ಬಿ.ಎಂ.ಎಸ್. ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ, ಬೆಂಗಳೂರು

(ಸ್ವಾಯತ್ತ ವಿದ್ಯಾ ಸಂಸ್ಥೆ)

ಬುಲ್ ಟೆಂಪಲ್ ರಸ್ತೆ, ಬೆಂಗಳೂರು – 560 019

Computer Science & Engineering

Scheme & Syllabus for
III to VIII Semesters
2009 – 2013

BMS COLLEGE OF ENGINEERING, BANGALORE

(Autonomous College under VTU)

Bull Temple Road, Bangalore - 560 019

BMS COLLEGE OF ENGINEERING, BANGALORE

Autonomous College under VTU

SCHEME OF INSTRUCTION

Department: Computer Science & Engineering **Semester:** III

Sl. No.	Subject Code	Course Title	Teaching Department	CREDITS				Contact Hrs	Marks			SEE Duration in Hrs
				L	T	P	Total		CIE	SEE	Total	
1	10MA3GCMAT	DISCRETE MATHEMATICAL STRUCTURES	CSE	3	1	0	4	5	50	50	100	3
2	09CI3GCCOA	COMPUTER ORGANIZATION AND ARCHITECTURE	CSE	4	0	0	4	4	50	50	100	3
3	09CI3GCDSL	DATA STRUCTURES	CSE	4	0	2	6	8	50	50	100	3
4	09CI3GCLDL	LOGIC DESIGN	CSE	4	0	1	5	6	50	50	100	3
5	09CI3GCMPL	MICROPROCESSORS	CSE	4	0	2	6	8	50	50	100	3
				Total Credits			**25**	**31**	**Total Marks**		**500**	

BMS COLLEGE OF ENGINEERING, BANGALORE

Autonomous College under VTU

SCHEME OF INSTRUCTION

Department: Computer Science & Engineering **Semester:** IV

Sl. No.	Subject Code	Course Title	Teaching Department	CREDITS				Contact Hrs	Marks			SEE Duration in Hrs
				L	T	P	Total		CIE	SEE	Total	
1	10MA4GCMAT	ENGINEERING MATHEMATICS – IV	CSE	3	1	0	4	5	50	50	100	3
2	09CI4GCTOF	THEORETICAL FOUNDATIONS OF COMPUTATION	CSE	4	0	0	4	4	50	50	100	3
3	09CI4GCUNX	UNIX PROGRAMMING	CSE	4	0	1	5	6	50	50	100	3
4	09CI4GCOOP	OBJECT-ORIENTED PROGRAMMING WITH C++	CSE	4	0	2	6	8	50	50	100	3
5	09CI4GCADA	ANALYSIS AND DESIGN OF ALGORITHMS	CSE	4	0	2	6	8	50	50	100	3
				Total Credits			**25**	**31**	**Total Marks**		**500**	

BMS COLLEGE OF ENGINEERING, BANGALORE

Autonomous College under VTU

SCHEME OF INSTRUCTION

Department: Computer Science & Engineering **Semester:** V

Sl. No.	Subject Code	Course Title	Teaching Department	CREDITS				Contact Hrs	Marks			SEE Duration in Hrs
				L	T	P	Total		CIE	SEE	Total	
1	10CI5GCOPS	OPERATING SYSTEM	CSE	4	0	0	4	4	50	50	100	3
2	10CI5GCDCN	DATA COMMUNICATIONS	CSE	4	0	0	4	4	50	50	100	3
3	10CI5GCDBM	DATABASE MANAGEMENT SYSTEMS	CSE	4	0	2	6	8	50	50	100	3
4	10CI5GCJAV	JAVA PROGRAMMING	CSE	4	0	2	6	8	50	50	100	3
5	10CS5DCSSW	SYSTEM SOFTWARE	CSE	4	0	2	6	8	50	50	100	3
				Total Credits			**26**	**32**	**Total Marks**		**500**	

BMS COLLEGE OF ENGINEERING, BANGALORE

Autonomous College under VTU

SCHEME OF INSTRUCTION

Department: Computer Science & Engineering **Semester:** VI

Sl. No.	Subject Code	Course Title	Teaching Department	CREDITS				Contact Hrs	Marks			SEE Duration in Hrs
				L	T	P	Total		CIE	SEE	Total	
1	10CI6GCSWE	SOFTWARE ENGINEERING	CSE	3	0	0	3	3	50	50	100	3
2	10CI6GCOOM	OBJECT-ORIENTED MODELING & DESIGN PATTERNS	CSE	4	0	0	4	4	50	50	100	3
3	10CI6GCPSQ	PROBABILITY, STATISTICS AND QUEUING	CSE	3	0	0	3	3	50	50	100	3
4	10CI6GCCON	COMPUTER NETWORKS	CSE	4	0	2	6	8	50	50	100	3
5	10CI6GCWEP	WEB PROGRAMMING	CSE	4	0	2	6	8	50	50	100	3
6	10CI6GEXXX	CLUSTER ELECTIVE - I	CSE	4	0	0	4	4	50	50	100	3
				Total Credits			**26**	**30**	**Total Marks**		**600**	

SUBJECT LIST: CLUSTER ELECTIVE - I

Sl. No.	Subject Code	Course Title	Teaching Department	CREDITS				Contact Hrs	Marks			SEE Duration in Hrs
				L	T	P	Total		CIE	SEE	Total	
1	10CI6GECCT	CLOUD COMPUTING	CSE	4	0	0	4	4	50	50	100	3
2	10CI6GEPCT	PARALLEL COMPUTING TECHNIQUE	CSE	4	0	0	4	4	50	50	100	3
3	10CI6GEPPL	PRINCIPLES OF PROGRAMMING LANGUAGES	CSE	4	0	0	4	4	50	50	100	3
4	10CI6GEADS	ADVANCED DATA STRUCTURES	CSE	4	0	0	4	4	50	50	100	3

BMS COLLEGE OF ENGINEERING, BANGALORE

Autonomous College under VTU

SCHEME OF INSTRUCTION

Department: Computer Science & Engineering **Semester:** VII

Sl. No.	Subject Code	Course Title	Teaching Department	CREDITS				Contact Hrs	Marks			SEE Duration in Hrs
				L	T	P	Total		CIE	SEE	Total	
1	11CI7GEXXX	SPECIAL CLUSTER ELECTIVE & LAB	CSE	4	0	2	6	8	50	50	100	3
2	11CI7GEXXX	CLUSTER ELECTIVE – II	CSE	4	0	0	4	4	50	50	100	3
3	11CS7DEXXX	ELECTIVE – I (DEPARTMENT)	CSE	3	0	0	3	3	50	50	100	3
4	11CI7GCEAM	ENTREPRENEURSHIP AND MANAGEMENT	CSE	3	0	0	3	3	50	50	100	3
5	11CI7IEXXX	INSTITUTIONAL ELECTIVE – I	CSE	4	0	0	4	4	50	50	100	3
6	11CI7GCPPI	PROJECT PHASE – I	CSE	0	0	4	4	8	50	50	100	3
				Total Credits			**24**	**30**	**Total Marks**		**600**	

SUBJECT LIST: SPECIAL CLUSTER ELECTIVE & LAB

Sl. No.	Subject Code	Course Title	Teaching Department	CREDITS				Contact Hrs	Marks			SEE Duration in Hrs
				L	T	P	Total		CIE	SEE	Total	
1	11CI7GECGH	COMPUTER GRAPHICS	CSE	4	0	2	6	8	50	50	100	3
2	11CI7GECDN	C# AND .NET	CSE	4	0	2	6	8	50	50	100	3
3	11CI7GECDI	COMPUTER VISION AND DIGITAL IMAGE PROCESSING	CSE	4	0	2	6	8	50	50	100	3

SUBJECT LIST: CLUSTER ELECTIVE – II

Sl. No.	Subject Code	Course Title	Teaching Department	CREDITS				Contact Hrs	Marks			SEE Duration in Hrs
				L	T	P	Total		CIE	SEE	Total	
1	11CI7GEMCN	MOBILE COMMUNICATION	CSE	4	0	0	4	4	50	50	100	3
2	11CI7GECNS	CRYPTOGRAPHY AND NETWORK SECURITY	CSE	4	0	0	4	4	50	50	100	3
3	11CI7GEBEA	BUILDING ENTERPRCSE APPLICATIONS	CSE	4	0	0	4	4	50	50	100	3
4	11CI7GEDMG	DATA MINING	CSE	4	0	0	4	4	50	50	100	3
5	11CI7GESNS	SENSOR NETWORKS	CSE	4	0	0	4	4	50	50	100	3

SUBJECT LIST: ELECTIVE – I (DEPARTMENT)

Sl. No.	Subject Code	Course Title	Teaching Department	CREDITS				Contact Hrs	Marks			SEE Duration in Hrs
				L	T	P	Total		CIE	SEE	Total	
1	11CS7DEABS	ARM BASED SYSTEM DESIGN	CSE	3	0	0	3	3	50	50	100	3
2	11CS7DEMCN	MICRO CONTROLLER	CSE	3	0	0	3	3	50	50	100	3
3	11CS7DESAC	SOFTWARE ARCHITECTURE	CSE	3	0	0	3	3	50	50	100	3
4	11CS7DEEMS	EMBEDDED SYSTEMS	CSE	3	0	0	3	3	50	50	100	3
5	11CS7DEAIN	ARTIFICIAL INTELLIGENCE	CSE	3	0	0	3	3	50	50	100	3

SUBJECT LIST: INSTITUTIONAL ELECTIVE – I

Sl. No.	Subject Code	Course Title	Teaching Department	CREDITS				Contact Hrs	Marks			SEE Duration in Hrs
				L	T	P	Total		CIE	SEE	Total	
1	11CI7IEJAP	JAVA PROGRAMMING	CSE	4	0	0	4	4	50	50	100	3
2	11CI7IEOOC	OOPS WITH C++	CSE	4	0	0	4	4	50	50	100	3
3	11CI7IEDSN	DATA STRUCTURE	CSE	4	0	0	4	4	50	50	100	3
4	11CI7IEDBM	DATABASE MANAGEMENT SYSTEMS	CSE	4	0	0	4	4	50	50	100	3
5	11CI7IESEG	SOFTWARE ENGINEERING	CSE	4	0	0	4	4	50	50	100	3
6	11CI7IEWEP	WEB PROGRAMMING	CSE	4	0	0	4	4	50	50	100	3
7	11CI7IEOSM	OPERATING SYSTEM	CSE	4	0	0	4	4	50	50	100	3

BMS COLLEGE OF ENGINEERING, BANGALORE

Autonomous College under VTU

SCHEME OF INSTRUCTION

Department: Computer Science & Engineering **Semester:** VIII

Sl. No.	Subject Code	Course Title	Teaching Department	CREDITS				Contact Hrs	Marks			SEE Duration in Hrs
				L	T	P	Total		CIE	SEE	Total	
1	11CI8GEXXX	CLUSTER ELECTIVE – III	CSE	4	0	0	4	4	50	50	100	3
2	11CI8GCICL	INDIAN CYBER LAW	CSE	3	0	0	3	3	50	50	100	3
3	11CI8IEXXX	INSTITUTIONAL ELECTIVE – II	CSE	4	0	0	4	4	50	50	100	3
4	11CI8GCPPT	PROJECT PHASE – II	CSE	0	0	13	13	26	50	50	100	3
				Total Credits			**24**	**37**	**Total Marks**		**400**	

SUBJECT LIST: CLUSTER ELECTIVE – III

Sl. No.	Subject Code	Course Title	Teaching Department	CREDITS				Contact Hrs	Marks			SEE Duration in Hrs
				L	T	P	Total		CIE	SEE	Total	
1	11CI8GESAN	STORAGE AREA NETWORKS	CSE	4	0	0	4	4	50	50	100	3
2	11CI8GEPRN	PATTERN RECOGNITION	CSE	4	0	0	4	4	50	50	100	3
3	11CI8GENNS	NEURAL NETWORKS	CSE	4	0	0	4	4	50	50	100	3
4	11CI8GESTG	SOFTWARE TESTING	CSE	4	0	0	4	4	50	50	100	3
5	11CI8GEFLC	FUZZY LOGIC	CSE	4	0	0	4	4	50	50	100	3

SUBJECT LIST: INSTITUTIONAL ELECTIVE – II

Sl. No.	Subject Code	Course Title	Teaching Department	CREDITS				Contact Hrs	Marks			SEE Duration in Hrs
				L	T	P	Total		CIE	SEE	Total	
1	11CI8IEJAP	JAVA PROGRAMMING	CSE	4	0	0	4	4	50	50	100	3
2	11CI8IEOOC	OOPS WITH C++	CSE	4	0	0	4	4	50	50	100	3
3	11CI8IEDSN	DATA STRUCTURE	CSE	4	0	0	4	4	50	50	100	3
4	11CI8IEDBM	DATABASE MANAGEMENT SYSTEMS	CSE	4	0	0	4	4	50	50	100	3
5	11CI8IESEG	SOFTWARE ENGINEERING	CSE	4	0	0	4	4	50	50	100	3
6	11CI8IEWEP	WEB PROGRAMMING	CSE	4	0	0	4	4	50	50	100	3
7	11CI8IEOSM	OPERATING SYSTEM	CSE	4	0	0	4	4	50	50	100	3

III SEMESTER

DISCRETE MATHEMATICAL STRUCTURES (CSE/ISE)

Contact Hours/Week: 04 **Credits: 4 [L-T-P: 3-1-0]**
Total Lecture Hours: 39 **CIE Marks: 50**
Total Tutorial Hours: 13 **SEE Marks: 50**
Subject Code: 10MA3GCMAT

UNIT 1

SET THEORY **[9 hours]**

Sets, subsets, operations on sets, countable and uncountable sets, the addition principle(No proof), Mathematical induction, Recursive definitions, Fibonacci numbers, Lucas numbers, Eulerion numbers, Ackerman's numbers. **(7L + 2 T)**

UNIT 2

RELATIONS AND FUNCTIONS **[10 hours]**

Relations: Cartesian product of sets, paths in relations and digraphs, operations on relations, composition of relations, properties of relations, equivalence relations, partial orders, Hasse Diagrams.

Functions: Definitions, Types of functions, Stirling's numbers of the second kind, composition of functions, invertible functions, pigeonhole principle. **(8L + 2 T)**

UNIT 3

MATHEMATICAL LOGIC **[11 hours]**

Propositions: Logical connectives, tautologies, contradictions, Logical equivalence: duality, the connectives NAND and NOR, converse, inverse, contrapositive, Rules of Inference: open statements: quantifiers: Logical implication involving quantifiers, statements with more than one variable, methods of proof and disproof. **(8L + 3 T)**

UNIT 4

GRAPHS AND DIRECTED GRAPHS **[12 hours]**

Graphs, directed graphs, vertex degree, handshaking property, isomorphism, sub graphs, operations on graphs, walks and their classification, connected and disconnected graphs, Euler circuits and Euler trails, the Konigsberg Bridge problem, Hamilton paths and cycles.

PLANAR GRAPHS AND COLORING

Planar and Non-planar graphs, Euler's formula (No derivation), detection of planarity, dual of a planar graph, graph coloring, chromatic polynomials.

(9 L +3 T)

UNIT 5

TREES **[10 hours]**

Trees and their basic properties, rooted trees, binary tree, spanning trees, minimal spanning trees, Kruskal's and Prim's algorithms, Depth-First Search and Breadth-First search Algorithms, prefix codes and weighted trees, cut-sets, Network flows, shortest path. **(7 L + 3 T)**

NOTE :- No Proofs of the theorems.

