



Basaveshwar Engineering College (Autonomous)

[TEQIP Lead Institute, Govt. Aided Institution, AICTE Recognized, Affiliated to VTU Belgaum]

Bagalkot-587102, Karnataka, India

Department of Computer Science and Engineering M. Tech in Computer Science and Engineering

Scheme of Teaching and Examination for 2009-10

Semester-I

Sl. No	Subject Code	Subjects Name	C	Exam Marks		
				CIE	SEE	Total
1	PCS111C	Core-1: Advanced Computer architecture	4	50	50	100
2	PCS112C	Core-2: Software Engineering & Quality assurance	4	50	50	100
3	PCS113C	Core-3: Advanced DS and algorithms.	4	50	50	100
4		Elective-1	4	50	50	100
5		Elective-2	4	50	50	100
6		Elective-3	4	50	50	100
7	PCS114S	Seminar	2	50	50	100
			26	350	350	700

Semester-II

Sl. No	Subject Code	Subjects	C	Exam Marks		
				CIE	SEE	Total
1	PCS211C	Core-4: AI and Expert System	4	50	50	100
2	PCS212C	Core-5 : Embedded Computing Systems	4	50	50	100
3	PCS213C	Core-6: Advanced Computer Networks.	4	50	50	100
4		Elective-4	4	50	50	100
5		Elective-5	4	50	50	100
6		Elective-6	4	50	50	100
7	PCS214S	Term Paper	2	50	50	50
			26	350	350	700

Semester-III

Sl. No.	Subject Code	Subjects	C	Exam Marks		
				CIE	SEE	Total
1	PCS0XXE	Elective-7	4	50	50	100
2	PCS301I	Industrial Training	4	50	50	100
3	PCS302P	Project phase-I	16	50	50	100
		Total	24	150	150	300

Semester-IV

Sl. No.	Subject Code	Subjects	C	Exam Marks		
				CIE	SEE	Total
1	PCS401P	Project phase-II	24	50	50	100
		Total	24	50	50	100

Department of Computer Science and Engineering
LIST OF ELECTIVE COURSES FOR I & II SEMESTER OF M.TECH (CSE)
2009-2010 Onwards

Sl. No.	Subject Code	Subjects	L	T	P	C
1	PCS001E		4	0	0	4
2	PCS002E	Computer Graphics and Visualization	4	0	0	4
3	PCS003E	Digital Image Processing	4	0	0	4
4	PCS004E	Object Technology	4	0	0	4
5	PCS005E	Digital Signal Processing	4	0	0	4
6	PCS006E	Machine Learning	4	0	0	4
7	PCS007E	Distributed Systems	4	0	0	4
8	PCS008E		4	0	0	4
9	PCS009E	Cryptography & Network Security	4	0	0	4
10	PCS010E	Pattern Recognition	4	0	0	4
11	PCS011E					
12	PCS012E					
13	PCS013E					
14	PCS014E	Multi core Programming	4	0	0	4
15	PCS015E					
16	PCS016E					
17	PCS017E	Soft Computing	4	0	0	4
18	PCS018E	Computer vision	4	0	0	4
19	PCS019E	System software and Compiler Design	4	0	0	4
20	PCS020E	Software Quality Engineering	4	0	0	4
21	PCS021E	Pervasive Computing	4	0	0	4
22	PCS022E	Database Management Systems	4	0	0	4
23	PCS023E	Storage area Networks	4	0	0	4
24	PCS024E	Grid and cluster Computing	4	0	0	4
25	PCS025E	Parallel Computing	4	0	0	4
26	PCS026E	Data Mining	4	0	0	4
27	PCS027E	Algorithmic Graph Theory	4	0	0	4
28	PCS028E	Wireless and Mobile Communication	4	0	0	4
29	PCS029E	Real Time Systems	4	0	0	4
30	PCS030E	Multimedia Computing	4	0	0	4
31	PCS031E	Finite Automata and Formal Languages	4	0	0	4
32	PCS032E	Mobile Computing	4	0	0	4

