and Practice	3rd edition	2008
4	Peter Shirley, Michael Ashikhmin, Michael Gleicher, Stephen R Marschner, Erik Reinhard, Kelvin Sung, and AK Peters,	Fundamental of Computer Graphics,	CRC Press	2010
5	Jeffrey McConnell,	Computer Graphics: Theory intoPractice	Jones and Bartlett Publishers	2006

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COMPUTER SCIENCE AND ENGINEERING

WEB URLs

1. http://www.2learn.ca/TeacherTools/multimedia/mmediahowto.html
2. http://www.courses.psu.edu/art/art201_jxm22/tutorials.html
3. http://www.graphics.cornell.edu/online/tutorial
4. http://www.student.kuleuven.be/~m0216922/CG
5. http://www.geocities.com/SiliconValley/Park/9784/tut.html

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COMPUTER SCIENCE AND ENGINEERING

16CSD15	ADVANCED DATA STRUCTURES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES
- To understand the non-linear data structures
- To learn the heaps and tree structure.
- To understand and solve the problems of set and graphs
- To implement search techniques
- To study algorithm design and analysis for various real time problems.

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

16CSD15.CO1	Understand nonlinear Data structure algorithms
16CSD15.CO2	Construct heaps and Tree structure
16CSD15.CO3	Analyze the mathematical model by applying Set and graph
16CSD15.CO4	Implement different searching techniques
16CSD15.CO5	Develop algorithms for real time problems

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16CSD15.CO1	x	-	x	-	x	-	-	x	-	-	-	-	x	-	-
16CSD15.CO2	-	x	-	x	x	x	-	-	-	-	x	x	-	x	x
16CSD15.CO3	x	-	x	-	x	-	-	-	-	x	-	-	-	-	x
16CSD15.CO4	-	x	-	x	-	-	x	-	x	-	-	x	x	x	-
16CSD15.CO5	-	x	x	-	x	-	-	-	-	-	x	-	-	x	-

UNIT I   NON-LINEAR DATA STRUCTURES   9
Binary tree – Implementation - Types of Binary Trees - Tree traversals - Binary Search Tree - AVL Trees; Threaded binary trees - Red-Black Trees- Splay tree- B-tree- B+ tree – Application of trees.

UNIT II   HEAPS AND TREE STRUCTURE   9
Heaps – Implementation - Application of Heaps – Priority Queues; Tree structure.

UNIT III   SET AND GRAPHS   9
Disjoint Set ADT - Dynamic Equivalence problem - Smart Union Algorithms - Path Compression - Application of sets; Graphs - Representation – Graph Traversals - Spanning Trees – Shortest path Algorithms –Network Flow problems- Applications ofGraphs.

UNIT IV   SEARCH TECHNIQUES   9
Hashing - Hash functions – Collision Resolution Techniques – Separate Chaining and Open addressing- Double hashing -Rehashing - Extensible Hashing.

UNIT V   ALGORITHM DESIGN AND ANALYSIS   9
Introduction to algorithm design techniques: Greedy Algorithms, Divide and Conquer- Dynamic Programming -Backtracking - Branch and bound , Randomized algorithms.

TOTAL: L: 45

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TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Mark Allen Weiss	Data structures and Algorithm Analysis in C	Pearson Education Second Edition	2011
2.	Alfred V. Aho, John E.Hopcroft and Jeffry D. Ullman	Data Structures and Algorithms	Pearson Education	2006

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Jean Paul Tremblay and Sorenson	An Introduction to Data Structures with Applications	McGraw Hill Publishing Company Second Edition	2007
2.	Yedidyah Langsam, Moshe J Augenstein and Aaron M Tanenbaum	Data Structures using C and C++	Prentice Hall of India/Pearson Education	2006
3.	Sartaj Sahni	Data Structures, Algorithms, and	Silicon Press, New Jersey,	2005
4.	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest , Clifford Stein	Introduction to Algorithms	3rd Edition, MIT Press	2010
5.	Gregory L.Heilman	Data Structures, Algorithms and Object Oriented Programming	Tata Mcgraw-Hill	2002

WEB URLs

1. http://www.imada.sdu.dk/~svalle/courses/dm14-2005/mirror/c
2. http://www.eskimo.com/~scs/cclass/notes/top.html
3. http://www.le.ac.uk/cc/tutorials/c
4. http://www.desy.de/gna/html/cc/Tutorial/node4.html
5. http://www.sqa.org.uk/e-learning/LinkedDS02CD/page_45.htm

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COMPUTER SCIENCE AND ENGINEERING

16CSD16	INTERNET PROGRAMMING	L	T	P	C
		3	0	2	4

COURSE OBJECTIVES
- To study the concepts of Networking and protocols.
- To study the way that object-oriented concepts are implemented in the Java programming language
- To demonstrate with perl.
- To study the way that exceptions are detected and handled in the Java programming language
- To write working Java code that demonstrates multiple treads of execution

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

16CSD16.CO1	Recall the concepts of Networking and protocols.
16CSD16.CO2	Apply object-oriented concepts in HTML Coding.
16CSD16.CO3	Illustrate the recent web technology using Perl.
16CSD16.CO4	Demonstrate the applets for client side Programming.
16CSD16.CO5	Implement the applications of multimedia over IP.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16CSD16.CO1	x	x	x	-	-	-	-	x	-	x	-	x	-	x	-
16CSD16.CO2	x	x	x	x	-	-	-	-	-	-	x	x	-	x	x
16CSD16.CO3	x	x	x	-	-	-	-	-	-	-	x	x	x	x	-
16CSD16.CO4	x	x	x	x	-	x	-	-	x	-	x	x	x	-	-
16CSD16.CO5	x	x	-	x	x	-	-	-	x	-	x	-	-	x	x

UNIT I   INTRODUCTION   9
Introduction - Network of Networks, Intranet, Extranet and Internet. World Wide Web- Domain and Sub domain, Address Resolution, DNS, Telnet, FTP, HTTP. TCP/IP- Features, Segment, Three-Way Handshaking, Flow Control, Error Control, Congestion control, IP Datagram, IPv4 and IPv6. IP Subnetting and addressing- Classful and Classless Addressing, Subnetting

UNIT II   HTML   9
Introduction, Editors, Elements, Attributes, Heading, Paragraph. Formatting, Link, Head, Table, List, Block, Layout, CSS. Form, IFrame, Colors, Color name, Color value. Image Maps- map, area, attributes of image area- Extensible Markup Language (XML)- Introduction, Tree, Syntax, Elements, Attributes, Validation, Viewing. XHTML in brief. CGI Scripts- Introduction- Environment Variable, GET and POST Methods.

UNIT III   PERL   9
Introduction, Variable, Condition, Loop, Array, Implementing data structure, Hash, String, Regular Expression, File handling, I/O handling- JavaScript- Basics, Statements, comments, variable, comparison, condition, switch, loop, break. Object – string, array, Boolean, reg-ex. Function, Errors, Validation. Cookies- Definition of cookies, Create and Store a cookie with example. Java Applets Container Class, Components, Applet Life Cycle, Update method, Applications.

UNIT IV   CLIENT-SERVER PROGRAMMING   9
Client-Server programming In Java - Java Socket, Java RMI. Threats - Malicious code-viruses, Trojan

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horses, worms; eavesdropping, spoofing, modification, denial of service attacks- Network security techniques- Password and Authentication- VPN, IP Security, security in electronic transaction, Secure Socket Layer (SSL), Secure Shell (SSH). Firewall- Introduction, Packet filtering, Stateful, Application layer, Proxy.

UNIT V   INTERNET TELEPHONY   9
Introduction, VoIP- Multimedia Applications- Multimedia over IP: RSVP, RTP, RTCP and RTSP- Streaming media, Codec and Plugins, IPTV- Search Engine and Web Crawler- Definition, Meta data, Web Crawler, Indexing, Page rank, overview of SEO.

TOTAL: L: 45

LIST OF EXPERIMENTS

1. Develop a static page using any 10 basic HTML elements. Tags – Heading, Table, Marquee, Image, Style elements, etc.,
2. Develop static pages (using Only HTML) of an online Book store. The website should contain the following pages.
   a. Home page
   b. Registration and user Login
   c. User Profile Page
   d. Books catalog e. Shopping Cart
   f. Payment By credit card
   g. Order Conformation
3. Mapping image on client and server side
4. Add a Cascading Style sheet (All types) for designing the web page.
5. Validate the Registration, user login, user profile and payment by credit card pages using JavaScript.
6. Create and save an XML document at the server, which contains users information. Write a program, which takes User Id as an input and returns the user details by taking the user information from the XML document.
7. Extracting contents of the XML document using CSS, XSLT, DOM parser
8. Simple applications using XQuery
9. i) Using ActiveX Components in server side scripting.
   ii) Create chat application using different types of protocols.
10. Create dynamic pages with database and server side scripting for any application
11. Working with files in PERL
12. Programs using Maps
13. Develop a simple java applet program in different forms of layout managers.
14. Creation of Distributed Application using RMI using java program.
15. Usage of Cookie.
16. Dynamic Web pages with PERL and CGI
17. Case Study – Internet Telephony

TOTAL : P : 30

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Deitel H.M. and Deitel P.J	Internet and World Wide Web How to program	Pearson International 4th Edition	2012
2.	Uttam K.Roy	Web Technologies	Oxford University Press	2011

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N.P. Gopalan and J.Akilandeswari	Web Technology	PHI Learning	2004

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Gopalan N.P. and Akilandeswari J	Web Technology	Prentice Hall of India	2011
2.	Paul Dietel and Harvey Deitel	Java How to Program	Prentice Hall of India, 8thEdition	2012
3.	Mahesh P. Matha	Core Java A Comprehensivestudy	Prentice Hall of India	2011
4	Thomno A. Powell	The Complete Reference HTMLand XHTML	Tata McGraw Hill	2008
5	Robert W. Sebesta	Programming the World WideWeb	Pearson Education	2015

WEB URLs

1. www.wileyindia.com/web-technologies-html-javascript-php-java-jsp-xml
2. www.comptechdoc.org/independent/web/
3. www.ddegjust.ac.in/studymaterial/msc-cs/ms-18.pdf
4. www.webstepbook.com/supplements/slides/ch01-internet.pdf
5. www.youtube.com/watch?v=3JluqTojuME&list=PLoYCgNOIyGAB_8_iq1cL8MVeun7cB6e

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COMPUTER SCIENCE AND ENGINEERING

16CSD17	PYTHON PROGRAMMING	L	T	P	C
		3	0	2	4

COURSE OBJECTIVES
- To write basic programs and high level applications using basic concepts
- To write programs using Language components such as Class, BIF of Python, Functions, looping andconditional statements.
- To uphold thorough knowledge on understanding of objects and classes
- To understand functions and modules with data base
- To know about I/O and Error handling in Python

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

16CSD17.CO1	Interpret basic principles of python programming
16CSD17.CO2	Write clear and effective python code
16CSD17.CO3	Create applications using python programming
16CSD17.CO4	Access database using python programming
16CSD17.CO5	Develop web applications using python programming

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16CSD17.CO1	X	X	X	-	X	X	-	-	X	-	-	-	-	X	X
16CSD17.CO2	X	X	X	-	-	-	-	-	X	-	-	-	-	X	-
16CSD17.CO3	X	X	X	-	-	-	X	-	-	X	-	X	X	X	-
16CSD17.CO4	X	X	X	-	X	-	-	-	X	-	X	X	-	X	-
16CSD17.CO5	X	X	-	X	X	X	-	X	-	X	X	X	X	-	X

UNIT I   INTRODUCTION TO PYTHON PROGRAMMING LANGUAGE   9
Introduction to Python Language: Strengths and Weaknesses, IDLE, Dynamic Types, Naming Conventions, String Values, String, Operations, String Slices, String Operators, Numeric Data Types, Conversions , Built in Functions

UNIT II   DATA COLLECTIONS AND LANGUAGE COMPONENT   9
Introduction, Control Flow and Syntax, Indenting, The if Statement, Relational Operators, Logical, Operators, True or False, Bit Wise Operators, The while Loop, break and continue, The for Loop, Lists, Tuples, Sets, Dictionaries, Sorting Dictionaries,Copying Collections.