Text Books:

1. Graph Theory by Narsing Deo. – Twenty – first Printing May, 2001

2. Discrete and combinatorial mathematics, Ralph. P. Grimaldi and B V Ramana 5th Edition, PHI/perason Education, 2004.

Unit No.	Text Book	Chapter No.	Article Number	Page Nos.
I	Ralph. P. Grimaldi and B V Ramana 5th Edition	3	3.1 to 3.3	125-151
		4	4.1 to 4.2	199-218, 223-227.
		5	5.2	273
II	Ralph. P. Grimaldi and B V Ramana 5th Edition	5	5.1 to 5.6	258 - 306
		7	7.1 to 7.4	345 - 383
III	Ralph. P. Grimaldi and B V Ramana 5th Edition	2	2.1 to 2.5	45 – 119
IV	Narsing Deo	1	1.1 to 1.5	1 - 9
		2	2.1 to 2.10	14 - 38
		5	5.2 to 5.6	90 – 104
		8	8.1to 8.3	165 – 177
V	Narsing Deo	3	3.1 to 3.7	39 – 67
		11	11-5: Algorithm 6 11-6: Algorithm 8	292 – 297 301 – 303
	Ralph. P. Grimaldi and B V Ramana 5th Edition	12	12.4	652 – 658

Reference Books:

1. Discrete Mathematics and its Applications, Kenneth H. Rosen, 6th edition, McGraw Hill, 2007.
2. Discrete mathematics with Applications, Thomas Koshy, Elseveire 2005.
3. Graph Theory and combinatorics, 3rd Edition by Dr. D.S.Chsndrasekharaiah.
4. Discrete Mathematical structures, 3rd Edition by Dr. D.S. Chsndrasekharaiah.

Question Paper Pattern:

1. Each unit consists of one full question.
2. Each full question consists of two, three or four subdivisions.
3. Five full questions to be answered.
4. Internal choice in Unit 4 and Unit 5.

III SEMESTER

COMPUTER ORGANIZATION AND ARCHITECTURE (CSE/ISE)

Contact Hours/Week: 04 **Credits: 4 [L-T-P: 4-0-0]**

Total Lecture Hours: 52 **CIE Marks: 50**

Subject Code: 09CI3GCCOA **SEE Marks: 50**

UNIT 1

Basic Structure of Computer: Functional Units, Basic Operational Concepts, Bus Structures, Performance- Processor Clock, Basic Performance Equation, Clock Rate, Performance Measurement. Machine Instructions and Programs: Numbers, Arithmetic Operations and Characters, Memory Location and Addresses, Memory Operations, Instructions and Instruction Sequencing, Addressing Modes, Assembly Language, Basic Input and Output Operations. Stacks and Queues, Subroutines, Additional Instructions, Encoding of Machine Instructions. **10 Hrs**

UNIT 2

Basic Processing Unit: Single bus organization, Execution of a Complete Instruction, Multiple Bus Organization, Hard-wired Control and Micro programmed Control. Pipelining (linear pipeline processor, Non-Linear pipeline processor—except examples on MAL, Latency calculation), vector processing and super scalar processing. **12 Hrs**

UNIT 3

Arithmetic: Addition and Subtraction of Signed Numbers Design of Fast Adders, Multiplication of Positive Numbers, Signed Operand Multiplication, Fast Multiplication, Integer Division, Floating-point Numbers and Operations. **10 Hrs**

UNIT 4

Input/output Organization: Accessing I/O Devices, Interrupts- Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Controlling Device Requests, Exceptions, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces - PCI Bus, SCSI Bus, USB. **10 Hrs**

UNIT 5

Memory System: Basic Concepts, Semiconductor RAM Memories, Read Only Memories, Speed, Size, and Cost, Cache Memories -Mapping Functions, Replacement Algorithms, Performance Considerations, Virtual Memories, Secondary Storage. **10 Hrs**

Text Book

1. **Computer Organization** by Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Ed 5, TMH. 2002. Chapters: 1.2, 1.3, 1.4, 1.6.1, 1.6.2, 1.6.4, 1.6.7, 2.1 to 2.10, 2.12, 7.1 to 7.5, 6.1 to 6.7, 4.1, 4.2.1 to 4.2.5, 4.4 to 4.7, 5.1 to 5.4, 5.5.1, 5.5.2, 5.6, 5.7, 5.9.
2. **Advanced Computer Architecture** by Kai Hwang, TMH 2001. Chapters—6 (6.1, 6.2), Ch-4 (4.2.3), Ch-4(4.2.1, Ex-4.5).

Reference Book

1. **Computer Organization & Architecture** by William Stallings, Ed7, PHI 2006.
2. **Computer Systems Design and Architecture** by Vincent P. Heuring & Harry F. Jordan, Ed2, Pearson Education, 2004.

III SEMESTER
DATA STRUCTURES (CSE/ISE)

Contact Hours/Week: 04 **Credits: 6 [L-T-P: 4-0-2]**
Total Lecture Hours: 52 **CIE Marks: 50**
Subject Code: 09CI3GCDSL **SEE Marks: 50**

UNIT 1

Introduction

Introduction to Data Structure and its Classification, Pointers Revisited, Pointers to variables, arrays, structures and functions. **3 Hrs**

Lists

Linked Lists, Static Memory Allocation and Dynamic Memory Allocation, Operations on SLL, DLL, Circular SLL and Circular DLL: insertion, deletion and display. Implementation of the above lists with Header nodes. **8 Hrs**

UNIT 2

Lists

Applications of Linked Lists: Merging, Reversing, Sorting, Searching. Addition of two polynomials, Evaluation of Polynomials, Addition of two long integers. **5 Hrs**

Files

Files Revisited, Operation on Files, Error handling during file operations, Random Access to files, Command Line Arguments. **6 Hrs**

UNIT 3

Stacks

Definition, Representation and Operations on stacks, Implementation using arrays, pointers and linked lists. Application of Stacks: Recursion, Binary Search, GCD, Factorial, Tower of Hanoi, Fibonacci, Largest of N numbers. Infix to postfix, prefix to postfix, evaluation of postfix. **10 Hrs**

UNIT 4

Queues

Definition, Representation, operations, implementation using arrays, pointers and linked lists. Different types of queues: Linear queue, Circular queue, Priority Queue and Double ended Queue, Applications of Queues. **10 Hrs**

UNIT 5

Trees

Definition, Representation using arrays and Linked Lists, Properties of Trees, Operations on Binary tree, Binary Search Tree [BST] - creation, insertion deletion and display. Tree Traversals, Threaded Binary Trees. **10 Hrs**

Text Book

1. **Data Structures using C and C++** by Yedidyah Langsam and Moshe J. Augenstein and Aaron M.Tenanbaum, PHI / Pearson 2008 Reprint.

Reference Book

1. **Data Structures and Program Design** by C R.Kruse, C.L Tondo and B.Leung, Second Edition, Pearson Education, 1997

2. **A structured programming approach using C** by Behrouz A. Forouzan.
3. **Data structures A Pseudocode approach with C** by Behrouz A. Forouzan & Richard F. Gilberg

III SEMESTER
LOGIC DESIGN (CSE/ISE)

Contact Hours/Week: 04 **Credits: 5 [L-T-P: 4-0-1]**
Total Lecture Hours: 52 **CIE Marks: 50**
Subject Code: 09CI3GCLDL **SEE Marks: 50**

UNIT 1

Boolean Algebra and Combinational Networks & Simplification of Boolean Expressions

Definition of a Boolean Algebra-Boolean Formulas and Functions-Canonical Formulas-Manipulations of Boolean Formulas-Gates and Combinational Networks-Incomplete Boolean Functions and Don't Care Conditions-Additional Boolean operations and Gates-Formulation of the simplification problem-Prime Implicants and Irredundant Disjunctive Expressions-Prime Implicates and Irredundant Conjunctive Expressions-Karnaugh Maps-Using K-Map to Obtain Minimal Expressions for Complete Boolean Functions-Minimal expressions of incomplete Boolean Functions- Variable Entered K-map. **11 hrs**

UNIT 2

Quine-McCluskey Simplification Method & Logic Design with MSI Components

The Quine-Mccluskey Method of Generating Prime Implicants and Prime Implicates-Prime-implicant/Prime-Implicate Tables and Irredundant Expressions-Prime- implicant/Prime-Implicate Table Reductions.

Binary Adders & Subtracters, Decimal Adders, Comparators, Decoders, Encoders, Multiplexers. **11 hrs**

UNIT 3

PLD and Flip-Flops

Programmable Logic Devices-Programmable Read-Only Memories-Programmable Logic Arrays-Programmable Array Logic.

The Basic Bistable Element-Latches-Timing Considerations-Master –Slave Flip-Flops, Pulse-Triggered Flip flops, Edge-Triggered Flip-Flops-Characteristic Equations **10 hrs**

UNIT 4

Registers, Counters, D/A Conversion

Registers-Counters-Design of Synchronous Counters-Variable, Resistor Networks-Binary Ladders-D/A Converters-D/A Accuracy & Resolution **10 hrs**

UNIT 5

Design of Sequential Circuit

Model Selection- State Transition Diagram- State Synthesis Table- Design Equations and Circuit Diagram-Implementation Using Read only Memory- Algorithmic State Machine- State Reduction Technique-Analysis of Asynchronous Sequential Circuits- Problems with Asynchronous Sequential Circuits- Design of Asynchronous Sequential Circuits **10 hrs**

Text Book

1. **Digital Principles & Design** by Donald D Givone, Tata McGraw Hill 2009.
2. **Digital Principles & Applications** by Donald Leach 6th Edition Tata McGraw Hill 2007.

Reference Book

1. **Fundamental of digital Logic with Verilog Design** by Stephen Brown & Zvonko Vranesic, Publication Tata McGraw Hill.

III SEMESTER
MICROPROCESSORS (CSE/ISE)

Contact Hours/Week: 04 **Credits: 6 [L-T-P: 4-0-2]**
Total Lecture Hours: 52 **CIE Marks: 50**
Subject Code: 09CI3GCMPL **SEE Marks: 50**

UNIT 1

Overview of Microcomputer structure and operation, Microprocessor Evolution, 8086 Internal Architecture, Physical Memory Organization, Addressing Modes, Instruction set of 8086 – Data Transfer instructions, Logical instructions, Arithmetic instructions, example programs. **10 Hrs**

UNIT 2

Branch instructions, Loop instructions, Machine control instructions, flag manipulation instructions, Shift and rotate instructions, assembly languages programming, assemble directives, Delay Loops. **10 Hrs**

UNIT 3

String instructions and programming, Stacks, procedures, macros, assembly language programming using procedures and macros, Memory interfacing. **10 Hrs**

UNIT 4

Pin Diagram of 8086, Maximum/ Minimum Mode of 8086, Timing Diagram, Instruction Templates, MOV instruction Coding Format and Examples, Assembly language Program Development Tools, Interrupts. **10 Hrs**

UNIT 5

8086 Microcomputer System, I/O interfacing-Programmable Peripheral interface 8255, Keyboard interfacing, Seven segment display interfacing, stepper motor, logic controller, DAC, Elevator, Introduction to 80386, 80486, Pentium processor. **12 Hrs**

Text Book

1. **Microprocessor & Interfacing** by Douglas V Hall, 2nd Edition, Tata Mc Graw-Hill.

Reference Book

1. **The Intel Microprocessors** by Barry B Brey, 8th Edition.
2. **Advanced Microprocessors and Peripherals** by A K Ray & K M Bhurchandi, Tata McGraw Hill.
3. **Microprocessor X86 Programming** by K.R.Venugopal & Raj Kumar, BPB Publications.
4. **Advanced Microprocessors & IBM-PC Assembly Language Programming** by K Udaya Kumar & B.S.Umashankar, Tata McGraw – Hill.

IV SEMESTER

ENGINEERING MATHEMATICS – IV (CSE/ISE)

Contact Hours/Week: 04 **Credits: 4 [L-T-P: 3-1-0]**
Total Lecture Hours: 39 **CIE Marks: 50**
Total Tutorial Hours: 13 **SEE Marks: 50**
Subject Code: 10MA4GCMAT

UNIT - 1

Matrices and their applications: (11 hours)

Elementary transformations, Echelon form of a matrix, Consistency of system of linear equations, solution of homogeneous system of linear equations, solution of non-homogeneous system of linear equations by Gauss elimination method, matrix operations, invertible matrices, L-U factorization. **[8 L + 3 T]**

UNIT- 2

Vector Spaces and Linear transformations: (9 hours)

Vector spaces, subspaces, linear independence, basis and dimension. Introduction to Linear transformations, definition, properties, matrix of linear transformation, range and null space, rank and nullity, Verification of rank-nullity theorem (without proof), singular and non-singular transformations. **[7 L + 2 T]**

UNIT- 3

Eigen values and Eigen vectors: (9 hours)

Definitions, characteristic equation, applications of Caley-Hamilton theorem (without proof), diagonalization, Computation of largest eigen value and eigen vector using Rayleigh's power method. **[7 L + 2 T]**

UNIT - 4

Inner product space: (11 hours)

Inner product space, length, orthogonality, orthogonal sets, orthogonal projections, Gram-Schmidt process, QR-factorization, least square problems, diagonalization of symmetric matrices, quadratic forms, Singular Value Decomposition theorem **[7 L + 4 T]**

UNIT- 5

Numerical methods: (12 hours)

Roots of transcendental equations using Regula-Falsi method, Newton-Raphson method, Finite differences: Newton-Gregory forward and backword interpolation formulae, Lagrange's interpolation formula, Newton's divided difference formula.

Numerical integration: Simpson's one-third rule, Simpson's three-eighth rule, Weddle's rule.

Numerical solutions of first order Ordinary Differential Equations: Taylor's series method, modified Euler's method, Runge-kutta method of fourth-order. (No derivations of formulae)

[10 L + 2 T]

Text books:

1. David C. Lay, " Linear Algebra and its Applications ," 3rd edition, Pearson Education (Asia) Pte. Ltd, 2005.

2. Dr.B.S.Grewal 'Higher Engineering Mathematics' Khanna Publications 36th Edition.

Reference Books:

1. Gilbert Strang, "Linear Algebra and its Applications." 3rd edition, Thomson Learning Asia, 2003.

2. B.V. Ramana "Higher Engineering mathematics" Tata McGraw Hill.

Question Paper Pattern

1. Each unit consists of one full question with or without internal choice.
2. Internal choice may be there in maximum of two units.
3. Each full question consists of three or four subdivisions covering the entire syllabus of the Unit
4. One question to be answered in each Unit.

IV SEMESTER

THEORETICAL FOUNDATIONS OF COMPUTATION (CSE/ISE)

Contact Hours/Week: 04 **Credits: 4 [L-T-P: 4-0-0]**

Total Lecture Hours: 52 **CIE Marks: 50**

Subject Code: 09CI4GCTOF **SEE Marks: 50**

UNIT 1

Introduction to Finite Automata

Introduction to Finite Automata, Central Concepts of Automata Theory, Deterministic Finite Automata (DFA), Nondeterministic Finite Automata (NFA), Equivalence of NFA and DFA. **11 Hrs**

UNIT 2

Regular Expressions and Regular Languages

Relation between Regular Expressions and Regular Languages, Regular grammars, Pumping Lemma, Equivalence and minimization of automata, Closure properties of regular languages. **11 Hrs**

UNIT 3

Context Free Grammars and Languages

Parse trees, Application of Context Free Grammars, Ambiguity in Grammars and Languages, Simplification of Context Free Grammar, Normal Forms – CNF and GNF, Pumping Lemma for CFG's, Closure properties of CFG's. **10 Hrs**

UNIT 4

Push Down Automata

Languages of PDA: Acceptance by final state, empty stack and conversion. Equivalence of PDA's and CFG's, Deterministic Push Down Automata. **10 Hrs**

UNIT 5

Turing Machines

Definition, Notation, Instantaneous Description and Languages, Design of TM's, Extension of Basic TM: Multitape TM, Restricted TM, Semi-infinite tape Machines, Multi-stack TM. Introduction to undecidable problems, Post-correspondence Problem. **10 Hrs**

Text Book

1. **Introduction to Automata Theory, Languages and Computation** by John E. Hop croft, Rajeev Motwani, Jeffrey D.Ullman: 3rd Edition, Pearson education, 2007.

Reference Book

1. **Introduction to Languages and Automata Theory** by John C Martin, 3rd Ed, Tata McGraw-Hill, 2007.
2. **An Introduction to formal Languages and Automata** by Peter Linz, Narosa publishing house, II edition, 1997.
3. **Introduction to Computer Theory** by Daniel I.A. Cohen, John Willy & Sons, Inc, 2nd Edition, 2000.

.