**FIRST SEMESTER M.TECH (COMPUTER SCIENCE AND ENGINEERING)
CORE COURSES**

PCS111C ADVANCED COMPUTER ARCHITECTURE 04 CREDITS

Total Hours: 48

UNIT I

12 Hrs

Parallel computer Model: State of computing, multiprocessor & multi-computer multivector & SIMD, VLSI Models Instruction Level parallel Processing Introduction to Pipe lined processors. Linear and Non-linear pipelines for corruption –carry-save adder pipes for integer multiplication- 4 stage fixed point multiplication of 8 bit integer.
Non-linear pipe theory – State transition diagram-issue latencies for non-linear pipes-use of delay to improve issue latencies.

UNIT II

12 Hrs

Scalar and Super scalar processing – data control and resource dependencies, register renaming –reservation stations-reorder buffers-Case studies-Power PC 620, CISC processors with RISC core-Pentium Pro Case study branch Control.

Data Parallel Architecture: Introduction -Static and dynamic interconnection networks – omega I and baseline networks.

UNIT III

12 Hrs

SIMD systems – case study – MPP and CMS

Vector Processing – Case study – Cray family Introduction to Systolic architecture – example matrix multiplication.

UNIT IV

12 Hrs

Multiprocessors and Multicomputers cache coherence and Synchronization mechanism Three generation of multicomputers

Data Flow Architecture: Data Flow and Hybrid Architecture – Data Flow Architecture (Ref. 2)Case Study: VLIW Architecture (Ref. 2) – Super scalar and RISC processor SPARC.

Text Books

1. 1. Advanced Computer Architectures – A design space approach, Dezso Sima, Terence Fountain, Peter Kacsuk, and Pearson Education 1997.
2. 2. Advanced Computer Architecture Parallelism, Scalability, Programmability,

Total Hours: 48**UNIT I****12 Hrs****Introduction to Software Engineering:**

Evolution of Software as an engineering discipline. Role of Software Engineering. Maturity of Software development Technology, Software life cycle, Software process models Requirement Engineering. Requirement analysis, System Models, Requirement definition and specification

UNIT II**12 Hrs****Software Design:**

Function Oriented Design; Module level Concept, Design notation and Specification. Structured Design Methodology verification. Metrics, Object oriented Design: Object Oriented Principles, Design for Object Oriented System, system design process, Object design process, Design Patterns.

UNIT III**12 Hrs****Management:**

Project Management Configuration Management Managing People Staffing and Personal plans Software cost estimation

Computer Aided Software Engineering & Quality Improvement:

Software Development tools, Computer aided Software Engineering, CASE work benches. Quality Management, Process improvement

UNIT IV**12 Hrs****Software Testing:**

Testing: Testing fundamentals various testing mechanisms, white box testing, Basis path testing, Block box testing

Software Testing Strategies:

Unit testing, Integration testing, Art of Debugging Software Reliability, Programming for Reliability

Text Books:

1. Pankaj Jalote: An integrated approach to Software Engineering, 8th Ed.
2. Lan Sommerville: Software Engineering 7th Ed.
3. Roger Presaman: Software Engineering A Practitioner's approach 5th Ed.

Total Hours: 48**UNIT I****12 Hrs**

Introduction: Mathematics Review, A Brief Introduction to Recursion, C++ Classes, Templates
Algorithm Analysis: Mathematical Background, Model, What to Analyze, Running Time Calculations

Lists, Stacks, and Queues: Abstract Data Types (ADTs), The List ADT, vector and list in the STL, Implementation of vector, Implementation of list, The Stack ADT, The Queue ADT

UNIT II**12 Hrs**

Trees: Preliminaries, Binary Trees, The Search Tree ADT-Binary Search Trees, AVL Trees, Splay Trees, Tree Traversals (Revisited), B-Trees

Hashing: General Idea, Hash Function, Separate Chaining, Hash Tables Without Linked Lists, Rehashing, Hash Tables in the Standard Library, Extendible Hashing.