UNIT III   OBJECT AND CLASSES   9
Classes in Python, Principles of Object Orientation, Creating Classes, Instance Methods, File Organization, Special Methods, Class Variables, Inheritance, Polymorphism, Type Identification, Custom Exception Classes

UNIT IV   FUNCTIONS AND MODULES   9
Introduction, Defining Your Own Functions, Parameters, Function Documentation, Keyword and Optional Parameters, Passing Collections to a Function, Variable Number of Arguments Scope, Functions - "First Class Citizens", Passing Functions to a Function, Mapping Functions in a Dictionary, Lambda, Modules, Standard Modules – sys, Standard Modules – math, Standard Modules – time, The dir Function

UNIT V   I/O AND ERROR HANDLING IN PYTHON   9
Introduction, Data Streams, Creating Your Own Data Streams, Access Modes, Writing Data to a File, Reading Data From a File, Additional File Methods, Using Pipes as Data Streams, Handling, IO

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Exceptions, Working with Directories, Metadata, Errors, Run Time Errors, The Exception Model, Exception Hierarchy, Handling Multiple Exceptions

TOTAL: L: 45

LIST OF EXPERIMENTS

1. Write python program to print Hello World
2. Write python program to Hello World using string variable
3. Write python program to store data in list and then try to print them.
4. Write python program to do basic trim and slice on string.
5. Write python program to print list of numbers using range and for loop
6. Write python program to store strings in list and then print them.
7. Write python program to let user enter some data in string and then verify data and print welcome to user.
8. Write python program in which an function is defined and calling that function prints Hello World
9. Write python program in which an function(with single string parameter) is defined and calling that function prints the string parameters given to function.
10. Write python program in which an class is define, then create object of that class and call simple print function define in class.

TOTAL : P : 30

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Mike	Dive into Python	novice to pro	2004
2.	Mark Lutz	Learning Python	novice to pro 4th Edition	2004

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Mark Lutz	Programming Python	4th Edition	2011
2.	Timothy A. Budd	Exploring Python	Tata Mcgraw-Hill Edition	2011
3.	GuidoVan Rossum, Fred . L. Drake	Introduction to Python	Network Theory Limited	2011
4	Alex Martelli	Pythonin a Nutshell	O'Reilly - 2nd Edition	2006
5	Wesley J. Chun	Python Programming	Second Edition Prentice Hall	2010

WEB URLs
1. http://www.pickatutorial.com/tutorials/python_1.htm
2. http://inventwithpython.com/
3. http://www.devshed.com/c/b/Python/
4. http://www.diveintopython.net/
5. http://gnosis.cx/TPiP/

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COMPUTER SCIENCE AND ENGINEERING

16CSE01	**C# AND .NET FRAMEWORK**	**L**	**T**	**P**	**C**
		3	2	0	4

COURSE OBJECTIVES

- To Discuss the concepts of NET Framework and C# language
- To Design and develop C# program using read/write byte streams.
- To Design and develop real-time applications using and object oriented concepts
- To Design and develop windows and web based applications using C# .
- To Develop C# programs for database connectivity and data manipulation using ADONET

COURSE OUTCOMES:

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

16CSE01.CO1	Analyze the features of C# and write console applications using various
16CSE01.CO2	Develop the web based applications using ADO.NET in C#
16CSE01.CO3	Interpret the need of MVC architecture and web services in .NET Framework
16CSE01.CO4	Develop the application by using .Net Framework
16CSE01.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
16CSE01.CO1	x	x	x	-	x	-	-	-	-	x	-	x	x	x	-
16CSE01.CO2	x	-	x	-	-	-	-	-	x	-	x	-	x	-	-
16CSE01.CO3	x	x	x	x	x	-	-	-	x	x	x	x	x	x	-
16CSE01.CO4	x	x	x	x	x	x	-	-	x	x	x	-	x	-	x
16CSE01.CO5	x	x	x	x	x	x	-	-	x	x	x	x	x	x	-

UNIT I   INTRODUCTION TO C#   9+6

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+6

Classes, Objects, Inheritance, Polymorphism, Interfaces, Operator Overloading, Delegates, Events, Errors andExceptions.

UNIT III   APPLICATION DEVELOPMENT ON .NET   9+6

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+6

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

UNIT V   THE CLR AND THE .NET FRAMEWORK   9+6

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: L: 45 + T:30 = 75

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TEXT BOOKS:

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

REFERENCE BOOKS:

Sl.No	Author(s)	Title e 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. Murugesan	A Textbook on C#	Pearson Education	2003
5.	Karli Watson, Christian Nagel,Jacob Hammer Pedersen,Jon Reid, MorganSkinner	Beginning Visual C# 2010	Wiley India Pvt.Ltd	2010

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3. https://www.lynda.com/C-sharp-training-tutorials/1022-0.html.
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COMPUTER SCIENCE AND ENGINEERING

16CSE02	SOFTWARE PROJECT MANAGEMENT	L	T	P	C
		3	0	0	3

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

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

16CSE02.CO1	Able to practice the process of project management and its application in delivering successful projects
16CSE02.CO2	Deconstructing the activities in the project management
16CSE02.CO3	Evaluate the risks and hazards in the project management
16CSE02.CO4	Apprise the right person to managing people and organizing team.
16CSE02.CO5	Evaluate a project to develop the scope of work, provide accurate effort estimation methods for software.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16CSE02.CO1	X	X	-	-	-	X	X	-	-	-	X	-	X	-	-
16CSE02.CO2	X	X	X	-	X	-	-	-	X	-	-	-	X	-	-
16CSE02.CO3	-	-	-	-	-	X	X	-	-	-	X	-	-	X	-
16CSE02.CO4	-	-	-	-	X	X	X	-	X	-	X	-	-	X	-
16CSE02.CO5	-	X	-	X	X	-	-	-	-	-	X	X	X	-	-

UNIT I   INTRODUCTION AND PROJECT EVALUATION   9
Project Definition – Importance of Software Project Management – Contract Management – Activities covered by Software Project Management – Setting objectives – Stakeholders - Management Control – Overview of Project Planning – Stepwise Project Planning – Project evaluation - Strategic Assessment – Technical Assessment – Cost Benefit Analysis – Cash Flow Forecasting – Cost Benefit Evaluation Techniques.

UNIT II   ACTIVITY PLANNING AND RISK MANAGEMENT   9
Objectives – Project Schedule – Sequencing and Scheduling Activities – Network Planning Models – Forward Pass – Backward Pass – Critical path (CRM) method – Activity Float – Shortening the Project Duration – Activity on Arrow Networks – Risk Management – Nature of Risk – Types of Risk – Managing Risk – Hazard Identification – Hazard Analysis.

UNIT III   PROJECT MANAGEMENT AND CONTROL   9
Introduction – Creating the Framework – Collecting the Data – Visualizing Progress – Cost Monitoring – Earned Value – Prioritizing Monitoring – Getting Project Back To Target – Change Control – Managing Contracts – Introduction – Types of Contract – Stages in Contract Placement – Typical Terms of a Contract – Contract Management –Acceptance

UNIT IV   MANAGING PEOPLE AND ORGANIZING TEAMS   9
Introduction – Understanding Behavior – Organizational Behavior – Selecting The Right Person For

COMPUTER SCIENCE AND ENGINEERING

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

UNIT V   SOFTWARE EFFORT ESTIMATION   9

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

TOTAL: L: 45

TEXT BOOKS:

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

REFERENCE BOOKS:

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

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2. https://at-web1.comp.glam.ac.uk/staff/dwfarthi/projman.html
3. https://www.tutorialspoint.com/management_concepts/project_management_softwares.htm
4. https://www.projectmanagement.com/wikis/233034/Cost-Benefit-Analysis
5. https://www.abebooks.com/book-search/kw/software-project-management-5th-edition-bob-hughes-mike- cotterell/

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COMPUTER SCIENCE AND ENGINEERING

16CSE03	SOFTWARE TESTING	L	T	P	C
		3	2	0	4

COURSE OBJECTIVES

- To understand the basic software testing principles.
- To understand the issues, techniques for software testing.
- To understand the working principles of various testing methodologies.
- To understand knowledge of techniques for management of testing projects
- To understand the concept of modern software testing tools.

COURSE OUTCOMES:

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

16CSE03.CO1	Determine the risk strategies in software testing.
16CSE03.CO2	Explain the organization and development of testing approach.
16CSE03.CO3	Exemplify the verification and validation process.
16CSE03.CO4	Differentiate pre operational and post operational testing.
16CSE03.CO5	Implement the testing and debugging policies.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16CSE03.CO1	X	X	-	-	X	-	-	X	-	-	-	-	X	-	-
16CSE03.CO2	X	X	-	X	X	X	-	X	-	-	X	-	X	-	-
16CSE03.CO3	X	X	-	X	X	X	X	-	X	-	X	X	X	-	-
16CSE03.CO4	X	-	X	-	X	X	X	X	-	-	-	-	X	-	-
16CSE03.CO5	-	X	X	X	X	X	-	X	X	-	X	X	-	X	-

UNIT I   INTRODUCTION   9+6

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+6

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+6

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+6

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-

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Modeling Defects- Metrics for Tracking System Test- Orthogonal Defect Classification- Defect Causal Analysis- Beta Testing- First Customer Shipment- System Test Report- Product Sustaining- Measuring Test Effectiveness

UNIT V   MODERN SOFTWARE TESTING TOOLS   9+6

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

TOTAL: L: 45 + T : 30 = 75

TEXT BOOKS:

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

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

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COMPUTER SCIENCE AND ENGINEERING

16CSE04	ARTIFICIAL INTELLIGENCE	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To Learn the concepts of computational intelligence for solving problems
- To learn the concepts of Predicate Logic.
- To Introduce the concepts of machine learning and Neural Networks
- To Initiate the Perception of Genetic Algorithms.
- To Understand the knowledge about Expert Systems

COURSE OUTCOMES:

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

16CSE04.CO1	Apply different searching strategies for problem solving.
16CSE04.CO2	Illustrate the planning problems and find the sequence of actions to achieve goals by using knowledge representation.
16CSE04.CO3	Categorize the various machine learning techniques
16CSE04.CO4	Analyze the different techniques to represent Genetic Algorithms
16CSE04.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
16CSE04.CO1	X	X	X	X	-	-	-	-	-	-	-	X	X	X	-
16CSE04.CO2	X	X	X	X	X	-	-	X	-	X	X	-	X	X	-
16CSE04.CO3	X	X	X	X	-	X	X	-	-	-	-	X	-	X	X
16CSE04.CO4	X	X	-	X	-	-	-	-	-	-	X	X	X	X	-
16CSE04.CO5	X	X	X	-	X	X	-	X	X	-	X	-	X	X	X

UNIT I INTRODUCTION TO Al 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

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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: L: 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:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Russell, Peter Norvig	Artificial Intelligence – A Modern Approach	Prentice Hall ofIndia	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, DrewMcDermott	Introduction to Artificial Intelligence	Pearson Education	2006
5.	Nils.J.Nilsson	Artificial Intelligence: A new synthesis	Elsevier	2003

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2. http://aima.cs.berkeley.edu
3. http://www-formal.stanford.edu/jmc/whatisai/
4. http://nptel.ac.in/courses/106106126
5. http://www.sciencedaily.com/news/computers_math/artificial_intelligence/

COMPUTER SCIENCE AND ENGINEERING

16CSE05	ETHICAL HACKING AND CYBER SECURITY	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES
- To understand the concept of Hacking.
- To understand the Hacking methods and types.
- To understand the Cyber Security tools
- To understand the Concept of Cyber Security
- To Understand the cyber Forensic analysis

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

16CSE05.CO1	Explain the basic concept of Ethical hacking.
16CSE05.CO2	Implement the techniques for system hacking wireless hacking and web server hacking.
16CSE05.CO3	Illustrate the penetration testing and cyber security.
16CSE05.CO4	Implement the Cyber Security by using its tools.
16CSE05.CO5	Explain the Cyber Security Organizational implications

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16CSE05.CO1	X	X	-	-	X	X	-	-	X	-	X	X	X	X	-
16CSE05.CO2	X	X	X	X	X	X	-	-	-	-	X	X	X	X	X
16CSE05.CO3	X	X	X	X	-	-	-	X	X	X	X	X	X	-	X
16CSE05.CO4	X	X	X	X	X	-	-	X	-	X	X	X	-	X	X
16CSE05.CO5	X	X	X	X	-	-	-	X	X	-	X	X	X	X	X

UNIT I   INTRODUCTION TO ETHICAL HACKING   9
Introduction-Ethical hacking Terminology-types of hacking technologies-phases of ethical hacking-Footprinting- Social Engineering-Scanning and enumeration. Understanding the password hacking techniques-Rootkits-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-honeypots- 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- a t t a c k s 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

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forensic from compliance perspectives

UNIT V   FORENSIC OF HAND HELD DEVICES   9
Forensic of Hand –Held Devices-Understanding cell phone working characteristics-Hand-Held devices and digital forensic- Toolkits for Hand-Held device-Forensic of i-pod and digital music devices-Techno legal Challenges with evidence from hand-held Devices. Cyber Security –Organizational implications-cost of cybercrimes and IPR issues Web threats for organizations: the evils and Perils-Social media marketing- Security and privacy Implications- Protecting people privacy in the organizations Forensic best practices for organizations.