IV SEMESTER
UNIX PROGRAMMING (CSE/ISE)

Contact Hours/Week: 04 **Credits: 5 [L-T-P: 4-0-1]**
Total Lecture Hours: 52 **CIE Marks: 50**
Subject Code: 09CI4GCUNX **SEE Marks: 50**

UNIT 1

Background and Basic Commands

Brief history, Salient features of a UNIX System, The UNIX Architecture. Introduction to Linux Operating System, Internal and External Commands, Introduction to system administration, man: Browsing and Manual Pages On-line, cal: The Calendar, date: Displaying and System Date, echo: Displaying a Message, printf: An Alternative to echo, bc: The Calculator, script: Recording Your Session, passwd: Changing Your Password, who: Who Are the Users?, uname: Knowing Your Machine's Characteristics, tty: Knowing Your Terminal, stty: Displaying and Setting Terminal Characteristics

The FILE System and FILE handling Commands

The File, What's in a (File)name? The Parent-Child Relationship, The HOME Variable: The Home Directory, pwd: Checking Your Current Directory, cd: Changing the Current Directory, mkdir: Making Directories, rmdir: Removing Directories, Absolute Pathnames, Relative Pathnames, Is: Listing Directory Contents, The UNIX File System. cat: Displaying and Creating Files, cp: Copying a File, rm: Deleting Files, mv: Renaming Files, more: Paging Output, The lp Subsystem: Printing a File, file: Knowing the File Types, wc: Counting Lines, Words and Characters, od: Displaying Data in Octal, The spell and ispell, cmp: Comparing Two Files, comm: What is Common?, diff **9 Hrs**

UNIT 2

Communication Commands

finger: Details of Users, mesg: Your Willingness to Communicate write: Communicating alternatively, talk: Online Communication, wall: writing on all terminals, news: knowing the local events, Email Basics, The mail command.

FILE Attributes

ls –l: Listing File Attributes, The –d Option: Listing Directory Attributes, File Ownership, File Permissions, chmod: Changing File Permissions, Directory Permissions, Changing File Ownership. File Systems and Inodes, Hard Links, Symbolic Links and ln, The Directory, umask: Default File and Directory Permissions, Modification and Access Times, find: Locating Files, Converting One File to Other, dos2unix and unix2dos: Converting between DOS and UNIX, Compressing Files, gzip, gunzip, zip and unzip commands, tar command. **9 Hrs**

UNIT 3

The Process

Process Basics, ps: Process Status, System Processes (-e or –a), Mechanism of Process Creation, Internal and External Commands, Running Jobs in Background, nice: Job Execution With Low Priority, Killing Processes with Signals, Job Control, at and batch: Execute Later, cron: Running Jobs Periodically, time: Timing Processes

Simple Filters

The Sample Database, pr: Paginating Files, head: Displaying the Beginning of a File, tail: Displaying the End of a File, cut: Slitting a File Vertically, paste: Pasting Files, sort: Ordering a File, uniq: Locate Repeated and Non repeated Lines, tr: Translating Characters, An Example: Displaying a Word-count List.

grep Family of Commands

grep: Searching for a Pattern, Basic Regular Expressions (BRE) – An Introduction, Extended Regular Expressions (ERE), egrep, fgrep **10 Hrs**

UNIT 4

SHELL Programming

The Shell's Interpretive Cycle, Pattern Matching – The Wild-cards, Escaping and Quoting, Redirection:The Three Standard Files, /dev/null and /dev/tty:Two Special Files, Pipes, tee: Creating a Tee, Command Substitution, Shell Variables, Environment Variables, Aliases (bash and ksh), Command History (bash and ksh). Shell Scripts, read and readonly commands, Using Command Line Arguments, exit and Exit Status of Command, The Logical Operators && and || -Conditional Execution, The if Conditional, Using test and [ ] to Evaluate Expressions, The case Conditional, expr: Computation and String Handling, $0: Calling a Script by Different names, while: Looping, for: Looping with a List, set and shift: Manipulating the Positional Parameters, The here Document (<<), trap: Interrupting a Program, Debugging Shell Scripts with set -x, export: Exporting Shell Variables, eval: Evaluating Twice, The exec Statement. Development of simple shell scripts to demonstrate the integer and real arithmetic operations, handling of positional parameters, the use of branching and looping constructs in the shell, handling of signals using the trap etc. **12 Hrs**

UNIT 5

AWK Programming

awk program line and script structure, awk's operational mechanism, Records and fields, special variables $0, $1, $2, etc., patterns, The BEGIN and END, Variables, built in variables, built in functions, length, split, getline, print, printf, sprintf, index, system, substr, etc., control structures, operators in awk, associative arrays, writing simple awk scripts, Running awk scripts from the shell.

PERL Programming

Perl Preliminaries, The structure of a perl script, running a perl script, perl data and operators, The chop and chomp functions: Removing the Last Character, Variables and Operators, The String Handling Functions, Specifying Filenames in Command Line, Current Line Number ($.) and the Range Operator (. .), Lists and Arrays, foreach: Looping Through a List, split: Splitting into a List or Array join: Joining a List, dec2bin.p1: Converting a Decimal Number to Binary, grep: Searching an Array for a Pattern, Associative Arrays (Hashes), Regular Expressions and Substitution, The match and substitute operation, File Handling, File Tests, Subroutines. **12 Hrs**

Text Book

1. **UNIX Concepts and Applications** by Sumitabha Das, 4th edition, Tata McGraw Hill, 2003

Reference Book

1. **Unix and Shell Programming** by Behrouz A. Forouzan & Richard F.Gilberg, Thomson, Edition-2003.
2. **The Complete Reference UNIX** by Kenneth Rosen, Douglas Host, James Farber and Richard Rosinski, Tata McGraw- Hill, Edition 2000.
3. **Linux: The Text Book**, by Syed Mansoor Saywar, Robert Koretsky, Syed aqeel Saywar, Addition-wesly, 2002.

IV SEMESTER

OBJECT-ORIENTED PROGRAMMING WITH C++ (CSE/ISE)

Contact Hours/Week: 04 **Credits: 6 [L-T-P: 4-0-2]**
Total Lecture Hours: 52 **CIE Marks: 50**
Subject Code: 09CI4GCOOP **SEE Marks: 50**

UNIT 1

Introduction to C++: A Review of Structures, Procedure-Oriented Programming Systems, Object-Oriented Programming paradigm, Features of OOPS, primitive and user defined data types, declaration of variables, Reference variables, Operators in C++,Type casting, Function prototyping, call by reference, return by reference, Function overloading, Inline functions, Default arguments, Friend and virtual Functions.

Classes and Objects: Introduction to classes and objects, defining data members and Member functions, scope resolution operator, arrays within a class, memory allocation for objects, static data members, static member functions. Array of objects, objects as function arguments, friend functions, returning objects, const member functions, pointers to members, Namespaces, Nested classes. **10 Hrs**

UNIT 2

Constructors and Destructors: Introduction, Constructors, Parameterized constructors, multiple constructors in a class, constructors with default arguments, dynamic initialization of Objects, copy constructors, dynamic constructors, destructors, Memory management operators, manipulators.

Operator Overloading and Type conversions: Defining Operator overloading, overloading unary operators, overloading Binary operators, overloading binary operators using friend functions, manipulation of Strings using operators, rules for overloading operators, Type conversions. **12 Hrs**

UNIT 3

Inheritance: Introduction, Defining derived classes. Single inheritance, making a private member inheritable, multilevel Inheritance, multiple inheritance, Hybrid inheritance, virtual base classes, abstract classes, constructors in derived classes, member classes: nesting of classes. **7 Hrs**

UNIT 4

Pointers, virtual Functions and Polymorphism: Introduction, Pointers to objects, this pointer, pointers to derived classes, virtual functions, pure virtual function.

Working with files: Introduction, Classes for file stream operations, opening and closing a file, detecting end-of-file, more about open( ): file modes, file pointers and their manipulations, sequential input and output operations, updating a file : Random access, error handling during file operations **13 Hrs**

UNIT 5

Templates: Introduction, class templates, class templates with multiple parameters, function templates, function templates with multiple parameters, overloading of template functions, non-type template arguments. Introduction to Standard Template Library: Introduction, Components of STL: Containers, Algorithms, Iterators, Application of Container Classes, Function Objects.

Exception Handling: Introduction, Basics of Exception Handling, Exception Handling mechanism, throwing and catching mechanism, rethrowing exception, specifying exceptions. **10 Hrs**

Text Book

1. **Object Oriented Programming with C++** by E Balaguruswamy, 4th Edition, Tata McGrawHill.

Reference Book

1. **The Complete Reference C++** by Herbert Schildt, McGrawHill.
2. **C++ Primer** by Stanley B. Lippman, Josee Lajoie, Barbara E. Moo, 4th Edition, Addison Wesley, 2005.

IV SEMESTER

ANALYSIS AND DESIGN OF ALGORITHMS (CSE/ISE)

Contact Hours/Week: 04 **Credits: 6 [L-T-P: 4-0-2]**
Total Lecture Hours: 52 **CIE Marks: 50**
Subject Code: 09CI4GCADA **SEE Marks: 50**

UNIT 1

Introduction

Algorithms, Fundamentals of Algorithmic Problem Solving, Space Complexity, Time Complexity, Asymptotic notations, Mathematical Analysis of Non-recursive algorithms and Recursive Algorithms. **8 Hrs**

Brute Force

Bubble Sort, Selection Sort, Sequential Search, String matching, Exhaustive Search**.** **3 Hrs**

UNIT 2

Divide and Conquer

Merge Sort, Quick Sort, Binary Search, Strassen's Matrix Multiplication, Multiplication of two Long Integers. **6 Hrs**

Backtracking

Sum of Subsets, N-Queens Problem **3 Hrs**

UNIT 3

Transform and Conquer

Presorting, Heap sort, Balanced Search Tree - AVL Trees and 2-3 trees, Problem reduction **6 Hrs**

Dynamic Programming

Binomial Coefficient, Warshall's Algorithm, Floyd's Algorithm, Knap sack Problem, Travelling Salesman Problem, Multistage Graphs **6 Hrs**

UNIT 4

Space and Time tradeoffs

Sorting by Counting, Horspool Algorithm, Hashing **4 Hrs**

Decrease and Conquer

Depth First Search [DFS], Breadth First Search [BFS], Topological Sorting, Insertion Sorting, Algorithms for generating Combinatorial Objects **6 Hrs**

UNIT 5

Greedy Technique

Prim's Algorithm, Kruskal's' Algorithm, Dijkstra's Algorithm, Optimal Storage on tapes, Optimal Merge Pattern, Huffman Code, Job Sequencing with Deadline, Knap sack Problem. **7 Hrs**

Limitations of Algorithm Power

Decision Trees, P, NP and NP-Complete Problems, Approximation Algorithm for NP-hard Problems. **3 Hrs**

Text Book

1. **"Introduction to the design and analysis of algorithms"** by Anany Levitin, Pearson Education, 2005.
2. **Computer Algorithms** by Horowitz E., Sahni S., Rajasekaran S., Galgotia Publications, 2001**.**

V SEMESTER
OPERATING SYSTEM (CSE/ISE)

Contact Hours/Week: 04 **Credits: 4 [L-T-P: 4-0-0]**
Total Lecture Hours: 52 **CIE Marks: 50**
Subject Code: 10CI5GCOPS **SEE Marks: 50**

UNIT 1

What operating systems do, Compute system organizations, Compute system architecture, Operating systems structure, Operating system operations, Distributed system, Special purpose systems, Computing environments, Operating systems services, User Operating system interface, system Calls, Types of system calls, System programs, Operating system Design and Implementation, Operating system Structure, Virtual machines, Operating system generation, System Boot. **7 Hrs**

UNIT 2

Process Concept, Process Scheduling, Operation on Process, Inter-process communication, Multi-Threaded programming: Overview, Multithreading models, Threading issues. Process scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms, Multi-processor scheduling, Thread scheduling. **11 Hrs**

UNIT 3

Synchronization: the critical section problem, Semaphores, Classical problems of synchronization, Critical regions.

Deadlocks: System Model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection and recovery from deadlock. **12 Hrs**

UNIT 4

Memory management strategies: Background, swapping, Contiguous memory allocation, Paging, Structure of page table, Segmentation.

Virtual memory management: Background, Demand paging, Copy on write, Page replacement algorithms, Allocation of frames, Thrashing

File system: File concept, Access methods, Directory structure, protection. **11 Hrs**

UNIT 5

Implementing File system: File system structure, File system implementation, Directory Implementation, allocation methods, Free space management.

Mass storage structures: Disk structure, Disk attachment, Disk scheduling methods, disk management

Protection: goals of protection, Principles of protection, Domain of protection, Access matrix, Implementation of access matrix, Access Control, Revocation of access rights. **11 Hrs**

Text Book

1. **Operating System Principles** by Abraham Silberschatz, Peter Baer Galvin, Greg Gagne:, 7th edition, Wiley India,2006 (Listed topics from chapters 1 to 12, 17 except 1.6,1.7,1.8,1.9,4.3,6.4,6.7,10.4 10.5, 12.6 and 17.8)

Reference Book

1. **Operating Systems, A Concept Based Approach** by DM Dhamdhere, 2nd edition, Tata Mcgraw-Hill, 2002

V SEMESTER
DATA COMMUNICATIONS (CSE/ISE)

Contact Hours/Week: 04 **Credits: 4 [L-T-P: 4-0-0]**
Total Lecture Hours: 52 **CIE Marks: 50**
Subject Code: 11CI5GCDCN **SEE Marks: 50**

Unit 1

Introduction: Data communications, Networks, The Internet, Protocols and Standards.
Network Model: Layered tasks, The OSI Model, Layers in the OSI Model, TCP/IP Protocol suite, Addressing.
Data and Signals: Analog and digital, Periodic analog signals, Digital signals, Transmission impairment, Data rate limits, Performance. **12 Hrs**

Unit 2

Digital Transmission: Digital-to-Digital conversion, Analog to digital conversion, Transmission modes. **Analog Transmission:** Digital to analog conversion, analog to analog conversion **Bandwidth Utilization:** Multiplexing, Spread spectrum, **Transmission media:** Guided Media, Unguided media: Wireless **12 Hrs**

Unit 3

Circuit Switching Networks: SONET; SONET Multiplexing, SONET Frame Structure; Transport Networks; SONET networks, Optical Transport networks; Circuit Switches; Space division switches, Time Division switches; the Telephone network: transmission Facilities, End to End digital Services. **8 Hrs**

Unit 4

Peer to Peer Protocols and Data Link layer

Part I : Peer-to-Peer Protocols: Peer-to-Peer protocols and service models; ARQ Protocols and Reliable Data Transfer service: Stop-and-wait ARQ, Go-Back-N ARQ, Selective Repeat ARQ; other Peer-to-Peer Protocols.
Part II : Data link controls: Framing; Point to Point protocol; ;HDLC Data Link Control; Link sharing using Packet Multiplexers: Statistical Multiplexing **10 Hrs**

Unit 5

Medium Access control Protocols and Local Area Networks

Part I : The medium access Control protocols multiple access communications random access; scheduling approaches to Medium Access control; Channelization schemes.
Part II: LAN: LAN Protocols; Ethernet and IEEE 802.3 LAN Standard; Token-Ring and IEEE 802.5 LAN Standard; FDDI; Wireless LAN Standard. **10 Hrs**

Text Book

1. **Data communications and Networking** by Behrouz A Forouzan, - Tata Mc Graw-Hill 4th edition.
2. **Communication Networks – fundamental Concepts and Key architectures** by Alberto Leon – Garcia and Indra Widjaja,. Tata Mc Graw-Hill 2nd edition.

Book 1: 1.1 to 1.4, 2.1 to 2.5, 3.1 to 3.6, 4.1 to 4.3, 5.1 to 5.2, 6.1 to 6.2, 7.1 to 7.2
Book 2: 4.2 to 4.5, 5.1 to 5.6, 6.1 to 6.4, 6.6 to 6.10.3

Reference Book

1. **Computer Networks** by Andrew S Tanenbaum, , Prentice Hall of India, 4th edition.
2. **Wireless Communications and Networks** by William Stallings, , 2nd Edition Pearson Publications.