Priority Queues (Heaps): Model, Simple Implementations, Binary Heap, Applications of Priority Queues

Sorting: Preliminaries, Insertion Sort, A Lower *Bound* for Simple Sorting Algorithms, Heapsort, Mergesort, Quicksort, A General Lower Bound for Sorting, External Sorting

UNIT III**12 Hrs**

Graph Algorithms : Definitions, Topological Sort, Shortest-Path Algorithms, Network Flow Problems, Minimum Spanning Tree, Applications of Depth-First Search, Introduction to NP-Completeness

Algorithm Design Techniques: Greedy Algorithms

UNIT IV**12 Hrs**

Algorithm Design Techniques: Divide and Conquer, Dynamic Programming, Randomized Algorithms, Backtracking Algorithms

Advanced Data Structures and Implementation: Top-Down Splay Trees, Red-Black Trees, Deterministic Skip Lists, AA-Trees, Treaps, k-d Trees, Pairing Heaps

Text Books

1. Mark Allen Weiss, 2009, "Data Structures and Algorithm Analysis in C++", 3rd edition, Pearson Education

References

1. Aaron M. Tenenbaum, Yedidyah Langsam, Moshe J. Augenstein, 2008, "Data Structures Using C", Eastern Economy Edition
2. Mark Allen Weiss, 2008 "Data Structures and Algorithm Analysis in C", 2nd edition Pearson Education

Note: The Evaluation is to be done with 50% weightage to CIE and 50% weightage to SEE. The CIE for 50 marks will be evaluated with the following components

- i. Two CIE tests for 15 marks each
- ii. Lab Assignments for 15 marks
- iii. Theory assignment for 5 marks

The SEE will be evaluated by a term end exam of 100 marks, which will be reduced to a maximum of 50 marks.

1. Behrouz a Fourouzan, 2007, “Data Communications and Networking”, 4th edition
TMH

Note: The Evaluation is to be done with 50% weightage to CIE and 50% weightage to SEE. The CIE for 50 marks will be evaluated with the following components

1. Two CIE tests for 15 marks each
2. Lab Assignments for 15 marks
3. Theory assignment for 5 marks

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**SECOND SEMESTER M.TECH (COMPUTER SCIENCE AND ENGINEERING)
CORE COURSES**

PCS 211 C Artificial Intelligence & Expert Systems 04 Credits

Total Hours: 48

UNIT I

12Hrs

Problems and Search

Introduction, Concepts and definition of AI, AI Problems, The Underlying assumption, What is an AI technique?, AI characteristics, AI versus Natural Intelligence, Applications of AI, Etc. (Also refer articles 10.2 to 10.4 of Book 2) Problems, Problem Spaces, and Search

Defining the Problem as State Space Search, Production Systems, Problem Characteristics, Production Systems Characteristics, Issues in the Design of Search Programs, Advantages and Disadvantages of DFS & BFS Techniques.

Heuristic Search Techniques

What is heuristic?, Heuristic Function, Importance of Heuristic Function, Examples, Search Techniques: Generate – and – Test, Hill Climbing, Best-First Search, Problem reduction, Constraint – Satisfaction, Means-Ends Analysis.

UNIT II

12 Hrs

Knowledge Representation

Representations and Mappings, Approaches to Knowledge Representation, Issues in Knowledge Representation. Procedural versus Declarative Knowledge, Logic Programming, Forward versus Backward reasoning, Matching. Approaches: Propositional Logic, Predicate Logic, Representing Simple Facts in Logic, Representing Instance and Isa Relationships, Computable Functions and Predicates, Resolution, Natural Deduction.

Structured Representation Approaches: Semantic Networks, Frames, Conceptual Dependency, Scripts, Etc.