TOTAL: L: 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 & SunitBelapure	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 andPenetration 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

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2. http://www.tutorialspoint.com/ethical_hacking/
3. http://breakthesecurity.cysecurity.org/category/ethical-hacking /
4. https://www.cybrary.it
5. https://www.futurelearn.com/courses/introduction-to-cyber-security

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COMPUTER SCIENCE AND ENGINEERING

16CSE06	SOFT COMPUTING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES
- To understand the basic concepts of soft computing,
- To understand the fundamentals of artificial and neural networks
- To understand the Unsupervised Networks.
- To Reviews the Classical SETs
- To Understand Fuzzy

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

16CSE06.CO1	Build intelligent machines using soft computing techniques.
16CSE06.CO2	Design a Neural Networks for the real time problems.
16CSE06.CO3	Implement various learning techniques
16CSE06.CO4	Apply fuzzy logic and Develop fuzzy sets for real time problems.
16CSE06.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
16CSE06.CO1	x	-	x	-	-	-	-	-	-	-	-	x	x	-	-
16CSE06.CO2	x	x	-	-	-	-	-	x	-	-	-	x	x	x	-
16CSE06.CO3	x	x	-	x		-	-	-	-	-	-	x	-	x	x
16CSE06.CO4	x	x	x	x	x	-	-	-	x	x	x	-	-	-	x
16CSE06.CO5	x	x	x	x	x	-	-	-	-	-	x	x	-	-	x

UNIT I   INTRODUCTION TO ARTIFICIAL INTELLIGENCE   9
AI Problems and Search: 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 and Rules.

UNIT II   NEURAL NETWORKS   9
Artificial Neural Networks: 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   MACHINE LEARNING TECHNIQUES   9
Unsupervised Learning Network- 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 networks.

UNIT IV   IV FUZZY SYSTEMS   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.

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UNIT V   HYBRID SYSTEMS   **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: L: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	S N Sivanandam, S N Deepa	Principles of SoftComputing	Wiley India	2007
2.	Fakhreddine 0 Karray, Clarence D Silva	Soft Computing andIntelligent 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 SoftComputing- Behavioral and Cognitive Modeling of the Human Brain	CRC press	2000
2.	Elaine Rich and KevinKnight	Artificial Intelligence	TMH	2008
3.	Stuart J. Russell and Peter Norvig	Artificial IntelligenceA 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

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2. http://www.myreaders.info/html/soft_computing.html
3. http://nptel.ac.in/courses/106106046/41
4. http://www.dailymotion.com/video/x4ns9my
5. https://www.youtube.com/watch?v=dHU5BUf1pZg

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COMPUTER SCIENCE AND ENGINEERING

16CSE07	REAL TIME SYSTEMS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

To understand the basic concepts of real-time computing
- To understand the major issues real-time scheduling and real-time kernels. To write Real-time schedulingalgorithms
- To provide the scientific methodology required for the design of real time systems.
- To Understand fault tolerance Techniques
- To implementation the real-time operating systems.

COURSE OUTCOMES:

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

16CED07.CO1	Apply the knowledge of operating system concepts to understand real time system.
16CSE07.CO2	Implement the tasks scheduling of Real time system.
16CSE07.CO3	Analyze the various parameters related to the different types of scheduling in single processor andmultiprocessor environments.
16CSE07.CO4	Find out the fault in real time system by using various techniques.
16CSE07.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
16CSE07.CO1	x	-	-	-	-	-	x	-	-	x	-	x	x	x	-
16CSE07.CO2	x	x	-	-	x	-	x	x	x	x	-	-	x	x	-
16CSE07.CO3	x	x	x	-	-	-	-	-	x	-	x	x	x	x	-
16CSE07.CO4	x	x	x	x	-	-	-	-	x	x	-	x	x	x	-
16CSE07.CO5	x	x	x	x	-	x	-	-	x	x	x	x	x	x	x

UNIT I   INTRODUCTION TO REAL TIME SYSTEM   9

Typical RT applications - Hard and soft Real Time constraints - Hard and soft RTS - Reference Modeling RTS - Issues inRTS - 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: L: 45

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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.	Prasad K.V.K.K	Embedded/Real-Time Systems: Concepts, Design and Programming Cognitive Modeling of the Human Brain	Dream Tech Press	2014
2.	Sriram V Iyer , PankajGupta	Embedded Real Time Systems Programming	McGraw Hill	2010
3.	Phillip A Laplante	Real-Time Systems Design & Analysis	John Wiley & Sons	2006
4.	Maryline Chetto	Real-time Systems Scheduling	John Wiley & Sons	2014
5.	Rajib Mall	Real-Time Systems: Theory and Practice	Pearson	2006

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2. http://www.bogotobogo.com/cplusplus/embeddedSystemsProgramming.php
3. http://nptel.ac.in/courses/106105036/
4. https://www.youtube.com/watch?v=7hNKSmuPU-g
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16CSE08	INFORMATION STORAGE MANAGEMENT	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES
- Evaluating storage architecture
- Understand logical and physical components of a storage infrastructure including storage subsystems
- Describing storage networking technologies such as FC – SAN, NAS, IP – SAN and data archival solution CAS
- Identifying difference storage virtualization technologies and their benefits
- Understanding business continuity solutions including, backup and recovery technologies, and Local and remote replication solutions.

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

16CSE08.CO1	Evaluate the performance of different storage networking technologies
16CSE08.CO2	Identify the issues in replication
16CSE08.CO3	Analyze the risk in business continuity
16CSE08.CO4	Implementing the business techniques
16CSE08.CO5	Analysis of replications

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16CSE08.CO1	-	-	-	-	X	-	-	X	-	-	-	-	-	-	X
16CSE08.CO2	X	-	-	X	X	X	-	-	-	-	X	-	-	X	-
16CSE08.CO3	-	X	X	-	X	-	X	-	-	-	-	-	-	X	-
16CSE08.CO4	-	-	X	X	X	-	X	-	-	-	-	-	X	-	-
16CSE08.CO5	-	-	X	-	X	-	X	-	-	-	X	-	-	X	-

UNIT I   STORAGE SYSTEMS   9
Introduction to Information Storage and Management: Information storage – Evolution of storage technology and architecture – Data center Infrastructure - Key challenges in managing information – Information life cycle. Storage System Environment: Components of a the Host. RAID – implementation of RAID – RAID array components – RAID levels – RAID Comparison - Host spares. Intelligent storage System – Components –intelligent storage array.

UNIT II   STORAGE NETWORKING TECHNOLOGIES   9
Direct – Attached storage and introduction to SCSI: Type of DAS – DAS benefits and limitations Disk Drive Interfaces – Introduction to Parallel SCSI – SCSI command model. Storage Area Networks – Fiber channel – SAN evolution - SAN components – FC Connectivity – Fiber channel ports – Fiber Channel Architecture - Zoning – Fiber Channel login types – FC Topologies. Benefits of NAS –NAS file I/O – Components of NAS – NAS implementation – NAS file sharing protocols – NAS I/O operations.

UNIT III   ADVANCED STORAGE NETWORKING AND VIRTUALIZATION   9
iSCSI – FCIP – Fixed content and archives – Types of archives – features and benefits of CAS – CAS architecture – Objects storage and retrieval in CAS – CAS Examples Storage Virtualization: Forms of Virtualization - SNIA Storage virtualization taxonomy – storage virtualization configurations – storage virtualization challenges – Types of storage virtualization.

UNIT IV   BUSINESS CONTINUITY   9
Introduction to Business continuity: Information availability – BC terminology – BC planning life cycle

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– Failure analysis – Business impact analysis – BC technology solutions – concept in practice Backup and Recovery: Backup purpose – considerations – granularity – recovery considerations – backup technologies – concepts in practice

UNIT V   REPLICATION   **9**

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

TOTAL: L: 45

TEXT BOOKS:

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

REFERENCE BOOKS:

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

WEB URLs

1.   https://www.youtube.com/watch?v=Z7YX9DX-7sY
2.   https://www.youtube.com/watch?v=-480F3iBOU4
3.   https://www.youtube.com/watch?v=kMzhb1i0zCo
4.   https://www.youtube.com/watch?v=bAMRr8kyxY8
5.   https://www.youtube.com/watch?v=IxSyLQd_nfM

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COMPUTER SCIENCE AND ENGINEERING

16CSE09	ADVANCED COMPUTER ARCHITECTURE	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES
- Understanding the concepts of computer architecture
- To exploit parallelism at the instruction level in a computer system
- To use the ILP concept for memory design
- To exploit parallelism in multiprocessors
- To know the Memory hierarchy

COURSE OUTCOMES:

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

16CSE09.CO1	Understanding the concepts of computer architecture
16CSE09.CO2	Able to analyze parallelism at the instruction level in a computer system
16CSE09.CO3	Use the ILP concept for memory design
16CSE09.CO4	Exploit parallelism in multiprocessors
16CSE09.CO5	Usage of memory hierarchy

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16CSE09.CO1	x	x	-	-	-	-	-	x	-	-	-	x	-	x	-
16CSE09.CO2	x	x	x	-	-	x	-	-	-	-	-	-	x	-	-
16CSE09.CO3	x	-	-	x	x	-	x	-	-	-	x	-	-	-	-
16CSE09.CO4	x	-	x	-	-	-	-	-	x	-	-	-	-	-	x
16CSE09.CO5	x	x	-	-	-	x	-	-	-	-	x	-	-	x	-

UNIT I   FUNDAMENTALS OF COMPUTER DESIGN   9

Introduction-measuring and reporting performance- Quantitative principles of computer design-Instruction set principles and examples- classifying instructions- set architectures-memory addressing-addressing modes for signal processing-type and size of operands.

UNIT II   INSTRUCTION LEVEL PARALLELISM   9

Concepts and challenges – overcoming data hazards with dynamic scheduling – examples- reducing branch costs with dynamic hardware prediction- high performance instruction delivery- taking advantages of ILP with multiple issues- limitations of ILP.

UNIT III   ILP WITH SOFTWARE APPROACHES   9

Basic compiler techniques for exposing ILP- static branch prediction- static multiple issues: VLIW approach Advanced compiler support for exposing and exploiting ILP-Hardware support-cross cutting issues- Intel IA64 architecture

UNIT IV   MEMORY HIERARCHY DESIGN   9

Introduction- review of caches- cache performance- reducing cache miss penalty-reducing miss rate- miss rate via parallelism –reducing hit time – main memory and organizations for improving performance-memory technology- virtual memory.

UNIT V   MULTIPROCESSORS AND THREAD LEVEL PARALLELISM   9

Symmetric shared memory architectures-performance of symmetric shared memory multiprocessors – Distributed shared memory architectures-synchronization- storage systems – types of storage devices-

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buses reliability-availability and dependability- RAID – errors and failures in real systems- I/O performance measures.

TOTAL: L: 45

TEXT BOOKS:
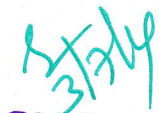
Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	John L. Hennessy andDavid A. Patterson	Computer Architecture: A Quantitative Approach	Morgan Kaufmann,3rd Edition	2003
2.	David A. Patterson and John L. Hennessey	Computer organization and design	Morgan Kauffman / Elsevier, Fifth edition,	2014

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 Organization	Mc Graw-Hill Inc	2012
2.	William Stallings	Computer Organization and Architecture	Seventh Edition , Pearson Education	2006
3.	Vincent P. Heuring, Harry F. Jordan	Computer System Architecture	Second Edition, Pearson Education	2005
4.	Govindarajalu	Computer Architecture and Organization, Design Principles And applicaions	Tata McGraw Hill, New Delhi	2005
5.	John P. Hayes	Computer Architecture and Organization	Third Edition, Tata McGraw Hill	1998

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2. https://www.youtube.com/watch?v=BWmljynuhYo
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4. https://www.youtube.com/watch?v=p40yyMqQITI
5. nptel.ac.in/courses/106102062/

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COMPUTER SCIENCE AND ENGINEERING

16CSE10	HIGH SPEED NETWORKS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES
- To be familiar with the types of high speed networks
- To exposed to the functionality of service.
- To learn TCP and ATM congestion control algorithms
- To understand the functionality of integrated and differentiated services
- To understanding of Protocol for QoS Support

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

16CSE10.CO1	Recognize the components required to build different high speed networks
16CSE10.CO2	Identify solution for functionality of services
16CSE10.CO3	Implement the flow of information from one node to another node in the network
16CSE10.CO4	Hypothesize the integrated and differentiated services
16CSE10.CO5	Analyze the protocols for QoS support

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16CSE10.CO1	x		x	x	x	x	-		x	-	x	x	-	-	x
16CSE10.CO2	x	x	x	x	-	x	x	x	x	-	x	x	x	x	x
16CSE10.CO3	x	x		x	x	x	-	-	x	x	-	-	-	x	-
16CSE10.CO4	x	x		x	-	x	-	-	x	-	-	x	x	x	x
16CSE10.CO5	x	x	x	x	-	-	-	-	x	x	-	x	x	x	x

UNIT I HIGH SPEED NETWORKS 9
Frame Relay Networks – Asynchronous transfer mode – ATM Protocol Architecture, ATM logical Connection – ATM Cell – ATM Service Categories – AAL. High Speed LAN's: Fast Ethernet – Gigabit Ethernet– Fibre Channel – Wireless LAN's, WiFi and WiMax Networks applications, requirements – Architecture of 802.11.