V SEMESTER

DATABASE MANAGEMENT SYSTEMS (CSE/ISE)

Contact Hours/Week: 04 **Credits: 6 [L-T-P: 4-0-2]**
Total Lecture Hours: 52 **CIE Marks: 50**
Subject Code: 10CI5GCDBM **SEE Marks: 50**

UNIT 1

Introduction

Introduction; An example; Characteristics of Database approach; Actors on the Screen; workers behind the scene; Advantages of using DBMS approach; A brief history of database applications; when not to use a DBMS. Data models, schemas and instances; three schema architecture and data independence; Database languages and interfaces; The database system environment; Centralized and client-server architectures; Classification of Database management systems. Entity-Relationship model; using High-Level conceptual Data Models for database Design; An example Database Application; Entity types, Entity Sets, Attributes and Keys; Relationship types, Relationship Sets, Roles and structural Constraints; Weak Entity types; Refining the ER Design; Er Diagrams, Naming Conventions and Design issues; Relationship types of degree higher than two. **12 Hrs**

UNIT 2

Relational Model and Relational Algebra

Relational Model Concepts; relational Model constraints and Relational Database Schemas; update operations, Transactions and dealing with constraint violations; Unary Relational Operations; SELECT and PROJECT; RELATIONAL Algebra Operations from Set Theory; Binary Relational Operations: JOIN and DIVISION; Additional Relational Operations; Examples of Queries in Relational Algebra; Relational Database Design Using ER-to-Relational mapping. **10 Hrs**

UNIT 3

SQL Data Definition and Data Types

Specifying basic constraints in SQL; schema change statements in SQL; Basic queries in SQL; More complex SQL queries-Insert, Delete and Update statements in SQL; Specifying constraints as Assertion and Trigger; Views(Virtual Tables) in SQL; Additional features of SQL; Database programming issues and techniques; Embedded SQL, Dynamic SQL; Database stored procedure and SQL/PSM. **10 Hrs**

UNIT 4

Database Design

Informal Design Guidelines for Relation Schemas; Functional Dependencies; Normal Forms Based on Primary Keys; General Definitions of Second and Third Normal Forms; Boyce-Codd Normal form, Properties of Relational Decompositions; Algorithms for relational Database Schema Design; Multivalued Dependencies and Fourth Normal Form; Join Dependencies and Fifth Normal Form; Inclusion Dependencies; Other Dependencies and Normal Forms. **10 Hrs**

UNIT 5

Transaction Management

Transaction and System Concepts, Desirable Properties of Transactions, characterizing schedules based on Recoverability, Characterizing schedules based on Serializability. Two-Phase Locking Techniques for Concurrency Control, Concurrency Control based on Timestamp ordering, Recovery Concepts, Recovery Techniques based on deferred update, Recovery techniques based on Immediate Update; Shadow

Paging. The ARIES Recovery Algorithm, Database Backup and Recovery from Catastrophic Failures.

10 Hrs

Text Book

1. **Fundamental of Database Systems** by Elmasri and Navathe, 5th Edition, Addison-Wesley, 2007.

Reference Book

1. **Data Base system Concepts** by Silberschatz, Korth and Sudharshan, 5th edition mc-graw Hill, 2006
2. **An Introduction to Database Systems** by C.J. Date, A.Kannan, S.Swamynathan, 8th Edition, Pearson Education, 2006.
3. **Database Management Systems** by Raghu Ramakrishnan and Johannes Gehrke – 3rd Edition, Mc Graw-Hill, 2003.

V SEMESTER
JAVA PROGRAMMING (CSE/ISE)

Contact Hours/Week: 04 **Credits: 6 [L-T-P: 4-0-2]**
Total Lecture Hours: 52 **CIE Marks: 50**
Subject Code: 10CI5GCJAV **SEE Marks: 50**

UNIT 1

Introduction of Java: Java and Java applications, java Development kit(JDK); Java is interpreted, Byte code, JVM, Objected Oriented Programming; simple java Programs.

Data types and other tokens: Boolean Variables, int, long, char, operators, arrays, white spaces, literals, assigning values, creating and destroying objects, access specifiers.

Operators and Exceptions: Arithmetic operators, Bitwise operators, Relational operators, the assignment operators, The ? Operator, operator precedence logical expression, type casting, strings.

Control Statements: Selection statements, iteration statements, Jump statements, Classes is Java, declaring a class, class name, Super classes, constructors, creating instances of class, Inner classes.

Inheritance: Simple, Multiple, multilevel inheritance, overriding, overloading, using super, multilevel hierarchy, dynamic method dispatch, abstract class, using final with inheritance. **8 Hrs**

UNIT 2

Packages and Interfaces

Packages: Defining a package, Finding packages and class path, Example; Access protection; importing packages

Interfaces: Defining a Interface, Implementing Interface, Nested Interfaces, Applying interfaces, Variables in interfaces.

Enumeration, Autoboxing: Enumeration, Type Wrappers, Autoboxing

Generics: What are Generics? A Simple Generics Example, A generics Class with two type parameters, The General form of a Generic Class.

Input/Output: Exploring java.io: The Java I/O Classes and Interfaces. File, The Closable and the Flushable Interfaces, The Stream classes, The Byte Streams, The Character Streams , The Console Class, Using Stream I/O, Serialization, Stream Benefits, Reading Console input, Writing Console input, Reading and writing files. **8 Hrs**

UNIT 3

String handling: Special string operators, character extraction, string comparison, searching strings, modifying a string, string buffer, additional string methods.

Exception handling: Fundamentals, Exception types, uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws, finally, Java's built-in exceptions. Creating your own exception subclasses, chained exceptions. **12 Hrs**

UNIT 4

Multithreaded Programming: Java thread model, main thread, creating thread, creating multiple threads, using isalive( ) and Join( ), thread priorities, synchronization, Interthread communication, suspending, resuming and stopping threads.

Applets: Fundamentals, Applet class, two types of Applets, Applet Basics, Applet architecture, An applet skeleton, display methods, requesting repainting, using status window, HTML applet tag, Passing parameter to applets, get Document base ( ), get codebase( ). **12 Hrs**

UNIT 5

Abstract window toolkit: AWT classes, window fundamentals, working with frame windows, creating a frame windows in a applet, creating a windowed program, displaying information, working with graphics, working with color.

Exploring java.lang: Primitive Type Wrappers, System, Object, Class, Class Loader, Math, Thread, Thread Group, Runnable, Throwable. The Collections Framework: Collections Overview, The Collection Interfaces, The List Interface, The Queue Interface, The Collection Classes, The Array List Class, The LinkedList class, The HashSet, The TreeSet Class. **12 Hrs**

Text Book

1. **Java the Complete Reference** by Herbert Schildt, 7th edition, Tata Mc Graw-hill Edition 2007

Reference Book

1. **Introduction to JAVA Programming** by Y. Daniel Liang, 6th edition, pearson education, 2007
2. **The Java Hand Book** by Patrick naughton, TMH, eleventh reprint 2002
3. **Programming in JAVA 5.0**, James P Cohoon, Jack W Davidson; TATA McGraw hill. Cay S Horstmann, Gary Cornell: Core Java2, Volume 1 and 2 , Seventh Edition, Pearson Education.

V SEMESTER
SYSTEM SOFTWARE (CSE)

Contact Hours/Week: 04 **Credits: 6 [L-T-P: 4-0-2]**
Total Lecture Hours: 52 **CIE Marks: 50**
Subject Code: 10CS5DCSSW **SEE Marks: 50**

UNIT 1

Machine Architecture: Introduction, System software and machine architecture, Simplified instructional computer (SIC) - SIC Machine architecture, SIC/XE machine architecture, SIC programming example.
Editors and Debugging Systems: Text editors- Overview of editing process, user interface Editor Structure interactive debugging systems – Debugging functions and capabilities, Relationship with other parts of the system, user interface criteria. **10 Hrs**

UNIT 2

Assemblers-1: Basic Assembler Function – A simple SIC assembler, Assembler algorithm and data structures, Machine Dependent Assembler features – Instruction formats and addressing modes, Program relocation.
Assembler-2: Machine independent assembler features – Literals, symbol definition statements, expression, program blocks, control sections and programming linking, assembler design operations – one pass assembler, Multi pass assembler, Implementation examples – MASM assembler.
11 Hrs

UNIT 3

Loaders and Linkers: Basic loader functions, Design of an absolute loader, A simple bootstrap loader, machine dependent loader features – Relocation, program linking, algorithm and Data structures for a linking loader, machine independent loader features – Automatic Library search, Loader options, Loader design options, Linkage editor, Dynamic linkage, Bootstrap loaders, implementation Examples, MS-Dos linker. **10 Hrs**

UNIT 4

Macro Processors: Basic macro processors Functions, macro definitions and expansion, macro processor algorithm and data structures, machine Independent Macro processor features- Concatenation of macro parameters, Generation of Unique labels, Conditional Macro expansion, Keyword macro parameters, macro processor design options, Recursive macro Expansion, General purpose macro processors, macro processing within language translators, implementation examples – MASM macro processors, ANSI C Macro processors. **10 Hrs**

UNIT 5

Lex and Yacc-1: Lex and Yacc-The simplest Lex program, Recognizing words with LEX, symbol tables, Grammars, Parser-Lexer communication, The parts of speech lexer, A YACC parser, The rules section, Running LEX and YACC, LEX and Hand written Lexers, Using LEX-Regular expression, examples of regular expressions, A word counting program, parsing a command line.
Lex and Yacc-2: Using YACC- Grammars, Recursive rules, Shift/Reduce parsing, what YACC cannot parse, A Yacc parser, the definition section, the rules section, symbol values and actions, the lexer, compiling and running a simple parser, Arithmetic expressions and ambiguity, variables and typed tokens.
11 Hrs

Text Book

1. **System Software** by Leland L Beck, 3rd Edition, Addison Wesley,1997 (Chapter- 1.1 to 1.3, 2 (expect 2.5.2 and 2.5.3), 3(except 3.5.2 and 3.5.3), 4(except 4.4.3))
2. **Lex and Yacc** by John R Levine, Tony Mason and Dough Brown, O'Reilly, SPD, 1998 (Chapters 1, 2(page 2 to 42),3(page 51 to 65)).

Reference Book

1. **System programming and operating systems** by D.M.Dhamdhere: 2nd Edition, Tata McGraw Hill, 1999.

VI SEMESTER
SOFTWARE ENGINEERING (CSE/ISE)

Contact Hours/Week: 03 **Credits: 3 [L-T-P: 3-0-0]**
Total Lecture Hours: 39 **CIE Marks: 50**
Subject Code: 10CI6GCSWE **SEE Marks: 50**

UNIT 1

OVERVIEW: Introduction: FAQs about software engineering, Professional and ethical responsibility. Socio-Technical systems**:** emergent system properties, System Engineering, Organizations, people and computer systems, Legacy systems.

REQUIREMENTS: Software requirements: Functional and Non-functional requirements, User requirements, System requirements, Interface specification, The software requirements document, Requirements engineering process, Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management. **10 Hrs**

UNIT 2

SYSTEM MODELS PROJECT MANAGEMENT: System models: Context models, Behavioral models, Data models, Object models, structured methods. Project management: Management activities, Project planning, project scheduling, Risk management. **10 Hrs**

UNIT 3

SOFTWARE DESIGN: Architectural Design: Architectural Design Decisions, system organizations, Modular decomposition styles, control Styles. Object-Oriented Design: Objects and Object classes, An object oriented design process, Design evolution. **9 Hrs**

UNIT 4

DEVELOPMENT: Rapid software development, Agile methods, Extreme programming, Rapid application development, Software evolution, Legacy system evolution.

VERIFICATION AND VALIDATION: Verification and validation: Planning, Software inspections, Automated static analysis, Verification and formal methods. Software testing: System Testing, Component testing, Test case design, test automation. **10 Hrs**

Text Book

1. **Software Engineering** by Ian Somerville, 8th edition, Pearson Education, 2007

Reference Book

1. **Software Engineering: A Practitioners Approach** by Rogers S Pressman, 7th edition, MCGrawHill, 2007
2. **Software Engineering theory and Practice** by shari Lawrence Pfleeger, Joanne m Atlec, 3rd edition, Pearson Education, 2006.
3. **Software Engineering Principles and Practice** by Waman.S.Jawadekar, Tata McGrawhill, 2004.

VI SEMESTER

OBJECT-ORIENTED MODELING AND DESIGN PATTERNS (CSE/ISE)

Contact Hrs/Week: 04 **Credits: 4 [L-T-P: 4-0-0]**

Total Lecture Hrs: 52 **CIE Marks: 50**

Subject Code: 11CI6GCOOM **SEE Marks: 50**

UNIT 1

Modeling Concepts: Modeling as Design Technique: Modeling; abstraction; the three models. Class Modeling: Object and class concepts; Link and associations concepts; Generalization and inheritance; A sample class model. Advanced Class Modeling: Advanced object and class concepts; Association ends; N-ary associations; Aggregation; Abstract classes; Multiple inheritance; Metadata; Reification; Constraints; Derived data; Packages. **11 Hrs**

UNIT 2

State Modeling: Events, States, Transitions and Conditions; State diagrams; State diagram behavior. Advanced State Modeling: Nested state diagrams; Nested states; Signal generalization; Concurrency; Relation of class and state models. **10 Hrs**

UNIT 3

Interaction Modeling: Use case models; Sequence models; Activity models. Advanced interaction modeling: Use case relationships; Procedural sequence models; Special constructs for activity models. System Conception: Devising a system concept; elaborating a concept; preparing a problem statement. **9 Hrs**

UNIT 4

Domain Analysis: Overview of analysis; Domain class model; Domain state model; Domain interaction model; Iterating the analysis. Application Analysis: Application interaction model; Application class model; Application state model; Adding operations. **10 Hrs**

UNIT 5

System Design: Overview of system design; Estimating performance; Making a reuse plan; Breaking a system in to sub-systems; Identifying concurrency; Allocation of sub-systems; Choosing a software control strategy; Common architectural styles; Architecture of the ATM system. Class Design: Realizing use cases; Recurring downwards, Refactoring; Design optimization; Reification of behavior; Organizing a class design; ATM example. Implementation Modeling: Overview of implementation; Fine-tuning classes; Fine-tuning generalizations; Realizing associations. Design Patterns: What is a pattern and what makes a pattern? Pattern categories; Relationships between patterns; Pattern description; Communication Patterns: Forwarder- Receiver. **12 Hrs**

Text Book

1. **Object-Oriented Modeling and Design with UML** by Michael Blaha, James Rumbaugh: , 2nd Edition, Pearson Education / PHI, 2005.

2. **Pattern-Oriented Software Architecture: A System of Patterns** by Frank Buschmann, Regine Meunier, Hans Rohnert, Peter Sommerlad, Michael Stal, Volume 1, John Wiley and Sons, 2006.

VI SEMESTER

PROBABILITY, STATISTICS AND QUEUING (CSE/ISE)

Contact Hours/Week: 03 **Credits: 3 [L-T-P: 3-0-0]**
Total Lecture Hours: 39 **CIE Marks: 50**
Subject Code: 10CI6GCPSQ **SEE Marks: 50**

UNIT 1

Introduction

Motivation, Probability Models, sample space Events, Algebra of Events, Graphical methods of representing events, Probability Axioms, Combinatorial Problems, Conditional Probability, Independence of Events, Bayes' Rule, Bernoulli Trails. **13 Hrs**

UNIT 2

Discrete Random Variables

Introduction, Random Variables and their Event Spaces, The Probability Mass function. Continues Random Variables**:** Introduction, the Exponential Distribution Stochastic Process Introduction, Classification of Stochastic Processes. **13 Hrs**

UNIT 3

Queuing Theory

Queuing notations, Rules for all Queues, Little Law, Types of Stochastic Processes, Birth-Death Process, The M/M/1 Queuing System, The M/M/m Queuing System, The M/M/m/B Queuing with Finite buffers **13 Hrs**

Text Book

1**. "Probability and Statistics with Reliability, Queuing and Computer Science Applications"** by Kishore S Trivedi, Prentice Hall of India, 2000 (Chapter 1.1 to 1.12, Chapter 2.1to 2.3, Chapter 3.1 to 3.2, Chapter 6.1 to 6.2)

2. **"The Art of Computer Systems Performance Analysis"** by Raj Jain, John Wiley & Sons (Chapter 30.1 to 30.4, Chapter 31.1 to 31.4)

Reference Book

1. **"Probability, Random Variables and Stochastic Processes"** by A. Papoulis and S. Unni Krishna Pillai, McGraw-Hill, 4th Edition.
2. **"Probability and Statistics for Engineers"** by Richard A Johnson, Pearson Education / Prentice Hall of India, 2002.