UNIT III

12 Hrs

Reasoning under Uncertainty

Introduction to Nonmonotonic Reasoning, Logics for Nonmonotonic Reasoning, Implementation Issues, Augmenting a Problem Solver, Statistical Reasoning, Probability and Bay's Theorem, Certainty Factors and Rule-based Systems, Bayesian Networks, Dempster-Shafer Theory.

Game Playing Overview, The Minima Search Procedure, Adding Alpha-Beta Cutoffs, Additional Refinements, Examples.

Expert Systems: Basic Concepts of Expert System, Structure of Expert Systems, The Human Element in Expert Systems, How Expert Systems Work, Example of an Expert System Consultation, Problem Areas Addressed by Expert Systems, Benefits of Expert Systems, Problems and Limitations of Expert Systems, Expert System Success Factors, Type of Expert Systems, Expert Systems and the Internet / Intranets / Web. (Chapter 10.6 to 10.16 of Book 2)

UNIT IV

12 Hrs

Learning

What is Learning?, Rote Learning, Learning by taking Advice, Learning in Problem Solving, Learning from Examples: Induction, Explanation-based Learning, Discovery Analogy, Formal Learning Theory, Neural Net Learning and Genetic Learning.

Planning

Overview, An Example Domain: The Blocks world, Components of a Planning System, Goal Stack Planning, Nonlinear Planning using Constraint Posting, Hierarchical Planning, Other Planning Techniques.

Natural Languages Processing & Understanding

What is Understanding?, What makes Understanding Hard?, Understanding as Constraint satisfaction, Introduction to NLP, Syntactic Processing, Semantic Analysis, Discourse and Pragmatic Processing.

Advanced Topics

Parallel and Distributed AI: Psychological Modeling, Parallelism in Reasoning Systems, Distributed Reasoning Systems, Commonsense Ontologies, Memory Organization, Case-based Reasoning, Perception, Action, Robot Architecture.

Text Books

1. Artificial Intelligence, Elaine Rich, Kevin Knight, Second Edition, Tata McGraw Hill.
2. Decision Support Systems and Intelligent Systems, Efraim Turban and Jay E. Aronson, Sixth Edition 2002, Pearson Education Asia.

Total Hours: 48

UNIT I

12 Hrs

Introduction to Embedded Systems: Embedded systems; Processor embedded into a system; Embedded hardware units and devices in a system; Embedded software in a system; Examples of embedded systems; Embedded System-on-Chip (SoC) and use of VLSI circuit design technology; Complex systems design and processors; Design process in embedded system. Formalization of system design; Design process and design examples; Classification of embedded systems; Skills required for an embedded system designer.

UNIT II

12 Hrs

Devices

I/O types and examples; Serial communication devices; Parallel device ports; Sophisticated interfacing features in device ports. Wireless devices; Timer and counting devices; Watchdog timer; Real time clock.

Communication Buses for Device Networks :

Networked embedded systems; Serial bus communication protocols; Parallel bus device protocols; Internet enabled systems; Wireless and mobile system protocols.

Device Drivers and Interrupts Service Mechanism: Device access without interrupts; ISR concept; Interrupt sources; Interrupt servicing mechanism; Multiple interrupts; Context and the periods for context-switching, interrupt latency and deadline;

UNIT III

12 Hrs

Classification of processors' interrupt service mechanism from context-saving angle; Direct memory access; Device drivers programming. Embedded Microcontroller Cores and Architecture 8051 micro controller; Architecture; Instruction sets; Assembly language programming; I/O port programming; Timer / counter programming; Serial Communication; Interrupts programming. **Program Modeling Concepts, Processes, Threads, and Tasks:** Program models; DFG models; State machine programming models for event controlled program flow; Modeling of multiprocessor systems. Multiple processes in an application; Multiple threads in an application; Tasks and task states; Task and data; Distinctions between functions, ISRs and tasks.