UNIT II CONGESTION AND TRAFFIC MANAGEMENT 9
Queuing Analysis – Queuing Models – Single Server Queues – Effects of Congestion –Congestion Control – Traffic Management – Congestion Control in Packet Switching Networks – Frame Relay Congestion Control.

UNIT III TCP AND ATM CONGESTION CONTROL 9
TCP Flow control – TCP Congestion Control – Retransmission – Timer Management – Exponential RTO backoff – KARN's Algorithm – Window management – Performance of TCP over ATM. Traffic and Congestion control in ATM – Requirements – Attributes – Traffic Management Frame work, Traffic Control – ABR traffic Management – ABR rate control, RM cell formats – ABR Capacity allocations – GFR traffic management.

UNIT IV INTEGRATED AND DIFFERENTIATED SERVICES 9
Integrated Services Architecture – Approach, Components, Services- Queuing Discipline – FQ – PS – BRFQ – GPS – WFQ – Random Early Detection – Differentiated Services.

COMPUTER SCIENCE AND ENGINEERING

UNIT V   PROTOCOLS FOR QOS SUPPORT   **9**

RSVP – Goals & Characteristics, Data Flow, RSVP operations – Protocol Mechanisms – Multiprotocol Label Switching – Operations, Label Stacking – Protocol details – RTP – Protocol Architecture – Data Transfer Protocol– RTCP.

TOTAL: L: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	William Stallings	High speed networks and internet	Second Edition, Pearson Education	2002
2.	John L Hennessey andDavid A Patterson	Computer Architecture A Quantitative Approach	Morgan Kaufmann/ Elsevier, Fifth Edition	2012

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Warland, Pravin Varaiya	High performance communication networks	Second Edition , Jean Harcourt Asia Pvt. Ltd	2001
2.	Irvan Pepelnjk, Jim Guichard, Jeff Apcar	MPLS and VPNarchitecture	Cisco Press, Volume 1 and 2	2004
3.	Abhijit S. Pandya, ErcanSea	ATM Technology forBroad Band Telecommunication Networks	CRC Press	2004
4.	Kai Hwang and Faye Briggs	Computer Architecture and Parallel Processing	Mc Graw-Hill International Edition	2000
5.	Sima D, FountainT and Kacsuk P	Advanced Computer Architectures	A Design Space Approach Addison Wesley	2000

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2. https://www.youtube.com/watch?v=xGkpXk-AnWU
3. https://www.youtube.com/watch?v=ZYIdYIt7W_g
4. https://www.youtube.com/watch?v=QmbjHESEcOk
5. https://www.youtube.com/watch?v=BG7KAz3nk6s

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16CSE11	GRAPH THEORY	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To Know mathematical definitions of objects in graph theory.
- To identify and construct examples and to distinguish examples from non-examples.
- Indentify critically assess a mathematical proof.
- Theoretical knowledge and independent mathematical thinking in creative ideas
- Reason from definitions to construct mathematical proofs.

COURSE OUTCOMES:

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

16CSE11.CO1	Write precise and accurate mathematical definitions of objects in graph theory.
16CSE11.CO2	Use mathematical definitions to identify and construct examples and to distinguish examples
16CSE11.CO3	Validate and critically assess a mathematical proof.
16CSE11.CO4	Use a combination of theoretical knowledge and independent mathematical thinking in creative investigation of questions in graph theory.
16CSE11.CO5	Reason from definitions to construct mathematical proofs.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16CSE11.CO1	x	x	x	-	-	-	-	-	-	-	-	-	-	x	-
16CSE11.CO2	x	x	x	-	-	-	x	-	-	-	-	-	x	-	-
16CSE11.CO3	x	-	-	-	x	-	-	-	-	-	-	-	-	-	-
16CSE11.CO4	x	x	-	x	-	-	-	-	-	-	-	x	-	-	x
16CSE11.CO5	x	x	-	-	x	-	x	-	-	-	-	-	x	-	-

UNIT I   INTRODUCTION   9

Graphs – Introduction – Isomorphism – Sub graphs – Walks, Paths, Circuits –Connectedness – Components – Euler graphs – Hamiltonian paths and circuits – Trees – Properties of trees – Distance and centers in tree – Rooted and binary trees.

UNIT II   TREES, CONNECTIVITY & PLANARITY   9

Spanning trees – Fundamental circuits – Spanning trees in a weighted graph – cut sets – Properties of cut set – All cut sets – Fundamental circuits and cut sets – Connectivity and reparability – Network flows – 1-Isomorphism – 2- Isomorphism – Combinational and geometric graphs – Planer graphs –Different representation of a planer graph.

UNIT III   MATRICES, COLOURING AND DIRECTED GRAPH   9

Chromatic number – Chromatic partitioning – Chromatic polynomial – Matching – Covering – Four color problem – Directed graphs – Types of directed graphs – Digraphs and binary relations – Directed paths and connectedness – Euler graphs.

UNIT IV   PERMUTATIONS & COMBINATIONS   9

Fundamental principles of counting - Permutations and combinations - Binomial theorem - combinations with repetition - Combinatorial numbers - Principle of inclusion and exclusion - Derangements - Arrangements with forbidden positions.

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UNIT V   GENERATING FUNCTIONS   **9**

Generating functions - Partitions of integers - Exponential generating function – Summation operator - Recurrence relations - First order and second order – Non-homogeneous recurrence relations - Method of generating functions.

TOTAL: L: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Narsingh Deo	Graph Theory: With Application to Engineering and Computer Science	Prentice Hall of India	2003
2.	Grimaldi R.P	Discrete and Combinatorial Mathematics: An Applied Introduction	Addison Wesley	1994

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Clark J. and Holton D.A	A First Look at Graph Theory	Allied Publishers	1993
2.	Mott J.L., Kandel A. and Baker T.P	Discrete Mathematics for Computer Scientists and Mathematicians	Prentice Hall of India	1996
3.	Liu C.L	Elements of Discrete Mathematics	Mc Graw Hill	1985
4.	Rosen K.H	Discrete Mathematics and Its Applications	Mc Graw Hill	2007
5.	Anurag Bishnoi	Discrete Mathematics,	Ghent University	2016

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3. https://www.youtube.com/watch?v=kEmWD4ODm7Q
4. https://www.youtube.com/watch?v=0NAASclUm4k&list=PLmdFyQYShrjfPLdHQxuNWvh2ct666Na3z
5. https://www.youtube.com/watch?v=HkNdNpKUByM

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COMPUTER SCIENCE AND ENGINEERING

16CSE12	ADVANCED DATABASE TECHNOLOGY	L	T	P	C
		3	2	0	4

COURSE OBJECTIVES
- Deals with the fundamentals of database management systems.
- Deals with distributed databases and its architecture
- Describes about the object oriented databases and locks with postgres.
- Obtain knowledge about the emerging database models like client-server models, data warehousing and datamining.
- Describes about the current issues while designing a different database systems.

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

16CSE12.CO1	Learnt about fundamentals of database management systems.
16CSE12.CO2	Working with distributed databases and its architecture
16CSE12.CO3	Working with object oriented databases and locks with postgres.
16CSE12.CO4	Implementing emerging database models like client-server models, data warehousing and data mining.
16CSE12.CO5	Understanding current issues while designing different database systems.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16CSE12.CO1	x	x	x	-	-	-	-	-	-	-	-	-	x	x	-
16CSE12.CO2	x	-	-	-	x	-	x	-	-	-	x	-	-	x	x
16CSE12.CO3	x	x	-	-	x	-	x	-	-	-	-	-	-	x	-
16CSE12.CO4	x	x	-	-	-	-	x	-	-	-	x	-	-	-	x
16CSE12.CO5	x	-	x	-	x	-	-	-	-	-	-	-	-	x	x

UNIT I   RELATIONAL MODEL ISSUES   9+6
ER Model - Normalization – Query Processing – Query Optimization – Transaction Processing - Concurrency Control – Recovery - Database Tuning.

UNIT II   DISTRIBUTED DATABASES   9+6
Parallel Databases – Inter and Intra Query Parallelism – Distributed Database Features – Distributed Database Architecture – Fragmentation – Distributed Query Processing – Distributed Transactions Processing – Concurrency Control – Recovery – Commit Protocols.

UNIT III   OBJECT ORIENTED DATABASES   9+6
Introduction to Object Oriented Data Bases - Approaches - Modeling and Design - Persistence – Query Languages - Transaction - Concurrency – Multi Version Locks – Recovery – POSTGRES – JASMINE – GEMSTONE - ODMG Model.

UNIT IV   EMERGING SYSTEMS   9+6
Enhanced Data Models - Client/Server Model - Data Warehousing and Data Mining - Web Databases –Mobile Databases- XML and Web Databases.

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UNIT V   CURRENT ISSUES   9+6

Rules - Knowledge Bases - Active and Deductive Databases - Multimedia Databases–
Multimedia Data Structures – Multimedia Query languages - Spatial Databases.

TOTAL: L: 45 + T : 30 = 75

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Thomas Connolly and Carlolyn Begg	Database Systems, A Practical Approach to Design, Implementation and Management	Third Edition, Pearson Education	2003
2.	Abraham Silberschatz, Henry F. Korth and S. Sudharshan	Database System Concepts	Sixth Edition, Tata McGrawHill	2011

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	R. Elmasri, S.B. Navathe	Fundamentals of Database Systems	Fifth Edition, Pearson Education	2006
2.	Abraham Silberschatz, Henry F. Korth, S. Sudharshan	Database System Concepts	Fifth Edition, TataMcGraw Hill	2006
3.	C.J.Date, A.Kannan,	An Introduction to Database Systems	Eighth Edition, PearsonEducation	2006
4	Raghu Ramakrishnan	Database Management System	Mc Graw Hill Publications	2000
5	Carlo Zaniolo, StefanoCeri S.Swamynathan	Advanced Database Systems	Morgan Kauffmann Publishers. VLDB Journal	1997

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2. http://study.com/academy/lesson/what-is-a-distributed-database-architecture-principles-advantages.html
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COMPUTER SCIENCE AND ENGINEERING

16CSE13	DIGITAL IMAGE PROCESSING	L	T	P	C
		4	0	0	4

COURSE OBJECTIVES
- Learn digital image fundamentals.
- Be exposed to simple image processing techniques.
- Be familiar with image compression and segmentation techniques.
- Learn to represent image in form of features.
- To understand image representation

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

16CSE13.CO1	Understand digital image fundamentals.
16CSE13.CO2	Gather information about image enhancement and use in the design.
16CSE13.CO3	Development of image restoration and segmentation.
16CSE13.CO4	Code the wavelets and image compression.
16CSE13.CO5	Analysis of image representation and recognition

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16CSE13.CO1	-	-	-	-	X	-	-	X	-	-	-	-	-	-	X
16CSE13.CO2	X	-	-	X	X	X	-	-	-	-	X	-	-	X	-
16CSE13.CO3	-	X	X	-	X	-	X	-	-	-	-	-	-	X	-
16CSE13.CO4	-	-	X	X	X	-	X	-	-	-	-	-	X	-	-
16CSE13.CO5	-	-	X	-	X	-	X	-	-	-	X	-	-	X	-

UNIT I   DIGITAL IMAGE FUNDAMENTALS   12
Introduction – Origin – Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels - color models.

UNIT II   IMAGE ENHANCEMENT   12
Spatial Domain: Gray level transformations – Histogram processing – Basics of Spatial Filtering– Smoothing and Sharpening Spatial Filtering – Frequency Domain: Introduction to Fourier Transform – Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters.

UNIT III   IMAGE RESTORATION AND SEGMENTATION   12
Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering Segmentation: Detection of Discontinuities– Edge Linking and Boundary detection – Region based segmentation- Morphological processing- erosion and dilation

UNIT IV   WAVELETS AND IMAGE COMPRESSION   12
Wavelets – Subband coding - Multiresolution expansions - Compression: Fundamentals – Image Compression models – Error Free Compression – Variable Length Coding – Bit-Plane Coding – Lossless Predictive Coding – Lossy Compression Lossy Predictive Coding – Compression Standards.

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UNIT V   IMAGE REPRESENTATION AND RECOGNITION   **12**

Boundary representation – Chain Code – Polygonal approximation, signature, boundary segments – Boundary description – Shape number – Fourier Descriptor, moments- Regional Descriptors – Topological feature, Texture - Patterns and Pattern classes - Recognition based on matching.