VI SEMESTER
COMPUTER NETWORKS (CSE/ISE)

Contact Hours/Week: 04 **Credits: 6 [L-T-P: 4-0-2]**
Total Lecture Hours: 52 **CIE Marks: 50**
Subject Code: 10CI6GCCON **SEE Marks: 50**

UNIT 1

Packet Switching networks-1: Network services and internal network operations; Packet network topology; Data grams and virtual circuits; Routing in packet networks; Shortest-path routing; ATM networks **8 Hrs**

UNIT 2

Packet Switching Networks-2 & TCP/IP-1: Traffic management at the packet level; Traffic management at the flow level; Traffic management at the flow – aggregate level. The TCP /IP architecture; The Internet protocol, IPv6; User datagram protocol; Transmission control protocol; Internet routing protocols; Multicast routing; DHCP, NAT, and Mobile IP **12 Hrs**

UNIT 3

Network Management, Security: Network management overview; SNMP; Structure of Management information; MIB; Remote network monitoring, Security and cryptographic algorithms; Security protocols; Cryptographic algorithms, QoS, Resource Allocation, VPNs, Tunneling, Overlay Networks: Overview of QOS; Integrated services QoS ;Differentiated services Qos; Resource allocation. Virtual Private Networks; Multiprotocol Label switching; Overlay networks **12 Hrs**

UNIT 4

Compression of Digital Voice and Video, VoIP, Multimedia Networking: Overview of data compression; Digital voice and compression; Still images and JPEG compression; Moving images and MPEG compression; Limits of compression with loss; Compression methods without loss; Case Study: FAX compression for transmission.

Overview of IP telephony; VoIP signaling protocols; Real-Time media transport protocols; Distributed multimedia networking; SCTP **10 Hrs**

UNIT 5

Mobile Ad-Hoc Networks, Wireless sensor Networks: Overview of wireless adhoc networks; Routing in adhoc networks; Routing protocols for adhoc networks; security of adhoc networks. Sensor networks and protocol structures; Communication energy model; Clustering protocols; Routing protocols; Zigbee technology and IEEE 802.15.4 **10 Hrs**

Text Book

1. **Communication Networks – Fundamental Concepts and Key architectures** by Alberto Leon Garcia and Indra Widjaja, 2nd Edition, Tat McGraw-Hill, 2004.
2. **Computer and Communication Networks** by Nader F. Mir:, Pearson Education, 2007.

Reference Book

1. **Data Communications and Networking** by Behrouz A. Forouzan:, 4th Edition, Tata McGraw-Hill, 2006.
2. **Data and Computer Communication** by William Stallings:, 8th Edition, Pearson Education, 2007.
3. **Computer Networks – A Systems Approach** by Larry L. Peterson and Bruce S. David:, 4th Edition, Elsevier, 2007.
4. **Introduction to Data Communications and Networking** by Wayne Tomasi, Pearson Education, 2005.

VI SEMESTER
WEB PROGRAMMING (CSE/ISE)

Contact Hours/Week: 04 **Credits: 6 [L-T-P: 4-0-2]**
Total Lecture Hours: 52 **CIE Marks: 50**
Subject Code: 10CI6GCWEP **SEE Marks: 50**

UNIT 1

XHTML : Basic syntax; Standard XHTML document structure; Basic text markup; Images; Hypertext Links; Lists; Tables; Forms; Frames; Syntactic differences between HTML and XHTML. **8 Hrs**

UNIT 2

Cascading Style Sheets: Introduction; Levels of style sheets; Style specification formats; Selector forms; Property value forms; Font properties; List properties; Color; Alignment of text; The Box model; Background images; The and tags; Conflict resolution. **8 Hrs**

UNIT 3

JAVASCRIPT: Overview of JavaScript; Object orientation and JavaScript; General syntactic characteristics; Primitives, operations, and expressions; Screen output and keyboard input; Control statements; Object creation and modification; Arrays; Functions; Constructor; Pattern matching using regular expressions; The Java script execution environment; The Document Object Model; Element access in Java script; Events and event handling; Handling events from the Body elements, Button elements, Text box and Password elements; The DOM 2 event model; The navigator object; DOM tree traversal and modification. Dynamic documents with JavaScript**:** Introduction to dynamic documents; Positioning elements; Moving elements; Element visibility; Changing colors and fonts; Dynamic content; Stacking elements; Locating the mouse cursor; Reacting to a mouse click; Slow movement of elements; Dragging and dropping elements. **14 Hrs**

UNIT 4

XML: Introduction to XML; Syntax; Document structure; Document Type definitions; Namespaces; XML schemas; Displaying raw XML documents; Displaying XML documents with CSS; XSLT style sheets; XML processors; Web services. **8 Hrs**

UNIT 5

CGI-Programming: The Common Gateway Interface, CGI Linkage, Query String Format, The CGI.pm Module. Basics of Perl: Scalars and their operations, assignment statements and control statements, Arrays, Hashes and References, Functions and pattern matching. PHP: primitives, operations and expressions, output and control statements, arrays, functions and pattern matching, cookies and session tracking. Architecture for Database access, MySQL Database system, Database access with Perl and MySQL, Database access with PHP and MySQL. **14 Hrs**

Text Book

1. **Programming the World Wide Web** by Robert W. Sebesta, 4th Edition, Pearson Education, 2008.

Reference Book

1. **Internet & World Wide Web How to program** by M. Deitel, P.J. Deitel, A. B. Goldberg, 3rd Edition, Pearson Education / PHI, 2004.
2. **Web Programming Building Internet Applications** by Chris Bates, 3rd Edition, Wiley India, 2006.
3. **The Web Warrior Guide to Web Programming** by Xue Bai et al, Thomson, 2003.

VI SEMESTER
CLOUD COMPUTING (CSE/ISE)

Contact Hours/Week: 04 **Credits: 4 [L-T-P: 4-0-0]**
Total Lecture Hours: 52 **CIE Marks: 50**
Subject Code: 10CI6GECCT **SEE Marks: 50**

UNIT 1

Introduction to Cloud Computing, Hardware Evolution, Internet Software Evolution, Server Virtualization (Book 1: Introduction 1.1 to 1.4 of Chapter-1) **10 Hrs**

UNIT 2

Hardware and Infrastructure: Client, Security & Network Service, Accessing the Cloud: Platforms, Web Applications, Web API's, Web Browser, Cloud Storage; Overview **10 Hrs**

UNIT 3

Software as a Service: Overview and driving Forces, case Studies of Company Offerings. Software Plus Services: Overview, Mobile device integration. Business case Studies: Cloud Computing Services, Benefits: Operational, Economics and Staffing **12 Hrs**

UNIT 4

Local Clouds and Thin Clients: Virtualization, Server Solutions, Thin Client Migrating to the Cloud. Cloud Services for the individuals and Enterprises. **10 Hrs**

UNIT 5

Best Practices and Future of Cloud Clouding Cloud Computing with the titans: Google, Microsoft, Net APP, Amazon, Salesforce.com **10 Hrs**

Text Book

1. **Cloud Computing: Implementation, Management and Security** by John W. Rittinghouse and James F. Ransome, CRC Press, 2010.
2. **Cloud Computing: A practical Approach** by Anthony T. Velte, Toby J. Vetle and Robert Elsenpeter, McGrawHill, 2010.

VI SEMESTER

PARALLEL COMPUTING TECHNIQUE (CSE/ISE)

Contact Hours/Week: 04 **Credits: 4 [L-T-P: 4-0-0]**
Total Lecture Hours: 52 **CIE Marks: 50**
Subject Code: 10CI6GEPCT **SEE Marks: 50**

UNIT 1

Fundamentals Of Computer Design: Introduction; Classes of computers; Defining computer architecture; Trends in Technology, power in Integrated Circuits and cost; Dependability; Measuring, reporting and summarizing Performance; Quantitative Principles of computer design.

Pipelining: Introduction; Pipeline hazards; Implementation of pipeline; What makes pipelining hard to implement? **11 Hrs**

UNIT 2

Instruction–Level Parallelism – 1: ILP: Concepts and challenges; Basic Compiler Techniques for exposing ILP; Reducing Branch costs with prediction; Overcoming Data hazards with Dynamic scheduling; Hardware-based speculation.

Instruction–Level Parallelism – 2: Exploiting ILP using multiple issue and static scheduling; Exploiting ILP using dynamic scheduling, multiple issue and speculation; Advanced Techniques for instruction delivery and Speculation; The Intel Pentium 4 as example. **11 Hrs**

UNIT 3

Multiprocessors & Thread–Level Parallelism: Introduction; Symmetric shared-memory architectures; Performance of symmetric shared–memory multiprocessors; Distributed shared memory and directory-based coherence; Basics of synchronization; Models of Memory Consistency **8 Hrs**

UNIT 4

Introduction to Multicore architectures

The power and potential of parallelism, Examining sequential and parallel programs, Parallelism using multiple instruction streams, The Goals: Scalability and performance portability, Balancing machine specifics with portability, A look at six parallel computers: Chip multiprocessors, Symmetric multiprocessor architectures, Heterogeneous chip designs, Clusters, Supercomputers, Observations from the six parallel computers.

Examples of Multi-Core Architectures

Introduction to Intel Architecture, How an Intel Architecture System works, Basic Components of the Intel Core 2 Duo Processor: The CPU, Memory Controller, I/O Controller; Intel Core i7: Architecture, The Intel Core i7 Processor, Intel QuickPath Interconnect, The SCH; Intel Atom Architecture.

Introduction to Texas Instruments' Multi-Core Multilayer SoC architecture for communications, infrastructure equipment **10 Hrs**

UNIT 5

Review of Memory Hierarchy: Introduction; Cache performance; Cache Optimizations, Virtual memory

Memory Hierarchy design: Introduction; Advanced optimizations of Cache performance; Memory technology and optimizations; Protection: Virtual memory and virtual machines.

Hardware and Software for VLIW and EPIC: Introduction: Exploiting Instruction-Level Parallelism Statically; Detecting and Enhancing Loop-Level Parallelism; Scheduling and Structuring Code for Parallelism; Hardware Support for Exposing Parallelism: Predicated Instructions; Hardware Support for Compiler Speculation; The Intel IA-64 Architecture and Itanium Processor; Conclusions. **12 Hrs**

Text Book

1. **Computer Architecture, A Quantitative Approach** by John L. Hennessey and David A. Patterson:, 4th Edition, Elsevier, 2007. (Chapter. 1.1 to 1.9, 2.1 to 2.10, 4.1to 4.6, 5.1 to 5.4, Appendix A, Appendix C, Appendix G)

Reference Book

1. **Advanced Computer Architecture Parallelism, Scalability, Programability** by Kai Hwang**,** 2nd Edition**,** Tata Mc Grawhill, 2010.
2. **Parallel Computer Architecture, A Hardware/Software Approach** by David E. Culler, Jaswinder Pal Singh, Anoop Gupta:, Morgan Kaufman, 1999.

VI SEMESTER

PRINCIPLES OF PROGRAMMING LANGUAGES (CSE/ISE)

Contact Hours/Week: 04 **Credits: 4 [L-T-P: 4-0-0]**
Total Lecture Hours: 52 **CIE Marks: 50**
Subject Code: 10CI6GEPPL **SEE Marks: 50**

UNIT 1

Introduction and Data Representation

Toward Higher-Level Languages, Programming Paradigms Language Implementation: Bridging the Gap, Expression Notations Abstract Syntax Trees, Elementary Data Types -Data Objects, Variables & Constants, Data Types, Declaration. Types Checking & Type Conversion. Numeric Data Types, Enumerations, Booleans, Characters. Structured Data Types –Structured Data Objects & Data Types Specification of Data Structure Types, Implementation of Data Structure Types, Vectors & Arrays, Records, Type Equivalence. **15 Hrs**

UNIT 2

Imperative Programming

Basic Statements, Structured Sequence Control, Handling Special Cases in Loops, Programming with Invariants, Proof Rules for Partial Correctness. Procedure Activation-Simple Call-Return Subprograms, Parameters Passing Methods, Scope Rules for Names, Nested Scopes in the Source Text, Activation Recorder, Lexical Scope: Procedure as in C. **10 Hrs**

UNIT 3

Object-Oriented Programming

Program Design with Modules, What is an Object?, Object Oriented Thinking, Inheritance, Object Oriented Programming in C++, Derived Classes & Information Hiding. **6 Hrs**

UNIT 4

Fundamental Programming

Elements of Fundamental Programming- A Little Language of Expression, Types: Values & Operations, Approaches to Expression Evaluation, Lexical Scope, Type Checking, Functional Programming in a Typed Language - Exploring a List, Function Declaration by Cases, Function as First Class Values, ML: Implicit Types Data Types, Exception Handling in ML. Functional Programming with Lists-Scheme, A Dialect of Lisp, The Structure of Lists, List Manipulation. **15 Hrs**

UNIT 5

Logic Programming

Computing With Relations, Introduction to Prolog, Data Structures in Prolog, Programming Techniques, Control in Prolog. **6 Hrs**

Text Book

1. **"Programming Languages"** by Ravi Sethi, 2nd Edition, Addison Wesley. (1.1, 1.3, 1.4, 2.1, 2.2, 3.4, 3.5, 3.6, 5.2 to 5.6, 6.3, 7.1 to 7.4, 7.6, 8.1, 8.2, 8.4, 8.5, 8.6, 9.1 to 9.6, 10.1 to 10.3, 11.1 to 11.5)
2. **"Programming Languages Design and Implementation"** by Terrence W Pratt, 4th Edition, Pearson/PHI. (5.1.1 to 5.1.4, 5.2.1 to 5.2.4, 6.1.1 to 6.1.3, 6.1.5, 6.1.6, 6.4.1, 8.3.1, 8.3.2, 9.1.1)

Reference Book

1. **"Programming Languages"** by Allen Tucker, and Robert Nonan, Tata McGraw-Hill, Edition 2002

2. **"Programming Languages Paradigm & Practice"** by Doris Appleby Julius J Vandekopple, 2nd Edition, Tata McGraw-Hill, 1998.

VI SEMESTER

ADVANCED DATA STRUCTURES (CSE/ISE)

Contact Hours/Week: 04 **Credits: 4 [L-T-P: 4-0-0]**

Total Lecture Hours: 52 **CIE Marks: 50**

Subject Code: 10CI6GEADS **SEE Marks: 50**

UNIT 1

Trees

Preliminaries, The Search Tree – Binary Search Trees, AVL Trees, Splay Trees, B-Trees, Red-Black Trees, Tree traversals ,rotation, insertion and deletion on the above trees. **11 Hrs**

UNIT 2

Hashing

General Idea, Hash Function, Separate Chaining, Collision resolution techniques, Hash Tables without Linked Lists, Rehashing, Extendible Hashing. **10 Hrs**

UNIT 3

Heaps

Binomial heaps, Binomial trees .Operations on binomial heaps. Structure of Fibonacci Heaps, Mergeable heap operations, Decreasing a key and deleting a node and bounding the maximum degree **10 Hrs**

UNIT 4

Dynamic Programming and Greedy Algorithm

Dynamic Programming-Matrix-chain multiplication, Longest common subsequence and Optimal polygon triangulation. Greedy Algorithm-.An activity-selection problem, Huffman codes and A task-scheduling problem. **10 Hrs**

UNIT 5

Sorting Networks and NP-Completeness

Sorting Networks – Comparison networks, Zero-one principle, A bitonic sorting network, Merging network and sorting network. NP-Completeness- NP-complete Problem, The clique problem, The vertex cover problem, The subset Sum Problem, The Hamiltonian-cycle problem Travelling Salesmen Problem and Graph coloring Problem. **11 Hrs**

Text Book

1. "**Data Structures and algorithm analysis in C++"** by Marks Allen Wesis, Pearson Education, 3rd Edition, 2007. (UNIT I ,UNIT II)
2. **Introduction to Algorithms** by T. H Cormen, C. E. Leiserson and R. L. Rivest, Second Edition*)*, Prentice Hall India (UNIT III, UNIT IV and UNIT V).

VII SEMESTER
COMPUTER GRAPHICS (CSE/ISE)

Contact Hrs/Week: 04 **Credits: 6 [L-T-P: 4-0-2]**
Total Lecture Hrs: 52 **CIE Marks: 50**
Subject Code: 11CI7GECGH **SEE Marks: 50**

UNIT 1

Introduction: Applications of computer graphics; A graphics system; Images: Physical and synthetic; Imaging Systems; The synthetic camera model; The programmer's interface; Graphics architectures; Programmable Pipelines; Performance Characteristics. Graphics Programming: The Sierpinski gasket; Programming Two Dimensional Applications.

The OpenGL: The OpenGL API; Primitives and attributes; Color; Viewing; Control functions; The Gasket program; Polygons and recursion; The three-dimensional gasket; Plotting Implicit Functions. **10 Hrs**

UNIT 2

Input and Interaction: Interaction; Input devices; Clients and Servers; Display Lists; Display Lists and Modeling; Programming Event Driven Input; Menus; Picking; A simple CAD program; Building Interactive Models; Animating Interactive Programs; Design of Interactive Programs; Logic Operations.