UNIT IV

12 Hrs

Real-time Operating systems: Operating System services; Process management; Timer functions; Event functions; Memory management; Device, file and I/O sub-systems management; Interrupt routines in RTOS environment and handling of interrupt source calls.

Embedded Software Development, Tools : Introduction; Host and target machines; Linking and locating software; Getting embedded software in to the target system; Issues in hardware software design and co-design; Testing on host machine; Simulators; Laboratory tools.

TEXT BOOKS:

1. Rajkamal: “**Embedded Systems Architecture, Programming and Design**”, 2nd Edition, Tata McGraw Hill, 2008.

REFERENCE BOOKS:

1. Wayne Wolf: “**Computers as Components Principles of Embedded Computer System Design**”, Elsevier, 2005.
2. Tammy Noergaard: “**Embedded Systems Architecture**”, Elsevier, 2005.
3. Steve Heath: “**Embedded Systems Design**”, 2nd Edition, Elsevier, 2003.
4. 4. Dr. K.V.K.K. Prasad: “**Embedded/Real-Time Systems: Concepts, Design and Programming – The Ultimate Reference**”, Dreamtech. Press, 2004.
5. Michael J.Point: “**Embedded C**”, Pearson Education, 2002.

Total Hours : 48

UNIT 1

12 Hrs

Data Communications, Data Networking, and the Internet: Data Communications and Networking for Today's Enterprise, A Communications Model, Data Communications , Networks, The Internet, An Example Configuration

Protocol Architecture, TCP IP, and Internet-Based Applications:The Need for a Protocol Architecture, The TCP IP Protocol Architecture, The OSI Model, Standardization within a Protocol Architecture, Traditional Internet-Based Applications, Multimedia, History of Computer Networking and the Internet

Application Layer : Principles of Network Applications, The Web and HTTP, File Transfer: FTP, Electronic Mail in the Internet, DNS-The Internet's Directory Service, P2P File Sharing, Socket Programming with TCP, Socket Programming with UDP, Building a Simple Web Server

UNIT II

12 Hrs

Transport Layer : Introduction and Transport-Layer Services, Multiplexing and Demultiplexing, Connectionless Transport: UDP, Principles of Reliable Data Transfer, Connection-Oriented Transport: TCP, Principles of Congestion Control, TCP Congestion Control

UNIT III

12 Hrs

The Network Layer: Introduction, Virtual Circuit and Datagram Networks, What's Inside a Router?, The Internet Protocol (IP): Forwarding and Addressing in the Internet, Routing Algorithms, Routing in the Internet, Broadcast and Multicast Routing

UNIT IV

12 Hrs

The Link Layer and Local Area Networks: Link Layer: Introduction and Services, Error-Detection and -Correction Techniques, Multiple Access Protocols, Link-Layer Addressing, Ethernet, Interconnections: Hubs and Switches, PPP: The Point-to-Point Protocol, Link Virtualization: A Network as a Link Layer

Wireless : Introduction, Wireless Links and Network Characteristics, Wi-Fi: 802.11 Wireless LANs

Text Books

1. James F Kurose, Keith W Ross,2005, “Computer Networking A Top Down Approach Featuring the Internet”, 3rd edition, Pearson Education
2. William Stallings, 2007, “ Data and Computer Communications”, 8th Edition, PHI (EEE)

Reference Books

1. Douglas E Coomer, 2004 “ Computer Networks and Internets with Internet Applications”, 4th edition Pearson Education
2. Larry L Peterson and Bruce S Davie, 2007, “ Computer Netwprks- A Systems Approach”, 4th edition, Elsevier Inc
3. Behrouz a Fourouzan, 2007, “Data Communications and Networking”, 4th edition TMH

Note: The Evaluation is to be done with 50% weightage to CIE and 50% weightage to SEE. The CIE for 50 marks will be evaluated with the following components

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2. Lab Assignments for 15 marks
3. Theory assignment for 5 marks

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A **term paper** is a research paper written by [students](#) over an [academic term](#) or semester which accounts for a large amount of a grade and makes up much of the course. Term papers are generally intended to describe an event or concept or argue a point. There is much overlap between the terms "research paper" and "term paper". The phrase "term paper" was originally used to describe a paper (usually a research based paper) that was due at the end of the "term" - either a semester or quarter, depending on which unit of measure a school used. However, the term has fallen out of favor. Common usage has "term paper" and "research paper" as interchangeable, but this is not completely accurate. Not all term papers involve academic research, and not all research papers are term papers.