TOTAL: L: 60

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Rafael C. Gonzales, Richard E. Woods	Digital Image Processing	Pearson Education, ThirdEdition	2010
2.	Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins	Digital Image Processing Using MATLAB,	Third Edition Tata McGraHill Pvt. Ltd	2011

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Rosenfled A. & Kak, A.C	Digital Picture Processing, vol .I& II, Academic Press	Elsevier	1982
2.	Anil Jain K	Fundamentals of Digital ImageProcessing	PHI Learning Pvt. Ltd	2011
3.	William K Pratt	Digital Image Processing	John Willey	2002
4	Malay K. Pakhira	Digital Image Processing andPattern Recognition	First Edition, PHI LearningPvt. Ltd.	2011
5	Anil K. Jain	Fundamentals of Digital imageProcessing,	2nd Edition, Prentice Hall ofIndia, New Delhi.	1994

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2.   http://www.caen.uiowa.edu/~dip/LECTURE/lecture.html
3.   http://freevideolectures.com/Course/2316/Digital-Image-Processing-IIT-Kharagpur/22
4.   https://www.youtube.com/watch?v=xuk_3PQ_DRc
5.   http://freevideolectures.com/Course/2316/Digital-Image-Processing-IIT-Kharagpur

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COMPUTER SCIENCE AND ENGINEERING

16CSE14	MACHINE LEARNING TECHNIQUES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To understand learning algorithms and models.
- To analyze parametric and semi-parametric methods
- To analyze artificial neural network.
- To use neural networks for learning.
- To understand reinforcement learning.

COURSE OUTCOMES:

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

16CSE15.CO1	Understand the basic concepts of machine learning with supervised learning.
16CSE15.CO2	Illustrate the parametric and semi-parametric models.
16CSE15.CO3	Discriminate the artificial neural network and advanced topics in neural networks.
16CSE15.CO4	Review the instance based learning.
16CSE15.CO5	Develop the graphical model and advanced learning techniques.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16CSE15.CO1	X	-	-	X	-	-	-	-	-	-	-	X	X	-	-
16CSE15.CO2	-	X	X	-	-	-	-	-	-	X	-	-	X	-	-
16CSE15.CO3	-	X	X	X	X	X	X	X	X	-	-	-	-	X	-
16CSE15.CO4	X	-	X	X	-	-	-	-	X	X	X	X	X	-	X
16CSE15.CO5	-	X	X	-	X	-	-	X	-	X	X	-	-	-	X

UNIT I   INTRODUCTION AND SUPERVISED LEARNING   9

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

UNIT II   PARAMETRIC AND SEMI-PARAMETRIC METHODS   9

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

UNIT III   ARTIFICIAL NEURAL NETWORKS   9

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

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UNIT IV   INSTANCE BASED LEARNING 9

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

UNIT V   ADVANCED LEARNING 9

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

TOTAL: L: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	EthemAlpaydin	Introduction to Machine Learning	Second Edition, MITPress	2013
2.	Tom M.Mitchell	Machine Learning	Mc Graw,First Edition	2015

REFERENCE BOOKS:

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

WEB URLs

1. https://www.youtube.com/watch?v=0dP-YtYZREU
2. http://www.powershow.com/view/6b61c-MTYzN
3. https://www.youtube.com/watch?v=aVId8KMsdUU
4. www.learnnc.org/lp/editions/every-learner/6691
5. https://www.youtube.com/watch?v=ju1Grt2hdko

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COMPUTER SCIENCE AND ENGINEERING

16CSE15	4G TECHNOLOGIES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES
- To learn various generations of wireless and cellular networks
- To study about fundamentals of 3G Services, its protocols and applications
- To study about evolution of 4G Networks, its architecture and applications
- To study about WiMAX networks, protocol stack and standards
- To Study about Spectrum characteristics & Performance evaluation

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

16CSE15.CO1	Interpret the various protocols and standards in various layers in Wireless networks.
16CSE15.CO2	Design and implement wireless network environment for any application using latest wireless protocols and standards
16CSE15.CO3	Analyze the performance of networks
16CSE15.CO4	Explore the benefits of WiMax networks
16CSE15.CO5	Exploit various diversity schemes in LTE

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16CSE15.CO1	X	X	X	X	-	X	-	-	X	X	-	-	X	-	-
16CSE15.CO2	X	X	X	X	-	X	-	-	X	X	-	X	X	X	X
16CSE15.CO3	X	X	-	X	X	X	-	X	X	X	X	X	X	-	-
16CSE15.CO4	X	X	X	X	-		X	-	X	X	X	-	X	X	X
16CSE15.CO5	X	-	X	-	-	-	-	-	-	X	X	X	X	-	-

UNIT I   INTRODUCTION   9
Introduction: History of mobile cellular systems, First Generation, Second Generation, Generation 2.5, Overview of 3G & 4G, 3GPP and 3GPP2 standards

UNIT II   3G NETWORKS   9
3G Networks: Evolution from GSM, 3G Services & Applications, UMTS network structure, Core network, UMTS Radioaccess, HSPA – HSUPA, HSDPA, CDMA 1X , EVDO Rev -0, Rev-A, Rev-B, Rev-C Architecture, protocol stack.

UNIT III   4G LTE NETWORKS   9
4G Vision, 4G features and challenges, Applications of 4G, 4G Technologies – Multi carrier modulation, Smart Antenna Techniques, OFDM-MIMO Systems, Bell Labs Layered Space Time (BLAST) System, Software-Defined Radio.

UNIT IV   WiMAX NETWORKS   9
WiMax: Introduction – IEEE 802.16, OFDM, MIMO, IEEE 802.20

UNIT V   SPECTRUM & PERFORMANCE   9
Spectrum for LTE-Flexibility-Carrier Aggregation-Multi standard Radio base stations-RF requirements for LTE - Sensitivity and Dynamic range-Receiver susceptibility. Performance Assessment-Performance Evaluation.

TOTAL: L: 45

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TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Erik Dahlman, Stefa Parkvall, Johan Skold	4G LTE/LTE – Advanced for Mobile Broadband	Academic Press	2011
2.	Erik Dahlman, Stefa Parkvall, Johan Skol and Per Beming	3G Evolution HSPA and LTE forMobile Broadband	Academic Press	2008

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Juha Korhonen, ArtechHouse	Introduction to 3G Mobile Communication	www.artechhouse.com	2003
2.	Flavio Muratore	UMTS Mobile Communication for the Future	John Wiley & Sons Ltd	2001
3.	Savo G.Glisic	Advanced Wireless Networks-4GTechnologies	Wiley	2006
4	Vijay Garg	Wireless Communications andNetworking	Morgan kufmann publisher	2007
5	Ezio Biglieri	MIMO Wireless Communications	Cambridge University Press.	2015

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2. www.comlab.hut.fi/opetus/238/lecture2.pdf
3. https://www.tu-ilmenau.de/fileadmin/public/iks/files/lehre/UMTS/
4. https://en.wikipedia.org/wiki/Bell_Laboratories_Layered_Space-Time
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COMPUTER SCIENCE AND ENGINEERING

16CSE16	TOTAL QUALITY MANAGEMENT	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES
- To explain the fundamental concepts of total quality management
- To describe the principle of Total quality management, leadership skill, and teamwork, Customer and management
- To know about defect prevention and data gathering
- To classify the different types of total quality management tools and techniques
- To explain different kinds of quality system and quality auditing systems

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

16CSE16.CO1	Recall Basic concepts of TQM
16CSE16.CO2	Classify TQM Principles
16CSE16.CO3	Demonstrate TQM Tools and Techniques I
16CSE16.CO4	Discriminate TQM Tools and Techniques II
16CSE16.CO5	Examine the Quality Systems

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16CSE16.CO1	X	X	-	-	-	-	X	X	-	-	-	X	X	-	-
16CSE16.CO2	X	-	-	-	X	X	X	X	X	-	X	-	-	-	X
16CSE16.CO3	X	-	X	X	-	X	-	X		X	X	-	X	-	X
16CSE16.CO4	X	X	-	X	X	-	-	X	X	-	X	-	-	-	X
16CSE16.CO5	X	-	-	X	-	X	X	-	X	X	X	X	-	X	-

UNIT I   INTRODUCTION   9
Introduction - Need for quality - Evolution of quality - Definitions of quality - Dimensions of product and service quality - Basic concepts of TQM - TQM Framework - Contributions of Deming, Juran and Crosby - Barriers to TQM – Customer: Focus, Satisfaction, Complaints, Retention - Costs of quality.

UNIT II   TQM PRINCIPLES   9
Leadership, Employee Involvement - Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous Process Improvement - PDCA cycle - Supplier Partnership - Partnering, Selection, Rating.

UNIT III   TQM TOOLS AND TECHNIQUES I   9
The Seven Traditional Tools of Quality - New management tools - Six sigma - Bench marking - FMEA - 5S.

UNIT IV   TQM TOOLS AND TECHNIQUES II   9
Quality Function Development (QFD) - Taguchi quality loss function - TPM - Concepts, improvement needs - Performance measures.

UNIT V   QUALITY SYSTEMS   9
ISO 9000 Quality Management Systems: Introduction to ISO, Need for ISO 9000, elements of ISO 9000, quality auditing, types of auditing.ISO 14000: Environmental Management systems: Introduction

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to ISO 14000, Series of ISO14000, ISO 9000 Vs ISO 14000, Elements of EMS. TQM Implementation in manufacturing and service

TOTAL: L: 45

TEXT BOOKS:

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

REFERENCE BOOKS:

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

WEB URLs

1. https://en.wikipedia.org/wiki/Total_quality_management
2. https://www.youtube.com/watch?v=VGzAO-ha_v8
3. https://www.youtube.com/watch?v=xVUqulhQDU0
4. study.com/.../what-is-continuous-quality-improvement-definition
5. www.fme.aegean.gr/sites/default/files/cn/quality_function_deployment.pdf

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COMPUTER SCIENCE AND ENGINEERING

16CSE17	CLOUD COMPUTING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To introduce the students with the Cloud Computing paradigm,
- Illustrate Capabilities and limitations of current providers of Cloud Computing services
- Cloud service model
- To understand the mechanisms required
- To apply Cloud Computing in their own endeavors.

COURSE OUTCOMES:

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

16CSE17.CO1   Understand the concept of Cloud Computing and its models
16CSE17.CO2   Predict suitable virtualization concept on data center automation
16CSE17.CO3   Analyze the Cloud Computing Platforms and its Applications
16CSE17.CO4   Examine the Programming models and Cloud Software Environments
16CSE17.CO5   Energy Efficiency and the future Cloud Computing Techniques.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16CSE17.CO1	X	X	-	X	X	X	-	-	-	-	-	-	X	X	X
16CSE17.CO2	X	-	X	-	X	-	X	-	-	-	-	-	X	X	-
16CSE17.CO3	X	X	X	-	X	X	-	-	X	-	X	-	-	X	X
16CSE17.CO4	X	X	X	-	-	X	-	-	-	-	-	X	X	-	-
16CSE17.CO5	X	-	X	X	X	-	X	X	-	-	X	X	-	X	-

UNIT I   INTRODUCTION   9

The Vision of Cloud Computing - Defining a Cloud - Cloud Computing Reference Model - Types of Clouds – Cloud Models. Developments: Distributed Systems, Virtualization, Web 2.0, Service-Oriented Computing, Utility-Oriented Computing.

UNIT II   VIRTUALIZATION   9

Basics of Virtualization - Characteristics of Virtualized Environments - Taxonomy of Virtualization Techniques - Virtualization and Cloud Computing - Pros and Cons of Virtualization- Implementation levels of virtualization - Virtualization of CPU, Memory and I/O devices - Virtualization for data center automation.

UNIT III   COMPUTING PLATFORMS AND APPLICATIONS   9

Cloud Platforms in Industry: Amazon Web Services - Google AppEngine - Microsoft Azure. Cloud Applications: Scientific Applications, Business and Consumer Applications.

UNIT IV   PROGRAMMING MODEL   9

Parallel and Distributed Programming Paradigms - MapReduce, Twister and IterativeMapReduce - Hadoop Library from Apache. Cloud Software Environments - Eucalyptus, OpenNebula, OpenStack, Aneka, CloudSim

UNIT V   ADVANCES IN CLOUD COMPUTING   9

Energy Efficiency in Clouds - Market Based Management of Clouds - Federated Clouds / InterCloud - Third PartyCloud Services.