Geometric Objects and Transformations-I: Scalars, Points, and Vectors; Three-dimensional Primitives; Coordinate Systems and Frames; Modeling a Colored Cube; Affine Transformations; Rotation, Translation and Scaling. **10 Hrs**

UNIT 3

Geometric Objects and Transformations-II: Geometric Objects & Transformations; Transformation in Homogeneous Coordinates; Concatenation of Transformations; OpenGL Transformation Matrices; Interfaces to three-dimensional applications; Quaternion's.

Viewing: Classical and computer viewing; Viewing with a Computer; Positioning of the camera; Simple projections; Projections in OpenGL; Hidden-surface removal; Interactive Mesh Displays; Parallel-projection matrices; Perspective-projection matrices; Projections and Shadows. **12 Hrs**

UNIT 4

Lighting and Shading: Light and Matter; Light Sources; The Phong Lighting model; Computation of vectors; Polygonal Shading; Approximation of a sphere by recursive subdivisions; Light sources in OpenGL; Specification of materials in OpenGL; Shading of the sphere model; Global Illumination.

10 Hrs

UNIT 5

Implementation: Basic Implementation Strategies; Four major tasks; Clipping; Line-segment clipping; Polygon clipping; Clipping of other primitives; Clipping in three dimensions; Rasterization; Bresenham's algorithm; Polygon Rasterization; Hidden-surface removal; Antialiasing; Display considerations.

10 Hrs

Text Book

1. **Interactive Computer Graphics - A Top-Down Approach with OpenGL** by.Edward Angel, 5th Edition, Pearson Education, 2008. (Chapters 1 to 7)

Reference Book

1. **Computer Graphics- OpenGL Version** by.Donald Hearn and Pauline Baker, 3rd Edition, Pearson Education, 2004.
2. **Computer Graphics Using OpenGL** by F.S. Hill Jr., 2nd Edition, Pearson education, 2001.
3. **Computer Graphics** by James D Foley, Andries Van Dam, Steven K Feiner, John F Hughes, Addison-Wesley 1997.

VII SEMESTER
C# AND .NET (CSE/ISE)

Contact Hrs/Week: 04 **Credits: 6 [L-T-P: 4-0-2]**
Total Lecture Hrs: 52 **CIE Marks: 50**
Subject Code: 11CI7GECDN **SEE Marks: 50**

UNIT 1

Introducing C# and the .NET platform and building C# applications :THE PHILOSOPHY OF .NET, Understanding the Previous State of Affairs, The .NET Solution, The Building Block of the .NET Platform (CLR, CTS, and CLS), The Role of the .NET Base Class Libraries, What C# Brings to the Table. An Overview of .NET Binaries (aka Assemblies), the Role of the Common Intermediate Language, The Role of .NET Type Metadata, The Role of the Assembly Manifest, Understanding the Common Type System, Intrinsic CTS Data Types. Understanding the Common Languages Specification, Understanding the Common Language Runtime, Building C# applications using csc.exe, Working with csc.exe Response Files, The Command Line Debugger (cordbg.exe). **10 Hrs**

UNIT 2

C# Language Fundamentals: The Anatomy of a Basic C# class, defining classes and creating objects, The System. Console class, Establishing member visibility, default values of class member variables. Member variable initialization syntax, Defining constant data, Defining Read only fields, Understanding the static keyword, Method parameter modifiers, Iteration constructs, Decision constructs and the relational/Equality operators, Understanding Value Types and Reference Types, Understanding Boxing and Un-boxing operations, Working with .NET enumerations, The Master class: System. Object, The System Data types, The System .String Data types, The Role of System.Text.StringBuilder, .NET Array types, Understanding the C# Nullable types, Defining custom namespaces.

Object oriented programming with C#: Understanding the C# class type, Reviewing the pillars of OOP, The First pillar: C# encapsulation services, The Second Pillar: C#'s inheritance support, The Third pillar: C#'s polymorphic support, C# casting rules, Understanding C# partial types, Documenting C# source code via XML. **12 Hrs**

UNIT 3

Understanding Object Lifetime: Classes, Objects and references, the basics of object lifetime,the role of application roots, Understanding object generations, The System.GC type, Building Finalizable objects, Building Finalizable and Disposable types.

Understanding structured exception handling: The Role of .NET exception handling, The simplest possible example, Configuring the state of an Exception, State level exception, Application level exception, Processes multiple exceptions, The Finally block, Who is throwing what, The result of Unhandled Exception. **10 Hrs**

UNIT 4

Interfaces and Collections: Defining interfaces in C#, Implementing an interface in C#, Contrasting interfaces to abstract base classes, Invoking interface members at object level, Interfaces as Parameters, Interfaces as Return values, Arrays of Interfaces types, Understanding Explicit interface implementation, Building Interface hierarchies, The interfaces of the System Collections namespace, The class types of System Collections.

Callback Interfaces, Delegates and Events: Understanding the Callback interfaces, Understanding the .NET Delegate type, Defining a Delegate in C#, The System Multicast Delegate and System Delegate base

classes, The simplest possible Delegate example, Understanding C# events, Understanding C# Anonymous methods, C# method group conversions. **10 Hrs**

UNIT 5

Introducing .NET assemblies: The role of .NET assemblies, Understanding the format of a .NET assembly, Building and consuming a Single file assembly, Building and consuming a Multifile assembly, Understanding Private assemblies, Understanding Shared Assemblies, Consuming a Shared assembly, Configuring Shared assembly. **10 Hrs**

Text Book

1. **Pro C# with .NET 3.0** by Andrew Troelsen (Special Edition) Apress.

VII SEMESTER

COMPUTER VISION AND DIGITAL IMAGE PROCESSING (CSE/ISE)

Contact Hrs/Week: 04 **Credits: 6 [L-T-P: 4-0-2]**

Total Lecture Hrs: 52 **CIE Marks: 50**

Subject Code: 11CI7GECDI **SEE Marks: 50**

UNIT 1

INTRODUCTION: Image representation, Image digitization, Digital image properties, Color images, Image pre-processing, Brightness and geometric transformations, local preprocessing. **9 Hrs**

UNIT 2

SEGMENTATION: Thresholding, Edge-based segmentation, Region based segmentation, Matching, Active contour models-snakes. **9 Hrs**

UNIT 3

IMAGE UNDERSTANDING AND 3D VISION: Image understanding and control strategies, RANSAC, Point distribution models, Active appearance models, Pattern recognition methods in image understanding, Boosted cascade of classifiers for rapid object detection, Scene labeling and constraint propagation, Semantic image segmentation and understanding, Hidden Markov models, Gaussian mixture models and expectation maximization, Basics of projective geometry, A single perspective camera, Scene reconstruction from multiple views. **12 Hrs**

UNIT 4

IMAGE DATA COMPRESSION AND MOTION ANALYSIS: Image data properties, Discrete image transforms in image data compression, Predictive compression methods, Vector quantization, Hierarchical and progressive compression methods, Comparison of compression methods, JPEG and MPEG image compression, Statistical Texture description, Syntactic texture description methods, Hybrid texture description methods, Differential motion analysis methods, Optical Flow, Analysis based on correspondence of interest points, Detection of specific motion patterns, video tracking, motion models to aid tracking**.** **12 Hrs**

UNIT 5

SHAPE REPRESENTATION AND MORPHOLOGY: Region identification, Contour-based shape representation and description, Region based shape representation and description, Shape classes, Morphology concepts and principles, Binary dilation and erosion, Gray-scale dilation and erosion, Skeletons and object marking, Granulometry, Morphology segmentation and watersheds. **10 Hrs**

Text Book

1. **Image Processing, Analysis and Machine Vision** by Milan Sonka, Vaclav Hlavac and Roger Boyle India Edition, Cengage Learning, 2008.

VII SEMESTER
MOBILE COMMUNICATION (CSE/ISE)

Contact Hrs/Week: 04 **Credits: 4 [L-T-P: 4-0-0]**
Total Lecture Hrs: 52 **CIE Marks: 50**
Subject Code: 11CI7GEMCN **SEE Marks: 50**

UNIT 1

INTRODUCTION: Applications: A short history of wireless communication. Wireless Transmission: Frequency for radio transmission, Signals, Antennas, Signal Propagation, Multiplexing, Modulation, Spread spectrum, Cellular systems. **8 Hrs**

UNIT 2

Medium Access Control: Motivation for a specialized MAC: hidden and Exposed terminals. Near and Far terminals; SDMA, FDMA, TDMA: Fixed TOM, Classical Aloha, Slotted Aloha, Carrier sense multiple access, Demand assigned multiple access, PRMA packet reservation multiple access, PRMA packet reservation multiple access, reservation TOMA, Multiple access with collision avoidance, Polling Inhibit sense multiple access; CDMA: Spread Aloha multiple access. **12 Hrs**

UNIT 3

Telecommunication Systems: GSM: Mobile Services, System Architecture, radio interface, Protocols, Localization and Calling, handover, Security, New Data Services (GPRS), UMTS. Satellite Systems: History, Applications and Basics; GEO, LEO, MEO Routing, Localization; Handover, Examples Broadcast Systems: Overview, Cyclic Repetition, Digital Audio; broadcasting: Multimedia object transfer Protocol; Digital Video Broadcasting. **12 Hrs**

UNIT 4

Mobile Network layer: Mobile IP: Goals, assumptions and requirements, Entities and Terminology, IP Packet delivery, Agent advertisement and discovery, Registration, Tunneling and Encapsulation, Optimizations, Reverse tunneling, Ipv6; Dynamic host configuration protocol, AD hoc Networks; Routing, Destination sequence distance vector, Dynamic source routing, Hierarchical algorithms, Alternative metrics. **8 Hrs**

UNIT 5

Mobile Transport Layer: Traditional TCP; Congestion control Slow start, Fast retransmit/fast recovery, Implications on mobility; Indirect TCP, Snooping TCP, Mobile RCP, Fast retransmit/fast recovery, Transmission/time-out freezing, selective retransmission, Transaction oriented TCP. Support for Mobility: Wireless application protocol: Architecture, Wireless datagram protocol, Wireless transport layer security, Wireless transaction protocol, Wireless session protocol, Wireless application environment, Wireless markup language; WML script, Wireless telephony application, Examples "Stacks with WAP" , Push Architecture , push/pull services. **12 Hrs**

Text Book

1. **"Mobile Communications",** by Jochen Schiller, 2nd Edition, Pearson Education
2. "**Wireless Communication and Networks"** by William Stallings, Prentice Hall-2005

Reference Book

1. **"Wireless Communication Principles and practices"** by Rappaport, 2nd Edition, Prentice Hall
2. **"Wireless and Mobile Network Architectures"** by YI Bing Un John Wiley

3. **“Wireless Network”** by P Nicopqlitidis, John Wiley
4. **“Mobile Satellite Communication: Principles and Trends”** by M. Richharia, Pearson Education.

VII SEMESTER

CRYPTOGRAPHY AND NETWORK SECURITY (CSE/ISE)

Contact Hrs/Week: 04 **Credits: 4 [L-T-P: 4-0-0]**

Total Lecture Hrs: 52 **CIE Marks: 50**

Subject Code: 11CI7GECNS **SEE Marks: 50**

UNIT 1

Introduction: Security Goals, Attacks, Services and Mechanism, Techniques , Mathematics of Cryptography, Integer arithmetic, Modular Arithmetic, Matrices, Linear Congruence, Primes, Primality Testing, Factorization, Chinese Remainder Theorem, Quadratic Congruence, Exponentiation and Logarithm. **11 Hrs**

UNIT 2

Traditional Symmetric–key Ciphers: Introduction, Substitution Ciphers, Transposition Ciphers, Streams and Block Ciphers, Introduction to Modern Symmetric Key Ciphers Modern Block Ciphers, Modern Stream Ciphers. **11 Hrs**

UNIT 3

Data Encryption Standard: Introduction, DES Structure, DES Analysis, Multiple DES, Security of DES, Differential Cryptanalysis, Linear Cryptanalysis of DES, Encipherment Using Modern Symmetric Key Ciphers Use of Modern Block Ciphers, Use of Stream Ciphers, Other Issues. **10 Hrs**

UNIT 4

Asymmetric Key Cryptography and Message Integrity: Introduction, RSA Cryptosystem, Message Integrity, Message Authentication Cryptographic Hash Functions, Introduction, SHA-512, Digital Signature Comparison, Attacks on Digital Signature. **10 Hrs**

UNIT 5

Key Management: Symmetric Key Distribution, Kerberos, Symmetric-key Agreement, Public-key Distribution- Public Announcement, Trusted Center, Controlled Trusted Center, Certification Authority. Security at the Application Layer, E-mail, PGP, S/MIME, SSL Architecture. **10 Hrs**

Text Book

1. **Cryptography and Network Security** by Behrouz A.Forouzan, Special Indian Edition

Reference Book

1. **Cryptography and Network Security** by William Stallings, 3rd Ed, Pearson Education/PHI, 2003
2. **Cryptography and Network Security** by Atul Kahate, Tata McGraw Hill, 2003

VII SEMESTER

BUILDING ENTERPRISE APPLICATIONS (CSE/ISE)

Contact Hrs/Week: 04 **Credits: 4 [L-T-P: 4-0-0]**
Total Lecture Hrs: 52 **CIE Marks: 50**
Subject Code: 11CI7GEBEA **SEE Marks: 50**

UNIT 1

Introduction: Enterprise Applications, Software Engineering Methodologies, Life Cycle Raising Enterprise Applications, Three key Determinants of Successful Enterprise Applications, Measuring the success of Enterprise Applications.

Incepting Enterprise Applications: Enterprise Analysis, Business Modeling, Loan Banking Business: Case Study of EM bank, Requirement Elicitation and Analysis, Requirements Validation, Planning and Estimation. **10 Hrs**

UNIT 2

Architecting and Designing enterprise applications: Architecture, Views and viewpoints, Enterprise applications: An enterprise architecture perspective, Logical architecture, Technical architecture and design, Data architecture and design, Infrastructure architecture and design, Architecture and design documentation. **10 Hrs**

UNIT 3

Constructing Enterprise Applications: Construction readiness, Introduction to software construction map, Constructing the solution layers, Code review, Static code analysis, Build processes and UNIT testing, Dynamic code analysis. **11 Hrs**

UNIT 4

Basics of Software Testing: Humans, errors and Testing, Software Quality, Requirements behavior and correctness, Correctness versus reliability, Testing and debugging, Test metrics, Software and hardware testing, Testing and Verification, Defect management, Execution history, Test Generation strategies, static testing, model based testing and model checking, control flow graph. **11 Hrs**

UNIT 5

Testing and Rolling out Enterprise Applications: Testing enterprise applications, Enterprise applications environments, Integration testing, System testing, User acceptance testing, rolling out Enterprise Applications. **10 Hrs**

Text Book

1. **Raising Enterprise Applications - A software engineering perspective Wiley India** by Anubhav Pradhan, Sateesha B Nanjappa, Senthil K. Nallasamy and Veerakumar Esakimuthu
2. **Foundations of Software Testing** by Pearson Aditya P Mathur.

VII SEMESTER
DATA MINING (CSE/ISE)

Contact Hrs/Week: 04 **Credits: 4 [L-T-P: 4-0-0]**
Total Lecture Hrs: 52 **CIE Marks: 50**
Subject Code: 11CI7GEDMG **SEE Marks: 50**

UNIT 1

What is Data Mining? : Motivating Challenges; The origins of data mining; Data Mining Tasks. Types of Data. Data Preprocessing, Measures of Similarity and Dissimilarity. **10 Hrs**

UNIT 2

Preliminaries of classification: General approach of solving a classification problem; Decision tree induction; Rule-based classifier, Bayesian Classifiers **11 Hrs**

UNIT 3

Association analysis: Problem Definition; Frequent Item set generation; Rule Generation; Compact representation of frequent item sets ; Alternative methods for generating frequent item sets. FP-Growth algorithm. **11 Hrs**

UNIT 4

Sequential patterns, subgraph patterns. Cluster analysis: Overview, K-means, Agglomerative hierarchical clustering, DBSCAN **10 Hrs**

UNIT 5

Multidimensional analysis and descriptive mining of complex data objects, Spatial data mining. Multimedia data mining; Text mining;. Data mining applications; Data mining system products and research prototypes; Trends in Data mining. **10 Hrs**

Text Book

1. **Introduction to Data Mining** by Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Pearson Education, 2007.
2. **Data Mining – Concepts and Techniques** by Jiawei Han and Micheline Kamber, 2nd Edition, Morgan Kaufmann, 2006.