ELECTIVE COURSES

PCS002E COMPUTER GRAPHICS AND VISUALIZATION 04Credits

Total Hours: 48

UNIT I

12 Hrs

Introduction: Application of computer graphics, Elements of pictures created in computer graphics, graphics display devices, Basic raster graphics algorithms for drawing 2D primitives: Midpoint line & circle drawing algorithm, scan-line polygon filling algorithm, antialiasing, 2D geometric transformations: Basic transformations,

UNIT II

12 Hrs

2D transformation matrix representations and homogeneous coordinates, composite transformations, window-to-view port coordinate transformation, clipping operations- Cohen Sutherland line clipping, Sutherland-Hogeman polygon clipping, 3D object representations: polygon surfaces, curved lines and surfaces, quadric surfaces, spline representations, Bezier curves and surfaces, B-spline curves and surfaces

UNIT III

12 Hrs

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. INPUT AND INTERACTION: Interaction; Input devices; Clients and servers; Display lists; Display lists and modeling; Programming event-driven input; Menus; A simple CAD program; Building interactive models; Animating interactive programs; Design of interactive programs; Logic operations.

UNIT IV

12 Hrs

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;
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.

TEXT BOOKS:

1. Computer Graphics - OpenGL Version – Donald Hearn and Pauline Baker, 2nd Edition, Pearson Education, 2003
2. Interactive Computer Graphics A Top-Down Approach with OpenGL -Edward Angel, 5th Edition, Addison-Wesley, 2008.

REFERENCE BOOKS:

1. Computer Graphics – James D Foley, Andries Van Dam, Steven K Feiner, John F Hughes, Addison-wesley 1997.
2. Computer Graphics Using OpenGL – F.S. Hill,Jr. 2nd Edition, Pearson Education, 2001.

UNIT I

12 Hrs

Introduction; Background, what is digital image processing, background on MATLAB and image processing Toolbox, Areas of image processing, MATLAB working environment. **Digital Image representation;** Reading, displaying and writing images, data classes, image types, converting between data classes and image types, array indexing, some important standard arrays, introduction to M-function programming.

Intensity transformations and spatial filtering; background, intensity transformation functions, histogram processing and function plotting, spatial filtering, image processing toolbox standard spatial filters.

UNIT II

12 Hrs

Frequency domain filtering; 2-D DFT, computing DFT in matlab, filtering in the frequency domain, obtaining frequency domain filters from spatial filters, generating filters directly in the frequency domain.

Image restoration; a model of the image degradation/restoration process, noise models, restoration in the presence of noise only spatial filtering, modeling the degradation function, direct inverse filtering, weiner filtering, constrained least squares filtering. **Color image processing;** color image representation in MATLAB, converting to other color spaces, basics of color image processing, color transformations, spatial filtering of color images, working directly in RGB vector space.

UNIT III

12 Hrs

Wavelets; Background, fast wavelet transform, working with wavelet decomposition structures, the inverse fast wavelet transform, wavelets in image processing. **Image processing;** background, coding redundancy, interpixel redundancy, psychovisual redundancy, JPEG compression. **Morphological image processing;** preliminaries, dilation and erosion, combining dilation and erosion, labeling connected components, morphological reconstruction.