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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 theInternet of Things	Morgan Kaufmann Publishers	2012
2.	Rajkumar Buyya, Christian Vecchiola,S Thamarai Selvi	Mastering Cloud Computing	Tata McGraw Hill	2013

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,Managem ent, and Security	CRC Press	2010
2.	Tim Malhar, S.Kumaraswamm y, S.Latif	Cloud Security & Privacy	O'REILLY	2013
3.	Antohy T Velte,	Cloud Computing : APractical Approach	McGraw Hill	2013
4	Barrie Sosinsky	Cloud Computing Bible	Wiley India	2015
5	Gautam Shroff	Enterprise CloudComputing	Cambridge	2010

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1. https://www.priv.gc.ca/resource/fs-fi/02_05_d_51_cc_e.pdf
2. http://www.secc.org.eg/recocape/SECC_Tutorials_An%20Introduction%20to%2 0Cloud%20Computing%20Concepts.pdf.
3. http://c.ymcdn.com/sites/www.aitp.org/resource/resmgr/2013-ie-files/cloudrevolution.
4. https://java.net/jira/secure/attachment/29265/CloudComputing.pdf
5. https://www.priv.gc.ca/resource/fs-fi/02_05_d_51_cc_e.pdf

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COMPUTER SCIENCE AND ENGINEERING

16CSE18	MOBILE COMPUTING	L T P C
		3 0 0 3

COURSE OBJECTIVES

- Introduction to wireless communication
- To study the details of mobile architectures and its introduction
- Context of pervasive computing and mobile applications.
- To learn details about the protocol architecture of different wireless networks.
- Transport Layer applications

COURSE OUTCOMES:

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

16CSE18.CO1	Explain the Architecture and features of cellular networks.
16CSE18.CO2	Summarize various wireless communication standards.
16CSE18.CO3	Outline the routing protocols of mobile networks and compare their pros and cons.
16CSE18.CO4	Analysis the transport layer protocols of mobile networks.
16CSE18.CO5	Determine the application layer protocols and build scripts for wireless Networks

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16CSE18.CO1	x	-	x	x	-	-	-	-	-	x	-	x	x	x	-
16CSE18.CO2	x	x	-	-	x	-	-	x	x	x	-	-	x	-	-
16CSE18.CO3	x	x	x	x	-	x	-	-	x	x	x	x	x	x	-
16CSE18.CO4	x	x	x	x	-	x	-	-	x	x	x	-	x		x
16CSE18.CO5	x	x	x	x	-	x	-	-	x	x	x	x	x	x	-

UNIT I   WIRELESS COMMUNICATION FUNDAMENTALS   9

Introduction – Wireless transmission – Frequencies for radio transmission – Signals – Antennas – Signal Propagation – Multiplexing – Modulation – Spread Spectrum –Medium Access Control (MAC) – Space Division Multiple Access(SDMA) –Frequency Division Multiple Access (FDMA) – Time Division Multiple Access (TMDA) Code Division Multiple Access(CDMA).

UNIT II   MOBILE NETWORKS   9

Telecommunication Systems – GSM – Architecture – Protocols – Localization and calling – Handover – security – GPRS Broadcast Systems – DAB – DVB.

UNIT III   WIRELESS NETWORKS   9

Wireless LANs and PANs– IEEE 802.11 Standard – Architecture – Physical and MAC layer- MAC management– HiperLAN – Bluetooth- Wi-Fi – WiMAX.

UNIT IV   ROUTING   9

Mobile IP – DHCP – MANET: Routing – Classification – Table driven routing- On-Demand routing- Hybrid routing- Hierarchical state routing- Power-aware routing- Operations of Multicast routing.

UNIT V   TRANSPORT AND APPLICATION LAYERS   9

Traditional TCP– WWW -WAP – Architecture – WDP – WTLS – WTP – WSP – WAE – WML–WML Scripts- WTA Architecture.

TOTAL: L: 45

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COMPUTER SCIENCE AND ENGINEERING

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Jochen Schiller C	Mobile Communications	PHI, Second Edition	2011
2.	Prasant Kumar Pattnaik, Rajib Mall	Fundamentals of MobileComputing	PHI Learning Pvt.Ltd, New Delhi	2012

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	William.C.Y.Lee	Mobile Cellular Telecommunications-Analog andDigital Systems	Second Edition,Tata McGraw Hill Edition	2006
2.	C.K.Toh	AdHoc Mobile Wireless Networks First Edition	Pearson Education	2002
3.	Frank Adelstein, Sandeep KS Gupta, Golden Richard	Fundamentals of Mobile and Pervasive Computing	McGraw-Hill	2005
4	Agrawal and Zeng	Introduction to Wireless andMobile Systems	Brooks / Cole (Thomson Learning), First Edition	2006
5	Uwe Hansmann, Lothar Merk, Martin S. Nicklons and	Principles of Mobile Computing	Springer	2006

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2. https://www.youtube.com/watch?v=J1Wkq3TwmqE
3. https://www.youtube.com/watch?v=Eu_mTZxPofI
4. https://networklessons.com/cisco/ccna-routing-switching-icnd1-100-105/introduction-to-routers-and-routing/
5. https://www.youtube.com/watch?v=SMKvILI5LnA

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16CSE19	SALESFORCE CRM AND PLATFORM	L	T	P	C
		3	0	2	4

COURSE OBJECTIVES
- To learn the basics of Sales force and CRM
- To write business logic customizations using Apex triggers and classes customized using SOQL and DML
- To describe how trigger code works within the basics of the Save Order of Execution and transactions
- To write Visualforce markup code to customize the user interface
- To describe the fundamental concepts of testing Visualforce pages

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

16CSE19.CO1	Understand the basics of Salesforce platform
16CSE19.CO2	Leverage configurable aspects of Salesforce for business process automation
16CSE19.CO3	Implement Apex Programming and Visual force
16CSE19.CO4	Develop Apex program with SOQL & DML, Testing and Execution of Triggers.
16CSE19.CO5	Apply Visualforce pages with various controllers.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16CSE19.CO1	X	X	X	X	X	-	-	X	X	X	X	X	X	-	X
16CSE19.CO2	X	X	X	X	X	X	-	X	-	-	X	X	X	X	-
16CSE19.CO3	X	X	X	X	X	X	-	X	X	X	X	X	X	X	-
16CSE19.CO4	X	X	X	X	X	X	-	X	-	-	-	X	X	X	X
16CSE19.CO5	X	X	X	X	X	X	-	X	X	-	X	X	X	X	X

UNIT I INTRODUCTION TO SALESFORCE 9
Salesforce Overview - Architecture – Environment - Sales Cloud - Service Cloud - Navigating Setup - Salesforce Objects - Standard Object - Custom Objects - Master Detail - Lookup Relationship - Schema Builder - Salesforce Data Security - Control Access Org - Control Access Objects - Control Access Fields - Control Access Records - Create a Role Hierarchy - Define Sharing Rules – Salesforce Process Builder - Automate Business Processes - Importing Data- Exporting Data – Reports Dashboards- Using Formula Fields.

UNIT II SALESFORCE CRM FUNCTIONALITY 9
CRM: Lead/Case Assignment, Conversion-Sales/Service Process - Escalation Rules - Web-to-Lead/Case- Merge Records- Global Search-Quick Create-data Management Rule-Data Model Design-Web Technology Basics.

UNIT III APEX PROGRAMMING BASICS 9
Programming with Apex: Introduction - **SOQL**: Syntax, SOQL in Apex – dynamic query creation - Query Parent-Child relationships: relationship query – child-to-parent relationship – parent-to-child relationship – DML essentials: DML operations with Apex - DML errors

UNIT IV APEX PROGRAMMING DEVELOPMENT 9
Trigger essentials: Introduction – Syntax – Use trigger context variables – Apex Trigger -Classes: Apex classes – Access Apex class –Save order of Execution and Apex Transactions: Order of Execution - Triggers with order of execution – lifecycle of an Apex transaction – Memory lifecycle for static variable- Sales force order of Execution: Eclipse-Visual Studio-Data Loader- Import Wizard-Workbench.

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UNIT V   VISUALFORCE DEVELOPMENT   **9**

Visualforce: Introduction – Creating Visualforce pages – standard controller –Visualforce page using a custom button – Display data from a record in a Visualforce page – Exploring the View and Controller layers of Visualforce – Display related data – Invoke standard controller actions Working with List controllers and SOSL Queries – Use a standard list controller in a Visualforce page – Create a SOSL query – Create a custom list controller – Visualforce Development considerations: Requirements - governor limit issues and security concerns – Visualforce strategies – Testing.

TOTAL: L: 45

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. Lightning Experience Basics
11. Build a Conference Management Application
12. Build a Visual force Application with the Lightning Design System
13. Development an Account Geolocation Application
14. Transform SQL Queries to SOQL Queries in a Lightning Application

TOTAL: P: 30

REFERENCE BOOKS:

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

WEB URLs
1. https://www.youtube.com/channel/UCTzFOVQiCXsZ_41FJvUx7UA
2. https://www.tutorialspoint.com/salessforce
3. https://www.salesforcetutorial.com
4. https://www.salesforcegeneral.com/salesforce-developer-tutorials
5. https://trailhead.salesforce.com/en/home

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16CSE20	INTRODUCTION TO INTERNET OF THINGS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES
- To understand Smart Objects and IoT Architectures
- To learn about various IOT-related protocols
- To develop different models for network dynamics
- To understand cloud in the context of IoT
- To develop IoT infrastructure for popular applications

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

16CSE20.CO1	Identify and design the new models for market strategic interaction.
16CSE20.CO2	Develop business intelligence and information security for Internet of Things(IoT).
16CSE20.CO3	Demonstrate a middleware for IoT.
16CSE20.CO4	Compare various protocols for IoT.
16CSE20.CO5	Implement different models for network dynamics.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16CSE20.CO1	x	-	x	-	-	x	x	x	-	x	-	-	x	-	-
16CSE20.CO2	x	x	-	-	-	x	x	x	-	x	-	-	-	x	x
16CSE20.CO3	x	-	x	x	-	x	-	x	-	x	-	x	x	x	-
16CSE20.CO4	x	-	x	-	x	-	-	x	-	x	-	x	x	x	-
16CSE20.CO5	x	-	x	-	x	-	x	-	-	x	-	x	-	x	-

UNIT I   INTRODUCTION   9
Introduction to IoT-origin of terminology-characteristics-evolution of connected devices-modern days IoT applications-IoT enabler –connectivity layers-Iot Vs M2M-IoT Vs WoT-Gateways-Multihoming-Sensors Vs Transducer-sensor features-types of   sensors-6LoWPAN-RFID-MQTT—components-methods-applications-SMQTT-CoAP-XMPP-AMQP-IEEE802.15.4- Zigbee networks

UNIT II   HART and WSN   9
HART and Wireless HART-Introduction-architecture-congestion control-WirelessHART Vs ZigBee-NFC-Blutooth- protocolstack-SDP-Zwave-Zwave Vs Zigbee-ISA 100.11A-WSN-Node behavior in WSN-Applications of WSN-Target tracking-WSN coverage-Stationary WSN Vs Mobile WSN-UAV networks-Machnie to machine communications.

UNIT III   PYTHON AND R-Pi   9
Basic concepts of programing in python-loops, modules-error handling-Basic concepts of file read/write operations -Image applications and networking applications (UDP Client Server Socket)- Basics of R-pi-its setup-accessing on R-pi over the network Basics of integration GPIO-based sensors as well as Pi-camera to a R-pi board-Integration sensor to R-pi and saving its data

UNIT IV   SDN and CLOUD COMPUTING   9
Introduction-SDN for mobile networks-Rule placement-Experimental approaches-Motivation for use of Cloud Computing in IoT-Evolution of Cloud computing-NIST Model-Characteristics-Components-Service and Deployment models-service mopdels:Saas,Paas,Iaas-Service offerings and SLAs-Economics

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of scaling-Data management and security

UNIT V   SENSOR CLOUD & FOG COMPUTING   **9**

Introduction-Virtualization-Limitations-Difference between WSN and Sensor-Cloud-Sensor-Cloud Architecture-Work-flow- Optimal Compositions of Virtual Sensors-Caching in Sensor-Cloud-Pricing in Sensor-Cloud- Introduction-Why Fog Computing?-Requirements for IoT-When to use- Fog Architecture-Fog nodes-Working of Fog-Advantages-Applications-Challenges-implementation
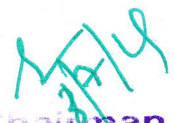
TOTAL: L: 45

TEXT BOOKS:

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

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Herbert Schildt	Java 2 - Complete Reference	Tata Mc Graw Hill	2011
2.	Bogdan Ciubotaru & Gabriel-MiroMuntean	Advanced Network Programming Principles & Techniques, Network Application Programming withJava	Springer Verlag	2013

WEB URLs

1. https://www.youtube.com/watch?v=h0gWfVCSGQQ
2. https://www.youtube.com/watch?v=WtRpFLx34BY
3. https://www.youtube.com/watch?v=usYySG1nbfI
4. https://www.geeksforgeeks.org/sensors-in-internet-of-thingsiot/
5. https://www.networkworld.com/article/3243111/what-is-fog-computing-connecting-the-cloud-to-things.html

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16CSE21	PROGRAMMING IN JAVA	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES
- To install and run the Java Programs.
- Understand the concepts of Inheritance, Packages and interfaces.
- To understand various errors and handling the errors using Exception handling.
- To study various I/O streams and Applet programming.
- To apply GUI applications using the tool AWT

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

16CSE20.CO1	Install and run Java programs using classes.
16CSE20.CO2	Ilustrate various inheritance concepts, packages and interfaces.
16CSE20.CO3	Develop Exception handling methods to avoid errors and thread concepts.
16CSE20.CO4	Implement I/O streams and Applet programming.
16CSE20.CO5	Deploy real time applications using AWT tool .