VII SEMESTER
SENSOR NETWORKS (CSE/ISE)

Contact Hrs/Week: 04 **Credits: 4 [L-T-P: 4-0-0]**
Total Lecture Hrs: 52 **CIE Marks: 50**
Subject Code: 11CI7GESNS **SEE Marks: 50**

UNIT 1

Introduction-Fundamentals of Wireless Communication Technology: The Electromagnetic Spectrum - Radio Propagation Mechanisms - Characteristics of the Wireless Channel - IEEE 802.11a,b Standard – Origin Of Ad hoc: Packet Radio Networks - Technical Challenges - Architecture of PRNETs -Components of Packet Radios – Ad hoc Wireless Networks -What Is an Ad Hoc Network? Types of Ad hoc Mobile Communications - Types of Mobile Host Movements - Challenges Facing Ad Hoc Mobile Networks-Ad hoc wireless Internet.

Introduction and Overview of Wireless Sensor Networks: Introduction: Background of sensor network Technologies, Applications of sensor networks and Basic Overview of technology: Basic sensor Network architectural elements, Brief historical survey of sensor networks, Challenges and Hurdles. **12 Hrs**

UNIT 2

Basic Wireless Sensor Technology: Introduction, sensor node technology: overview, hardware and software, Sensor Taxonomy, WN Operating Environments.

Wireless Transmission Technology: Introduction, Radio technology primer: propagation and propagation impairments, Modulation, Available wireless technologies: Campus Applications, MAN/WAN Applications.

Medium Access Control Protocols for sensor networks: Introduction, Background, Fundamentals of MAC Protocols: performance requirements, common protocols. MAC protocols for WSNs: Schedule-Based Protocols, Random-Access Based protocols. **12 Hrs**

UNIT 3

Routing protocols for wireless sensor networks: Introduction, Background, Data dissemination, Routing challenges and Design issues in wireless sensor networks: Network scale and time varying characteristics, Resource Constraints, Sensor applications Data Models. Routing strategies in wireless sensor networks: WSN Routing techniques, Flooding and its variants, Sensor protocols for information via negotiation, Low-energy adaptive clustering hierarchy, Power-efficient gathering in sensor information systems, Directed diffusion, Geographical routing. **12 Hrs**

UNIT 4

Transport Control Protocols for Wireless Sensor Networks: Traditional Transport Control protocols: TCP, UDP, Mobile IP, Feasibility of using TCP or UDP for WSN's. Transport protocol design issues, Examples of Existing Transport Control Protocols: CODA, ESRT. Performance of transport Control Protocols: congestion, packet loss recovery. **8 Hrs**

UNIT 5

Network Management for Wireless Sensor Networks: Introduction, Network Management Requirements, Traditional Network Management Models: SNMP, Telecom operation Map. Network management design issues, examples of management architecture: MANNA, Other Issues Related to Network Management: Naming, Localization. **8 Hrs**

Text Book

1. **"Ad Hoc Wireless Networks Architectures and Protocols"** by C. Siva Ram Murthy and B. S. Manoj, Prentice Hall, PTR, 2004.
2. **Wireless Sensor Networks Technology, Protocols, and Applications** by Kazen, Sohraby, Daniel Minoli, Taieb Znati Wiley Publications.

Reference Book

1. **Wireless Sensor Networks** by Ragavendra, C.S.; Sivalingam, Krishna M; Znati, Taieb Wiley India Edition.
2. **Wireless Sensor Networks** by S.AnandaMurgan Tech India Publication Series.

VII SEMESTER

ARM BASED SYSTEM DESIGN (CSE)

Contact Hrs/Week: 03 **Credits: 3 [L-T-P: 3-0-0]**

Total Lecture Hrs: 39 **CIE Marks: 50**

Subject Code: 11CS7DEABS **SEE Marks: 50**

UNIT 1

Introduction: The RISC design philosophy; The ARN design philosophy; Embedded system hardware and software. ARM processor fundamentals: Registers; Current Program Status Register; Pipeline; Exceptions, interrupts and the Vector Table; Core extensions; Architecture revisions; ARM processor families. **8 Hrs**

UNIT 2

Arm Instruction Set And Thumb Instruction Set: ARM instruction set: Data processing instructions; Branch instructions; Load-store instructions; Software interrupt instruction; Program Status Register functions; Loading constants; ARMv5E extensions; Conditional execution. Thumb instruction set: Thumb register usage; ARM –Thumb interworking; Other branch instructions; Data processing instructions; Single-Register Load-Store instructions; Multiple-Register Load-Store instructions; Stack instructions; Software interrupt instruction **8 Hrs**

UNIT 3

Writing And Optimizing ARM Assembly Code: Writing assembly code; Profiling and cycle counting; Instruction scheduling; Register allocation; Conditional execution; Looping constructs; Bit manipulation; Efficient switches; Handling unaligned data. **8 Hrs**

UNIT 4

Optimized Primitives: Double-precision integer multiplication; Integer normalization and count leading zeros; Division; Square roots; Transcendental functions; Endian reversal and bit operations; Saturated and rounded arithmetic; Random number generation. **8 Hrs**

UNIT 5

Exception And Interrupt Handling: Exception handling; Interrupts and interrupt handling Schemes. **7 Hrs**

Text Book

1. **ARM System Developer's Guide – Designing and Optimizing System Software** – by Andrew N. Sloss, Dominic Symes, Chris Wright, Elsevier, 2004.

Reference Book

1. **ARM Architecture Reference Manual** by David Seal (Editor), 2nd Edition, Addison-Wesley, 2001.
2. **ARM System-on-Chip Architecture** by Steve Furber, 2nd Edition, Addison-Wesley, 2000.

VII SEMESTER
MICRO CONTROLLER (CSE)

Contact Hrs/Week: 03 **Credits: 3 [L-T-P: 3-0-0]**
Total Lecture Hrs: 39 **CIE Marks: 50**
Subject Code: 11CS7DEMCN **SEE Marks: 50**

UNIT 1

Introduction, 8051 Assembly Language Programming–1: Microcontrollers and embedded processors; Overview of the 8051 family.8051 Assembly Language Programming (ALP) -1: Inside the 8051;Introduction to 8051 ALP; Assembling and running an 8051 program; The PC and ROM space in 8051. **8 Hrs**

UNIT 2

ALP-2: Data types, directives, flag bits, PSW register,register banks, and the stack.Jump and loop instructions; Call instructions; Time delay forvarious 8051 family members; I/O programming; I/O bit manipulation programming. Immediate and register addressing modes; Accessing memoryusing various addressing modes. Bit addresses for I/O and RAM; Extra128 bytes of on-chip RAM in 8052. **8 Hrs**

UNIT 3

ALP-3: Arithmetic instructions; Signed numbers and arithmetic operations; Logic and compare instructions; rotate instruction and serialization; BCD, ASCII, and other application programs. Programming in C:Data types and time delays; I/O programming; Logic operations; Data conversion programs; Accessing code ROM space; Data serialization. **8 Hrs**

UNIT 4

Pin-Description of 8051: Pin description of8051; Intel Hex file; Programming the 8051 timers; Counter programming; programming Timers 0 and 1 in Basics of serial communications; 8051 connections to RS232; Serial portrogramming in assembly and in C. **7 Hrs**

UNIT 5

Interrupts ,Interfacing Ext. Memory& Interfacing with 8255: 8051 interrupts; Programming timer interrupts; Programming external hardware interrupts; Programming the serial communications interrupt; Interrupt priority in 8051 /8052; Interrupt programming in Memory address decoding; Interfacing 8031 /8051 with externalROM; 8051 data memory space; Accessing external data memory in Interfacing with 8255; Programming 8255 in C. **8 Hrs**

Text Book

1. **The 8051 Microcontroller and Embedded Systems using Assembly and C** by Muhammad Ali Mazidi, Janice GillispieMazidi, Rolin D. McKinlay, 2nd Edition, Pearson Education, 2008.

VII SEMESTER
SOFTWARE ARCHITECTURE (CSE)

Contact Hrs/Week: 03 **Credits: 3[L-T-P: 3-0-0]**
Total Lecture Hrs: 39 **CIE Marks: 50**
Subject Code: 11CS7DESAC **SEE Marks: 50**

UNIT 1

Envisioning Architecture

The Architecture Business Cycle: Where do architecture come from, Software processes and the architecture business cycle, What makes a "Good Architecture", What Software architecture is and what it isn't, Other points of view, Architectural patterns, Reference models and reference architectures, Why is software Architecture important.

Architectural styles: Pipes and Filters, Data abstraction and Object oriented organization, Event based , Implicit invocation, Layered Systems, Repositories, Interpreters, Process control, Other familiar architectures, Heterogeneous Architectures. **10 Hrs**

UNIT 2

Understanding quality attributes and achieving qualities

Understanding quality attributes: Functionality and Architecture, Architecture and Quality attributes, System quality attributes, Quality attributes scenarios in practice, other system quality attributes, Business qualities, Architecture qualities.

Achieving qualities: Introducing tactics, Availability tactics, Modifiability tactics, Performance tactics, Security tactics, Testability tactics, Usability tactics, relationship of tactics to architectural patterns.

10 Hrs

UNIT 3

Designing and documenting the Architecture

Designing the Architecture: Architecture in the life cycle, designing the Architecture, Forming a team structure, creating a skeletal system.

Documenting Software Architecture: Uses of Architectural Documentation, Views, Choosing the relevant views, Documenting a view, Documentation across views, Unified Modeling Language.

Reconstructing software Architectures: Introduction, Information Extraction, Database Construction, View fusion, Reconstruction and Example. **10 Hrs**

UNIT 4

Analyzing Architectures

The ATAM(A comprehensive method for Architecture Evaluation): Participants in the ATAM, outputs of the ATAM, phases of the ATAM. The nightingale System: A case study.

The CBAM (A quantitative approach to architecture design decision making): Decision making context, the basis for the CBAM, Implementing the CBAM, Case study, The NASA ECS project, results of the CBAM exercise. **9 Hrs**

Text Book

1. **Software Architecture in practice** by Len Bass, Paul Clements, Rick Kazman, , 2nd edition, Pearson Education, Inc.
2. **Software Architecture- Perspectives on an emerging discipline** by Mary Shaw, David Garlan, Eastern Economy Edition.

VII SEMESTER
EMBEDDED SYSTEMS (CSE)

Contact Hrs/Week: 03 **Credits: 3 [L-T-P: 3-0-0]**
Total Lecture Hrs: 39 **CIE Marks: 50**
Subject Code: 11CS7DEEMS **SEE Marks: 50**

UNIT 1

Embedded systems: processor embedded into a system, embedded hardware UNITs and devices in a system, examples of embedded systems; embedded SOC and use of VLSI circuit design technology, Complex systems design and processors, design process in embedded system, formalization of a system, design process and design examples, classification of embedded systems, skills required for embedded system designer, MC68HC08 architecture, MC68HC11 architecture. **13 Hrs**

UNIT 2

IO types and examples: serial communication devices, parallel device ports, sophisticated interfacing features in device ports, wireless devices, timer and counting devices, watch dog timer, real time clock, networked embedded systems, serial bus communication protocols, parallel bus device protocols, internet enable systems-an introduction(no protocols), wireless and mobile system protocols. **13 Hrs**

UNIT 3

Programmed IO busy –wait approach without interrupt service mechanism, ISR concept, Interrupt sources, interrupt service handling mechanism, Program modeling concepts: program modes, DFG models, state machine programming models, and modeling of multiprocessor systems, RTOS. **13 Hrs**

Text Book

1. **Embedded systems-architecture, programming and design**,by Rajkamal, TMH, 2nd edition. (Chap. -1,3,4,6)
2. **An embedded software primer** by David E Simon, Pearson education, Inc. (Chap. -5,6,7,8,9)
3. **Embedded microcomputer systems,**by Jonathan W Valvano, Thomson Brooks/Cole (Chapter -1.3,1.4)

VII SEMESTER
ARTIFICIAL INTELLIGENCE (CSE)

Contact Hrs/Week: 03 **Credits: 3 [L-T-P: 3-0-0]**
Total Lecture Hrs: 39 **CIE Marks: 50**
Subject Code: 11CS7DEAIN **SEE Marks: 50**

UNIT 1

What is AI? Intelligent Agents: Agents and environment; Rationality; the nature of environment; the structure of agents. Problem-solving: Problem-solving agents; Example problems; Searching for solution; Uninformed search strategies. Informed search strategies; Heuristic functions; On-line search agents and unknown environment. **8 Hrs**

UNIT 2

Knowledge-based agents; The wumpus world as an example world; Logic; propositional logic Reasoning patterns in propositional logic; Effective propositional inference; Agents based on propositional logic. Representation revisited; Syntax and semantics of first-order logic; Using first-order logic. **8 Hrs**

UNIT 3

Knowledge engineering in first-order logic. Propositional versus first-order inference; Unification and lifting. Forward chaining; Backward chaining; Resolution. **8 Hrs**

UNIT 4

Learning: Forms of Learning; Inductive learning; Learning decision trees; Ensemble learning; Computational learning theory. **7 Hrs**

UNIT 5

Statistical learning, maximum likelihood parameter learning, Bayesian parameter learning, passive reinforcement learning, active reinforcement learning. **8 Hrs**

Text Book

1. **Artificial Intelligence: A Modern Approach** by Stuart Russel, Peter Norvig, 2nd Edition, Pearson Education, 2003.

Reference Book

1. **Artificial Intelligence** by George F Luger, 5th Edition Pearson Education, 2009.

VII SEMESTER

ENTREPRENEURSHIP AND MANAGEMENT (CSE/ISE)

Contact Hrs/Week: 03 **Credits: 3 [L-T-P: 3-0-0]**

Total Lecture Hrs: 39 **CIE Marks: 50**

Subject Code: 11CI7GCEAM **SEE Marks: 50**

UNIT 1

Entrepreneur: Introduction, concept of Entrepreneur, characteristics of an entrepreneur, qualities of an entrepreneur, Distinction between an entrepreneur and a manager, functions of an entrepreneur, types of entrepreneur. Entrepreneurship: Concept of entrepreneurship, nature and characteristics of entrepreneurship, scope of entrepreneurship, factors affecting entrepreneurial growth: economic factors, non-economic factors and government factors. **8 Hrs**

UNIT 2

PLANNING AND ORGANISATIONAL OBJECTIVES: Planning-Organizations' mission, purpose, goals and objectives-strategies. Planning process-planning and Budgeting. Management by objective-MBO process. Strategies and Policies-Porter's industry analysis and generic competitive strategies. Decision Making-Decision Making under certainty, uncertainty and risk. Organizing, Organization structure, Departmentation. Line and staff authority, Empowerment and Decentralization. Organization culture and Managing diversity. Entrepreneur and Re-engineering. **15 Hrs**

UNIT 3

WESTERN AND INDIAN PHILOSOPHIES: 1) Idealism 2) Naturalism 3)pragmatism, 4) Realism Their aims methods and approaches to theory of knowledge and its implications. **8 Hrs**

UNIT 4

PERSONALITY AND LEADERSHIP: Nature and theories of personality; personality assessment; determinants of personality; psychological conflict and conflict handling mechanisms.

Leadership: Nature and Definitions of Leadership: Functions of Leader; Characteristics of Leaders; The concept of Leadership Effectiveness; Leadership Styles. Job-satisfaction, characteristic of the work-place. Working conditions; Safety-violence and health in the work place; stress in work place

8 Hrs

Reference Book

1. **Entrepreneurship Development** by S S Khanka – S Chand & Co
2. **A Global and Entrepreneurial Perspective.** By Heinz Neihrich, Mark V cannice and Harold Koontz, Management: New Delhi, TMH publishing, 2008
3. **Major Philosophies of Education** by Dr. R.S. Panday., Vinod Pustak mandir, Agra.
4. **Understanding Psychology** by Feldman R.S., Tata-McGraw-Hill Publishing Company, New Delhi.