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16CSE20.CO1	X	-	-	X	-	-	-	X	-	X	-	X	X	X	-
16CSE20.CO2	X	X	-	-	X	-	-	X	X	X	-	-	X	-	-
16CSE20.CO3	X	X	X	X	-	X	X	-	X	-	X	X	-	X	-
16CSE20.CO4	X	-	X	X	X	X	-	-	X	-	X	X	X	-	X
16CSE20.CO5	X	X	X	X	-	-	X	-	X	-	X	X	X	X	-

UNIT I   INTRODUCTION   9
Introduction-JAVA Programming steps-JAVA tools and resources- How to Install Java- Running Java Programs-Editing, Compilation and Execution-Few Simple JAVA- JAVA Applet programming-Writing and Running a Java Applet using HTML File- Running a Java Applet without using HTML File- Encapsulation-Encapsulation: Creating a Class- Objects creation- constructor-constructor overloading- To Avoid Name Space Collision- More Specialized Use of this Keyword-JAVA Programming Insights- Use of print (), println () and printf () -Command Line Input in Java-Take Input using Scanner Class- Read Input

UNIT II   INHERITANCE,PACKAGES AND INTERFACES   9
JAVA static scope rule- Programs to Demonstrate Loop Control, Scope of Variables and recursion- Inheritance- Simple Inheritance-Multilevel Inheritance-Use of super Keyword- Method Overriding in Inheritance-Abstract Class-Use of final Keyword-Information hiding- Example of Access Modifiers- Java Access Modifiers with Method Overloading- Concept of Package in Java-Types of packages-Accessing, importing of packages-Package implementation-Interfaces

UNIT III   EXCEPTION HANDLING   9
Exception-Concept of Errors in Java-Exception Handling Mechanism- try-catch block- try- with Multiple catch- Multiple Errors with Single catch- finally in try-catch- throw in try-catch- Built-in Exception Handling in Java-User Defined Exceptions- Final Round of Wrapping Multithreading in Java- Concept of Multithreading- Creating Threads with Thread- Creating Threads with Runnable-States of a Thread- Scheduling of Threads-Priority of Threads- Synchronization of Threads

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UNIT IV   IO STREAM AND APPLET PROGRAMMING   9

Usage of I-O Stream Classes-Files Handling in Java-Checking Status of a File-Reading a File-Writing into a File- Merging two Files into a File- Random Access Files in Java-Interactive Input-Output-Graphical Input-Output- Java Programming for Applet-Structure of an Applet- Input to an Applet-Application Versus Applet- Applet Basics-Applet Skeleton and Syntax- Designing an Applet

UNIT V   AWT   9

AWT Concept- GUIs with AWT-GUIs with AWT Component - GUIS with Layout Mangers –Flow Layout-Border Layout- Grid Layout-Card Layout-Events-event handling- Swing: Basics of Swing-Java Swing Components- Java swing Calculator – Networking with JAVA-JDBC connectivity-Case study.

TOTAL: L: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Herbert Schildt	Java 2 - Complete Reference	Tata Mc Graw Hill	2011
2.	Cay s.Horstmann, Gary Cornell	Core Java Volume - 1Fundamentals	Prentice Hall, 9th Edition	2013

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Bogdan Ciubotaru & Gabriel-Miro Muntean	Advanced Network Programming Principles &Techniques, Network Application Programming with Java	Springer Verlag	2013
2.	StevenHolzner	Java 2 Black book	Dreamtech press	2011

WEB URLs

1. https://nptel.ac.in/courses/106/105/106105191/
2. https://www.tutorialspoint.com/java/index.htm
3. https://www.w3schools.com/java/
4. https://www.javatpoint.com/java-tutorial

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16CSF01	PROJECT WORK PHASE I	L	T	P	C
		0	0	6	3

COURSE OBJECTIVES
- The practical implementation of theoretical knowledge gained during the study from First year to Third year
- The student should be able implement their ideas/real time industrial problem/ current application of their engineering branch which they have studied in curriculum
- To build confidence in the student what he has learnt theoretically
- Describe the problem statement
- Analyze and process the experimental information

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

16CSF01.CO1	Understand the technical concepts of project area.
16CSF01.CO2	Identify the problem and formulation
16CSF01.CO3	Design the problem statement
16CSF01.CO4	Formulate the algorithms by using the design
16CSF01.CO5	Develop the module

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16CSF01.CO1	X	X	X	-	X	X	-	-	-	X	-	X	X	-	X
16CSF01.CO2	X	X	-	-	X	-	-	X	-	-	X	-	-	X	-
16CSF01.CO3	X	X	-	X	-	X	-	-	-	-	X	X	-	-	X
16CSF01.CO4	X	-	X	-	-	-	X	-	X	-	-	-	X	X	-
16CSF01.CO5	X	X	-	X	X	-	-	X	X	X	X	X	X	-	X

CONTENT
1. Project helped students to gather, organize, summarize and interpret technical literature with the purpose of formulating a project proposal.
2. B.E. Projects can be two types: Projects based on implementation of any application oriented problem, which will be more or less experimental in nature, and the others will be based on some innovative/ theoretical work.
3. In Project Phase-I the student will undertake project over the academic year, which will involve the analysis, design of a system or sub system in the area identified earlier in the field of Information Technology.
4. The topic must be formulated in consultation with the guide and project coordinator
5. The project will be undertaken preferably by a group of 1-3 students who will jointly work and implement the project.
6. The group will select a project with approval from a committee formed by the department of senior faculty to check the feasibility and approve the topic.

REVIEW COMMITTEE
1. The Head of the department/Project coordinator shall constitute a review committee for project work for project group
2. Project guide would be one member of that committee by default

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3. The students or project group shall make presentation on the progress made by them before the committee.
4. The record of the remarks/suggestions of the review committee should be properly maintained and should be made available at the time of examination
5. Each student/group is required to give presentation as part of review for 10 to 15 minutes followed by a detailed discussion.

PROJECT WORK REVIEWS

1. Project work phases will have a minimum of three internal reviews by an appointed committee of faculty.
2. The final review will be done by an external faculty

Review 1: Finalization of scope - the objectives and scope of the project should be finalized in second week of their academic semester. Should finalize list of required hardware, software or other equipment for executing the project, test environment/tools

Review 2: Finalization - High level design, planning

Guidelines for Students and Faculty:
PROJECT REVIEW COMMITTEE

1. This committee will be responsible for evaluating the timely progress of the projects and communicating the progress report to the students.
2. As far as possible Students should finalize the same project title taken for Project.
3. Review committee should conduct "Feasibility Review" in first week after commencement of the term.
4. Review Committee should finalize the scope of the project.
5. If change in project topic is unavoidable then the students should complete the process of project approval by submitting synopsis along with the review of important papers. This new project topic should be approved by review committee

TERM WORK

1. The term work will consist of a report prepared by the student on the project allotted to them
2. They should use appropriate tools for the preparation of the report like project planning, UML diagram, testing tools, referencing tools etc.

REPORT STRUCTURE

- Contents
- List of Abbreviations
- List of Figures
- List of Graphs
- List of TableS
    1. Introduction and aims/motivation and objectives
    2. Literature Survey
    3. Problem Statement
    4. Project Requirements
    5. System Analysis Proposed Architecture/ high level design of the project
    6. Verification Validation
    7. Project Plan 8. Conclusion

References
Appendices
Base Paper(s)
EVALUATION GUIDELINES

A panel of examiner will evaluate the viability of project / project scope.

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The panel will also verify that all the suggestions/comments in the review document are taken care and accordingly allot the term work marks.

Oral examination in the form of presentation will be based on the project work completed by the candidates. Preliminary report must also be presented during the oral examination.

TOTAL: P :90

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16CSF02	PROJECT WORK - PHASE II	L	T	P	C
		0	0	30	15

COURSE OBJECTIVES
1. Plan an experimental design to solve Engineering problems
2. Develop an attitude of team work and independent working on real time problems
3. Analyze and process the experimental information
4. Evaluate, interpret and justify the experimental results
5. Develop a dissertation report

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

16CSF02.CO1	Design an experiment to solve engineering / societal problems using modern tools
16CSF02.CO2	Develop lifelong learning to keep abreast of latest technologies.
16CSF02.CO3	Implement the workflow to provide sustainable solutions
16CSF02.CO4	Interpret the experimental results and the impact on society and environment
16CSF02.CO5	Investigate the application for the real time problems

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16CSF02.CO1	X	X	X	X	X	-	-	-	X	-	-	-	X	X	X
16CSF02.CO2	X	X	X	-	X	X	-	X		-	X	X	X	X	-
16CSF02.CO3	X	X	X	X	X	-	-	-	X	-	X	-	X	-	X
16CSF02.CO4	X	X	X	X	-	X	X	X	-	X	X	X	X		-
16CSF02.CO5	X	X	X	-	-	-	X	X	X	X	-	X	-	X	X

PROJECT WORK REVIEWS

- Project work phases will have a minimum of three internal reviews by an appointed committee of faculty.
- The final review will be done by an external faculty

Review 3: Implementation Status and testing document

Review 4: Final Project Demonstration, Project Report and proper Result analysis

The group will submit at the end of semester II.
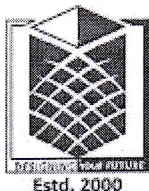
6. The Workable project.

7. Project report (Word Document) in the form of bound journal complete in all respect – 1 copy for the Institute, 1 copy for guide and 1 copy of each student in the group for certification.

The project report contains the details:

8. Problem definition

9. Requirement specification

System design details (UML diagrams)

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System implementation – code documentation – dataflow diagrams/ algorithm, protocols used

Test result and procedure

Conclusions.

Appendix

    a. Tools used

    b. References

    c. Papers published/certificates

TOTAL: P : 180

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16CSF03	COMPREHENSION	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES
- To write effective and coherent paragraphs
- To comprehend the overall and internal organization of an academic essay
- To write an effective thesis statement
- To understand vocabulary
- To use pre-writing strategies to plan writing.

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

16CSF03.CO1	Write a paragraph with a topic sentence, support, and concluding sentence
16CSF03.CO2	Produce coherent and unified paragraphs with adequate support and detail of the topic
16CSF03.CO3	Write an effective introduction thesis statement that addresses the writing prompt and conclusion
16CSF03.CO4	Produce appropriate vocabulary and correct word forms
16CSF03.CO5	Produce accurate grammatical structures for the paragraph writing.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16CSF03.CO1	x	-	-	-	x	x	x	x	x	x	-	x	-	x	-
16CSF03.CO2	x	-	-	-	-	x	-	x	x	x	-	x	-	-	x
16CSF03.CO3	x	x	x	x	x	x	-	-	x	x	x	x	-	x	-
16CSF03.CO4	x	-	-	-	x	-	-	x	x	x	x	x	x	-	x
16CSF03.CO5	x	-	-	-	x	x	-	-	x	x	x	x	x	x	-

COMPREHENSION TOPICS
1. Cloud Computing for Small Businesses
2. Role of Information Technology in Corporate Functions
3. Knowledge Management
4. The Impact of Cloud Computing
5. Cluster computing
6. Computer Forensics
7. The Internet of Things
8. Data Security
9. Green Computing
10. Issue on eGovernment Development and Applications
11. Big Data
12. Design of Reversible Computing Systems
13. Social Platforms

TOTAL : P :60

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16CSF04	DESIGN PROJECT	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES
- To provide background information and tools to guide project identification and formulation
- To emphasize the importance of sound selection of alternative means at the early stages of the cycle.
- To explain how sound choice can be guided by using tools such as Log frame analysis.
- To demonstrate how project elements can be clearly specified and risks assessed and reduced
- To set out how to link logical project design to work planning and budgeting

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

16CSF04.CO1	Identify the project area
16CSF04.CO2	Classify the problems
16CSF04.CO3	Design the project
16CSF04.CO4	Synthesis the problem statement
16CSF04.CO5	Implement the project

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16CSF01.CO1	x	x	x	x	-	-	-	-	-	-	-	x	x	-	x
16CSF01.CO2	x	x	-	x	x	-	-	x	-	x	x	-	-	x	-
16CSF01.CO3	x	x	x	x	-	x	x	-	-	-	-	x	-	x	-
16CSF01.CO4	x	x	-	x	-	-	-	-	-	-	x	x	x	x	-
16CSF01.CO5	x	x	-	-	x	x	-	x	x	-	x	-	-	-	x

TOTAL : P : 60

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| 16CSF05 | TECHNICAL SEMINAR | L T P C |
| | | 0 4 0 2 |

COURSE OBJECTIVES

- To develop Communication and Presentation skill
- To expose students to the 'real' working environment and get acquainted with the organization structure
- To develop the business operations and administrative functions
- To promote and develop presentation skills and import a knowledgeable society
- To set the stage for future recruitment by potential employers

COURSE OUTCOMES:

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

16CSF05.CO1	Develop a skill for work in actual working environment.
16CSF05.CO2	Utilize available technical resources in efficient manner
16CSF05.CO3	Write technical documents and give oral presentations related to the work completed
16CSF05.CO4	Prepare a presentation in latest trends in Information Technology
16CSF05.CO5	Implement the presentation in latest trends in Information Technology

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16CSF05.CO1	x	-	x	-	-	x	x	-	-	-	-	-	x	-	-
16CSF05.CO2	-	-	x	-	x	-	-	x	x	x	-	-	-	-	x
16CSF05.CO3	x	-	x	-	x	-	-	-	-	x	x	-	-	x	-
16CSF05.CO4	-	-	·x	x	x	-	-	-	x	-	x	-	x	x	-
16CSF05.CO5	x	-	x	-	x	x	-	-	x	-	-	x	x	x	x

Seminar Topic:
1. Seminar topic should relate to the Information Technology, Some of the seminar topics are listed below:
2. FreeNet
3. Linear Programming in Cloud
4. Blackberry Technology
5. Biometric Security Systems
6. Credit Card Fraud Detection
7. Vehicle Management System
8. Smartshader Technology
9. Digital Piracy
10. Google Glass
11. Data Recover
12. Cyber and Social Terrorism
13. Space Mouse

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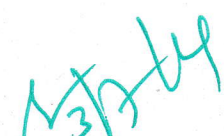Estd. 2000

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14. Pill Camera

15. Ambient Intelligence

16. Mind Reading Computer

17. Honeypots

18. Security through Obscurity

19. Electronic Banking

20. Gi-Fi

SCHEME OF EVALUATION

I.   The Course is evaluated based on:

- Presentation

- Student's reports

- PPT presentation

- Presentation will take place in the weekly class. The presentation is evaluation by your class in charge

- Report must be submitted during presentation. The report evaluation is done by your class in charge.

- A Viva voce comprising comprehensive questions based on the presentation

TOTAL : P :60

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16CSF06	ENTREPRENEURSHIP DEVELOPMENT	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To promote strong entrepreneurship among Engineers, Managers and Science students.
- To promote entrepreneurship among relevant sectors in the state.
- To collaborate with other organizations and institutions.
- To organize entrepreneurship development and awareness programs.
- To develop close links between industry-Institute by interaction programs. High priority to activities designedto bring about improvement in the performance of the industry.

COURSE OUTCOMES:

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

16CSF06.CO1	Identifying real problems and a solutions people want Pitching solutions, such as products and services.
16CSF06.CO2	Developing and managing early stage software.
16CSF06.CO3	Achieve high degree of productivity in a small team via agile, high quality practices and teamorganization approaches
16CSF06.CO4	Create a production software development environment.
16CSF06.CO5	Achieve customer satisfaction in the development of IT products and services

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16CSF06.CO1	X	-	X	X	-	-	-	-	-	X	-	X	X	X	-
16CSF06.CO2	X	X	-	-	X	-	-	X	X	X	-	-	X	-	-
16CSF06.CO3	X	X	.X	X	-	X	-	-	X	X	X	X	X	X	-
16CSF06.CO4	X	X	X	X	-	X	-	-	X	X	X	-	X	-	X
16CSF06.CO5	X	X	X	X	-	X	-	-	X	X	X	X	X	X	-

UNIT I   CONCEPT OF ENTREPRENEURSHIP: 9

Meaning and characteristics of entrepreneurship, entrepreneurial culture, socio-economic origin of entrepreneurship, factors affecting entrepreneurship, conceptual model of entrepreneurship, traits of a good entrepreneur, entrepreneur, intra-preneur and manager ENTREPRENEURIAL MOTIVATION: motivating, compelling and facilitating factors, entrepreneurial ambition, achievement motivation theory and Kakinada experiment.

UNIT II   ESTABLISHMENT OF ENTREPRENEURIAL SYSTEMS   9

Search, processing and selection of idea, Input requirements SMALL SCALE INDUSTRY: meaning, importance, characteristics, advantages and problems of SSIs. Steps for starting a small industry, guidelines for project report registration as SSI.

UNIT III   ASSISTANCE TO SSI   9

need for incentives & subsidies, need for institutional support, role of government and other institutions

UNIT IV   FUNCTIONAL PLANS   9

Marketing plan- marketing research for the new venture, steps in preparing marketing plan, contingency planning; Organizational plan- Forms of ownership, designing organizational structure, job design, manpower planning; Financial plan- cash budget, working capital, proforma income statement, Proforma

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cash flow, proforma balance sheet, break even analysis.

UNIT V   SOURCES OF FINANCE   9
Debt or Equity financing, commercial banks, venture capital; financial institutions supporting entrepreneurs; legal issues- intellectual property rights, patents, trademarks, copy rights, trade secrets, licensing franchising.
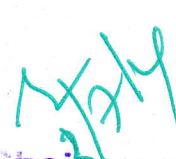
TOTAL: L: 45

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Gupta C. B. and Srinivasan N. P	Entrepreneurial Development	Sultan Chand &Sons	2014
2.	Vasant Desai	Management of a SmallScale Industry	Himalaya Publishing House	2011

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Sangeetha Sharma	EntrepreneurshipDevelopment	PHI Learning Pvt. Ltd	2016
2	K Ramachandran	Entrepreneurship Development	Tata McGraw-Hill	2009
3	Abhishek Nirjar	EntrepreneurshipDevelopment	CBS Publishers	2014
4	S. Anil Kumar	EntrepreneurshipDevelopment	New Age International	2008
5	Fang Zhao	Information Technology Entrepreneurship and Innovation	O'Reilly	2008

WEB URLs

1. https://www.tutorialspoint.com/entrepreneurship_development/index.htm
2. https://www.entrepreneur.com/article/244279
3. https://ocw.mit.edu/courses/entrepreneurship/
4. http://freevideolectures.com/Course/3645/Technology-Entrepreneurship
5. http://articles.bplans.com/11-excellent-free-online-courses-for-entrepreneurs/

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16CSF07	SOFT SKILLS	L	T	P	C
		2	2	0	3

COURSE OBJECTIVES
- To enhance holistic development of students and improve their employability skills.
- To develop inter personal skills and be an effective goal oriented team player.
- To develop professionals with idealistic, practical and moral values.
- To develop communication and problem solving skills.
- To re-engineer attitude and understand its influence on behavior.

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

16CSF07.CO1	Explores various individual and group problem-solving approaches and thinking patterns
16CSF07.CO2	Analyze how stress impacts all of us in our professional lives
16CSF07.CO3	Manage their time in an efficient and effective manner
16CSF07.CO4	Proactively to situations and communicate more effectively
16CSF07.CO5	Equip participants with critical skill and decision making

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16CSF07.CO1	-	x	x	-	-	x	-	-	-	x	-	-	-	-	x
16CSF07.CO2	x	-	-	x	-	-	-	x	x	-	-	-	-	x	-
16CSF07.CO3	-	-	-	-	-	x	x	x	-	-	-	x	-	-	x
16CSF07.CO4	-	-	-	-	x	-	-	-	x	-	x	x	x	-	-
16CSF07.CO5	-	-	-	-	-	-	x	-	x	x	-	x	-	-	-

UNIT I
6

Self Analysis: SWOT Analysis-Who am I- Attributes- Importance of Self Confidence- Self Esteem.
Team Work: Necessity of Team- Work Personally- Socially and Educationally
Gratitude: Understanding the relationship between Leadership Networking & Team work- Assessing InterpersonalSkills -Situation description of Interpersonal Skill.

UNIT II
6

Attitude: Factors influencing Attitude- Challenges and lessons from Attitude- Etiquette.
Leadership: Skills for a good Leader- Assessment of Leadership Skills
Creativity: Out of box thinking-Lateral Thinking.

UNIT III
6

Stress Management: Causes of Stress and its impact- how to manage & distress- Circle of control- Stress Busters. **Emotional Intelligence:** What is Emotional Intelligence- emotional quotient why Emotional Intelligence matters- Emotion Scales- Managing Emotions

UNIT IV
6

Motivation: Factors of motivation- Self talk, Intrinsic & Extrinsic Motivators.
Conflict Resolution: Conflicts in Human Relations – Reasons Case Studies- Approaches to conflict resolution

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UNIT V   6

Goal Setting: Wish List- SMART Goals- Blue print for success- Short Term- Long Term- Life Time Goals.

Time Management: Value of time- Diagnosing Time Management- Weekly Planner To do list- Prioritizing work **Decision Making:** Importance and necessity of Decision Making- Process and practical way of Decision Making-Weighing Positives & Negatives.

TOTAL: L: 30 + T : 30 = 60

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Career Development Centre	Soft Skills	Green Pearl Publications	2015
2.	Daniel Coleman	Emotional Intelligence	Bantam Book	2006

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Gopalaswamy Ramesh	The Ace of Soft Skills: Attitude, Communicationand Etiquette for Success	Pearson EducationIndia	2010
2	M. S. Rao	Soft Skills – Enhancing Employability	I. K. International Pvt Ltd	2010
3	Barun Mitra	Personality Development and Soft Skills	Oxford UniversityPress	2012
4	Frederick H. Wentz	Soft Skills Training: A Workbook to Develop Skills for Employment	Create space Independent Pub	2012
5	John Z. Sonmez	Soft Skills: The Software Developer's Life Manual	Manning Publications Company	2014

WEB URLs

1. https://onlinecourses.nptel.ac.in/noc16_hs15
2. http://www.skillkey.com/courses/explore
3. https://www.wiziq.com/tutorials/soft-skills
4. http://www.skillsoft.com
5. https://elearningindustry.com/soft-skills-training-make-elearning-work-enhancing-soft-skills

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16CSF08	PROFESSIONAL PRACTICES	L	T	P	C
		0	0	6	3

COURSE OBJECTIVES

- To examine important professional issues in contemporary practice and
- To help students become an effective participant in a team of IT professionals.
- To have gained a thorough understanding of the various issues/factors and IT professional faces and how oneshould respond.
- To have learned what are considered professional behavior in the IT field
- To have learned about the current IT practices.

COURSE OUTCOMES:

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

16CSF08.CO1	Describe the various issues/factors an information technology professional
16CSF08.CO2	Describe professional behavior in the information technology.
16CSF08.CO3	Recognize what are the current issues in IT and the emerging technology
16CSF08.CO4	Write properly formatted and organized technical reports
16CSF08.CO5	Develop professional attitude from the perspectives of experienced IT practitioners

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
16CSF08.CO1	X	-	X	X	-	X	-	-	-	X	-	X	-	X	-
16CSF08.CO2	X	X	-	-	-	-	-	X	X	X	-	-	X	X	X
16CSF08.CO3	X	-	X	X	-	X	X	-	X	X	X	X	-	X	X
16CSF08.CO4	X	X	X	X	-	X	-	-	X	X	X	-	X	-	X
16CSF08.CO5	X	X	X	X	-	X	X	-	X	X	X	X	-	X	-

CONTENT

1. Discipline-specific knowledge and capabilities: appropriate to the level of study related to an InformationTechnology profession.
2. Communication: using oral, written and interpersonal communication to inform, motivate and effect change
3. Digital literacy: using technologies to find, use and disseminate information
4. Critical thinking: evaluating information using critical and analytical thinking and judgment
5. Problem solving: creating solutions to authentic (real world and ill-defined) problems
6. Self-management: working and learning independently, and taking responsibility for personal actions.
7. Teamwork: working and learning with others from different disciplines and backgrounds
8. Global citizenship: engaging ethically and productively in the professional context and with diverse communitiesand cultures in a global context

I   **Information Technology Professionalism**

A.   Privacy and confidentiality
B.   Computer ethics
C.   Intellectual property issues
D.   Computer crime and fraud
E.   Professional bodies

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	F.	Impact of information technology on society
II		**Information Technology Practices**
	A.	Effects of standardization
	B.	Effectiveness vs efficiency
	C.	Distributed systems issues
	D.	Emerging technologies
	E.	Quality issues
	F.	Current issues

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Schultz, Robert A	Contemporary Issues in Ethics and Information Technology	IRM Press	2006
2.	Baase S	A Gift of Fire, Social, Legal and Ethical Issues for Computers and the Internet	Prentice Hall	2003

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Johnson DG	Computer Ethics	Prentice Hall	2001
2.	Spinello RA	CyberEthics: Morality and Law in Cyberspace	Jones and Bartlett	2000

WEB URLs

1. www.infosec.gov.hk
2. www.pcpd.org.hk
3. www.ipd.gov.hk
4. www.ogcio.gov.hk
5. www.hkcs.org.hk

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