VIII SEMESTER
STORAGE AREA NETWORKS (CSE/ISE)

Contact Hrs/Week: 04 **Credits: 4 [L-T-P: 4-0-0]**
Total Lecture Hrs: 52 **CIE Marks: 50**
Subject Code: 11CI8GESAN **SEE Marks: 50**

UNIT 1

Introduction: Server Centric IT Architecture and its Limitations; Storage – Centric IT Architecture and its advantages. Case study: Replacing a server with Storage Networks; The Data Storage and Data Access problem; The Battle for size and access.

Intelligent Disk Subsystems: Architecture of Intelligent Disk Subsystems; Hard disks and Internal I/O Channels; JBOD, Storage virtualization using RAID and different RAID levels; Caching: Acceleration of Hard Disk Access; Intelligent disk subsystems, Availability of disk subsystems. **12 Hrs**

UNIT 2

I/O Techniques: The Physical I/O path from the CPU to the Storage System; SCSI; Fibre Channel Protocol Stack; Fibre Channel SAN; IP Storage. **10 Hrs**

UNIT 3

Network Attached Storage: The NAS Architecture, The NAS hardware Architecture, The NAS Software Architecture, Network connectivity, NAS as a storage system.

File System and NAS: Local File Systems; Network file Systems and file servers; Shared Disk file systems; Comparison of fibre Channel and NAS. **10 Hrs**

UNIT 4

Storage Virtualization: Definition of Storage virtualization; Implementation Considerations; Storage virtualization on Block or file level; Storage virtualization on various levels of the storage Network; Symmetric and Asymmetric storage virtualization in the Network. **10 Hrs**

UNIT 5

SAN Architecture and Hardware devices: Overview, Creating a Network for storage; SAN Hardware devices; The fibre channel switch; Host Bus Adaptors; Putting the storage in SAN; Fabric operation from a Hardware perspective.

Software Components of SAN: The switch's Operating system; Device Drivers; Supporting the switch's components; Configuration options for SANs. **10 Hrs**

Text Book

1. **Storage Networks Explained** by Ulf Troppens, Rainer Erkens and Wolfgang Muller, Wiley India, 2007
2. **Storage Networks The Complete Reference** by Robert Spalding: Tata McGraw-Hill, 2003.

Reference Book

1. **Storage Area Network Essentials A Complete Guide to understanding and Implementing SANs** by Richard Barker and Paul Massiglia, Wiley India, 2006.
2. **Information Storage and Management** by G. Somasundaram, Alok Shrivastava, EMC Education Services, Wiley- India, 2009.

VIII SEMESTER
PATTERN RECOGNITION (CSE/ISE)

Contact Hrs/Week: 04 **Credits: 4 [L-T-P: 4-0-0]**
Total Lecture Hrs: 52 **CIE Marks: 50**
Subject Code: 11CI8GEPRN **SEE Marks: 50**

UNIT 1

Introduction: Machine perception, an example; Pattern Recognition System; The Design Cycle; Bayesian decision theory: Introduction, Bayesian Decision Theory; Continuous Features, Minimum error rate, classification, classifiers, discriminant functions, and decision surfaces; The normal density; Discriminant functions for the normal density. **10 Hrs**

UNIT 2

Maximum-Likelihood And Bayesian Parameter Estimation: Introduction; Maximum-likelihood estimation; Bayesian Estimation; Bayesian parameter estimation: Gaussian Case, general theory; Hidden Markov Models. Non-parametric techniques: Introduction; Density Estimation; Parzen windows; kn – Nearest- Neighbor Estimation; The Nearest- Neighbor Rule; Metrics and Nearest-Neighbor Classification. **12 Hrs**

UNIT 3

Linear Discriminant Functions: Introduction; Linear Discriminant Functions and Decision Surfaces; Generalized Linear Discriminant Functions; The Two-Category Linearly Separable case; Minimizing the Perception Criterion Functions; Relaxation Procedures; Non-separable Behavior; Minimum Squared-Error procedures; The Ho-Kashyap procedures. **10 Hrs**

UNIT 4

Stochastic Methods: Introduction; Stochastic Search; Boltzmann Learning; Boltzmann Networks and Graphical Models; Evolutionary Methods. Non-parametric methods: Introduction; Decision Trees; CART; Other Tree Methods; Recognition with Strings; Grammatical Methods. **10 Hrs**

UNIT 5

Learning And Clustering: Introduction; Mixture Densities and Identifiability; Maximum-Likelihood Estimates; Application to Normal Mixtures; Unsupervised Bayesian Learning; Data Description and Clustering; Criterion Functions for Clustering. **10 Hrs**

Text Book

1. **Pattern Classification** by Richard O. Duda, Peter E. Hart, and David G.Stork, 2nd Edition, Wiley-Interscience, 2001.

Reference Book

1. **Pattern Recognition and Image Analysis** by Earl Gose, Richard Johnsonbaugh, Steve Jost, Pearson Education, 2007.

VIII SEMESTER
NEURAL NETWORKS (CSE/ISE)

Contact Hrs/Week: 04 **Credits: 4 [L-T-P: 4-0-0]**
Total Lecture Hrs: 52 **CIE Marks: 50**
Subject Code: 11CI8GENNS **SEE Marks: 50**

UNIT 1

INTRODUCTION: History, structure and function of single neuron, neural net architectures, neural learning, use of neural networks, Supervised learning, single layer networks, perceptrons, linear separability**.** **12 Hrs**

UNIT 2

Perceptron training algorithm, guarantees of success, modifications. Multiclass networks-I, multilevel discrimination, back propagation, setting parameter values, theoretical results. **10 Hrs**

UNIT 3

Accelerating learning process, application, Madaline adaptive multilayer networks. Prediction networks, radial basis functions, polynomial networks, regularization, unsupervised learning, winner-take-all networks. **10 Hrs**

UNIT 4

Learning vector quantizing, counter propagation networks' Adaptive resonance theorem, toplogically organized networks, distance based learning, recognition. **10 Hrs**

UNIT 5

Associative models, Hop Field networks, brain state networks, Boltzmann machines, hetero associations. Optimization using Hopfiled networks, simulated annealing, random search, evolutionary computation. **10 Hrs**

Text Book

1. **Elements Of Artificial Neural Networks** -by Kishan Mehrotra, C. K. Mohan, Sanjay Ranka, Penram, 1997
2. **Artificial Neural Networks –** by R. Schalkoff – Mc Graw Hill 1997

Reference Book

1. **Introduction to Artificial Neural Systems** by J. Zuarda-Jaico 2003
2. **Neural Networks** by Haykins, PHI, 1999.
3. **Neural Network Design** by Hagan, Demuth and Beale- Thomson learning, 1996

VIII SEMESTER
SOFTWARE TESTING (CSE/ISE)

Contact Hrs/Week: 04 **Credits: 4 [L-T-P: 4-0-0]**
Total Lecture Hrs: 52 **CIE Marks: 50**
Subject Code: 11CI8GSTG **SEE Marks: 50**

UNIT 1

Fundamentals of Software Testing : Introduction, Historical perspective of Testing, Definition of Testing, Approaches of Testing, Popular definitions of Testing, Testing during development life cycle, Requirements traceability matrix, Essentials of software testing, Workbench, Important features of Testing Process, Misconceptions about Testing, Principles of Testing, Salient features of Good testing, Test policy, Test strategy of Test approach, Test Planning, Testing process and number of defects found in Testing, Test team efficiency, Mutation Testing, Challenges in Testing, Test team approach, Process problems faced by Testing, Cost aspects of Testing, Establishing Testing policy, Methods, Structured approach to Testing, Categories of Defect, Defect, Error or mistakes in software, Developing test strategy, Developing Testing methodologies, Testing Process, Attitude towards testing, Test Methodologies/approaches, People challenges in software testing, Raising Management awareness for testing, Skills required by tester. **10 Hrs**

UNIT 2

Configuration Management: Introduction ,configuration management ,cycle of configuration management Configuration management process, Auditing configuration Library, configurable items,Baselining,Few more concepts about configuration library, Storage of configurable items in library, Using Automated configuration Tools,Configuration management planning.

Risk analysis: Introduction, Advantages of Automated System, Disadvantages of automated system,Risk,Constraints, Project Risks, Risk Faced Due to Software system ,product Risks, Software Implementations Risks, Identification of Risks, Type of Software Risks Handling of Risks in Testing, Types of Action for Risk Control Management,Risks and Testing, Assumption in Testing, Testing as a Risk Reduction Program (Prioritizing in Testing) ,Risks of Testing. **11 Hrs**

UNIT 3

Levels of Testing: Introduction, Proposal testing , Requirement testing, Design Testing, code Review, UNIT Testing, Module testing, Integration testing, Big-Bang testing, Sandwich testing ,Critical path first , Subsystem testing, System testing, testing stages.

Acceptance testing: Introduction, Acceptance testing criteria, Importance of Acceptance criteria, Some famous Acceptance criteria, Alpha testing, Beta testing , gamma testing, Acceptance testing during each phase of software development, Consideration of Alpha and Beta Acceptance testing process, What does software Acceptance enable?, customer's responsibilities in Acceptance testing, Fits for Acceptance testing, Define Acceptance criteria, Criticality of requirements, Factors affecting criticality of the requirements, Developing Acceptance test plan, Software Acceptance plan, User responsibilities in Acceptance test plan, Executing Acceptance plan. **11 Hrs**

UNIT 4

Testing Tools: Introduction, Features of Test tool, Guidelines for selecting a tool, Tools and skills of tester, Static Testing tools, Dynamic Testing tools, Advantages of using tools, Disadvantages of using tools, When to use Automated test tools, Testing using Automated tools, Difficulties while introducing new tools, Process of procurement of COTS, Procurements of tools from contractor, Advantages of tools developed by External organizations, Contracting a software, Process of procurements of tools from

contractor Test Planning: Introduction, Test policy, Content of test policy in general, Test Planning, Test plan, Quality plan and Test plan, Quality plan template, Test plan template, Guidelines for developing the test plan, Test administration definition, Test Estimation, Test standards, Building Test data and test cases, Test scenarios, Test cases, Essential activities in testing, Template for test cases, Test scripts, Test management software, Test log documents, Effective test cases, Test file, Building test data, Generation of test data, Tools used to build test data, Roles and responsibilities in testing life cycle, Test progress monitoring. **10 Hrs**

UNIT 5

Test Metrics and Test Reports: Introduction, Testing related data, Defect data, Efficiency/Productivity data Categories of the Product/Project test Metrics, Estimated Budgeted approval and actual, Resources consumed in Testing ,Effectiveness of Testing, Defect Density, Defeat Leakage Ratio, Residual Defect Density, Test Team Efficiency, Test case Efficiency,Rework,MTBF/MTTR,Implmenting Measurement Reporting system in an Organisation,Test Reports, Project Test status Reports, Integrated Test Report,System Test Report, Acceptance Test Report, Guidelines for Writing and Using Report, Final Test Reporting, Test status Report, Benchmarking. **10 Hrs**

Text Book

1. **Software Testing Principles, Techniques and Tools** by M.G. LIMAYE, Tata McGraw- Hill Publication.

Reference Book

1. **Software Testing Principles and Practice** by Srinivasan Desikan, Gopalaswamy Ramesh, Pearson Education.
2. **Software Testing concepts and Tools** by Nageshwar Rao pusuluri, Greentech Press.

VIII SEMESTER
FUZZY LOGIC (CSE/ISE)

Contact Hrs/Week: 04 **Credits: 4 [L-T-P: 4-0-0]**
Total Lecture Hrs: 52 **CIE Marks: 50**
Subject Code: 11CI8GEFLC **SEE Marks: 50**

UNIT 1

Introduction, Classical Sets And Fuzzy Sets: Background, Uncertainty and Imprecision, Statistics and Random Processes, Uncertainty in Information, Fuzzy Sets and Membership, Chance versus Ambiguity. Classical Sets - Operations on Classical Sets, Properties of Classical (Crisp) Sets, Mapping of Classical Sets to Functions. Fuzzy Sets - Fuzzy set operations, Properties of Fuzzy Sets. Sets as Points in Hyper cubes .

Classical Relations And Fuzzy Relations: Cartesian Product, Crisp Relations - Cardinality of Crisp Relations, Operations on Crisp Relations, Properties of Crisp Relations, Composition. Fuzzy Relations - Cardinality of Fuzzy Relations, Operations on Fuzzy Relations, Properties of Fuzzy Relations, Fuzzy Cartesian Product and Composition, Non-interactive Fuzzy Sets. Tolerance and Equivalence Relations - Crisp Equivalence Relation, Crisp Tolerance Relation, Fuzzy Tolerance and Equivalence Relations. Value Assignments - Cosine Amplitude, Max-min Method, Other Similarity methods. **12 Hrs**

UNIT 2

Membership Functions: Features of the Membership Function, Standard Forms and Boundaries, Fuzzification, Membership Value Assignments – Intuition, Inference, Rank Ordering, Angular Fuzzy Sets, Neural Networks, Genetic Algorithms, Inductive Reasoning.

Fuzzy-To-Crisp Conversions: Lambda-Cuts for Fuzzy Sets, Lambda-Cuts for Fuzzy Relations, Defuzzification Methods. Extension Principle - Crisp Functions, Mapping and Relations, Functions of fuzzy Sets – Extension Principle, Fuzzy Transform (Mapping), Practical Considerations. **10 Hrs**

UNIT 3

Fuzzy Arithmetic: Fuzzy Numbers, Interval Analysis in Arithmetic, Approximate Methods of Extension - Vertex method, DSW Algorithm, Restricted DSW Algorithm, Comparisons. Fuzzy Vectors.

C**lassical Logic And Fuzzy Logic:** Classical Predicate Logic – Tautologies, Contradictions, Equivalence, Exclusive OR and Exclusive NOR, Logical Proofs, Deductive Inferences. Fuzzy Logic, Approximate Reasoning, Fuzzy Tautologies, Contradictions, Equivalence and Logical Proofs, Other forms of the Implication Operation, Other forms of the Composition Operation. **10 Hrs**

UNIT 4

Fuzzy Rule- Based Systems: Natural Language, Linguistic Hedges, Rule-Based Systems - Canonical Rule Forms, Decomposition of Compound Rules, Likelihood and Truth Qualification, Aggregation of Fuzzy Rules, Graphical Techniques of Inference.

Fuzzy Decision Making: Fuzzy Synthetic Evaluation, Fuzzy Ordering, Preference and consensus, Multi objective Decision Making, Fuzzy Bayesian Decision Method, Decision Making under Fuzzy States and Fuzzy Actions. **10 Hrs**

UNIT 4

Fuzzy Classification: Classification by Equivalence Relations - Crisp Relations, Fuzzy Relations. Cluster Analysis, Cluster Validity, c-Means Clustering - Hard c-Means (HCM), Fuzzy c-Means (FCM). Classification Metric, Hardening the Fuzzy c-Partition, Similarity Relations from Clustering. **10 Hrs**

Text Book

1. **Fuzzy Logic with Engineering Applications** by Timothy J. Ross, McGraw- Hill, II Edition.

VIII SEMESTER
INDIAN CYBER LAW (CSE/ISE)

Contact Hrs/Week: 03 **Credits: 3 [L-T-P: 3-0-0]**
Total Lecture Hrs: 39 **CIE Marks: 50**
Subject Code: 11CI8GCICL **SEE Marks: 50**

UNIT 1

Detailed Section-by-Section analyses of the Information Technology Act, 2000, Commentary on the 4 amended laws amended by the IT Act, 2000 namely, The Indian Penal Code, 1860, The Indian Evidence Act, 1872, The banker's Book Evidence Act, 1891, The Reserve Bank of India Act, 1934, Latest Cyber-crime cases in the country, Need for Taking Steps Ahead.

UNIT 2

Evolving Cyber law Practices – A Guide for Corporate, Privacy in Indian Cyberspace, Terrorism and Cyberspace, Terrorism and Cyberspace, Cyber Theft and the Indian Telegraph Act, 1885, Cyber stalking, Cyber stalking, Cyber Harassment, Cyber Fraud & Indian Cyber law.

UNIT 3

Protecting Indian Children Online, Spam, Contempt in Cyberspace, Indian Consumers & Cyberspace, Electronic Governance – Some Legal Issues, E- Governance and IT Act, 2000, E-Courts for India.

UNIT 4

Domain Names-An Indian Overview, Internet Public Interest Litigations, Up-To-Date Account on Various Trends of Cyber law In India, Historical Perspective of the Growth of Cyber law in India. E-commerce business Practice.

Reference Book

1. **Cyberlaw-The Indian perspective** by Pavan Duggal, 2009 Edition.