UNIT IV

12 Hrs

Image segmentation; point, line and edge detection, line detection using the Hough transform, thresholding, region based segmentation, segmentation using watershed transform. **Representation and Description;** Background, Representation, boundary description, regional descriptors. **Object recognition;** background, computing distance measures in MATLAB, recognition based on decision theoretic methods, structural recognition.

Text book:

1. Rafael C. Gonzalez, Richard E. wooda et al., *Digital Image Processing Using MATLAB*, Pearson Education Publisher, 2007.

Reference books:

1. Anil K Jain, "Fundamentals of Digital Image Processing", Pearson Education/Prentice-Hall of India Pvt. Ltd., 1997.
2. B.Chanda, D Dutta Majumder, "Digital Image Processing and Analysis", Prentice-Hall, India, 2002.

Total Hours: 48

UNIT I

12 Hrs

Introduction: Why object orientation, History and development of Object Oriented Programming language, concepts of object oriented programming language. Object oriented analysis. Usecase diagram; Major and minor elements, Object, Class.

UNIT II

12 Hrs

Object oriented design: Relationships among objects, aggregation, links, relationships among classes- association, aggregation, using, instantiation, meta-class, grouping constructs.

UNIT III

12 Hrs

Basic concepts of object oriented programming using Java Object, class, message passing, encapsulation, polymorphism, aggregation, threading, applet programming, difference between OOP and other conventional programming-advantages and disadvantages.

UNIT IV

12 Hrs

Fundamentals of Object Oriented design in UML Static and dynamic models, why modeling, UML diagrams: Class diagram, interaction diagram: collaboration diagram, sequence diagram, statechart diagram, activity diagram, implementation diagram, UML extensibility- model constraints and comments, Note, Stereotype.

Text Books:

1. Grady Booch: Object Oriented Systems Development”, Ali Bahrami, - “Object – Oriented System Development” - Mc Graw Hill.
2. Rambaugh, James Michael, Blaha - “Object Oriented Modelling and Design” – PHI
3. Bruce, Foundations of Object Oriented Languages, PHI
4. Patrick Naughton, Herbert Schildt – “The complete reference-Java2” - TMH
5. Priestley – “Practical Object Oriented Design using UML” - TMH
6. Jana, C++ & Object Oriented Programming,
7. Alhir, learning UML, SPD/O’Reily

Reference Books:

1. Roff: UML: A Beginner’s Guide TMH
2. Rajaram: Object Oriented Programming and C++, New Age International
3. Mahapatra: Introduction to System Dynamic Modelling, Universities Press
4. Muller : Instant UML, Shroff Publishers / Wrox
5. Srimathi, Object Oriented Analysis & Design Using UML, Scitech
6. Alhir : UML in a Nutshell, Shroff Publishers / O’reilly
7. Olshevsky : Revolutionary guide to Object Oriented Programming using C++, Shroff / Wrox

UNIT I

12 Hrs

The Discrete Fourier Transform: Its Properties and Applications: Frequency Domain Sampling: The Discrete Fourier Transform: Frequency Domain Sampling and Reconstruction of Discrete-Time Signals, The Discrete Fourier Transform (DFT), The DFT as a Linear Transformation, Relationship of the DFT to other Transforms. Properties of the DFT: Periodicity, Linearity and Symmetry Properties, Multiplication of Two DFT's and Circular Convolution; Additional DFT Properties. Linear Filtering Methods Based on the DFT: Use of the DFT in Linear Filtering, Filtering of Long Data Sequences. Frequency Analysis of Signals using the DFT.

UNIT II

12 Hrs

Efficient Computation of the DFT: Fast Fourier Transform Algorithms: Efficient Computation of the DFT: FFT Algorithms: Direct Computation of the DFT, Divide-and-Conquer Approach to Computation of the DFT, Radix-2 FFT Algorithms, Radix-4 FFT Algorithms, Split-Radix FFT Algorithms, Implementation of FFT Algorithms. Applications of FFT Algorithms: Efficient computation of the DFT of Two Real Sequences, Efficient computation of the DFT of a $2N$ -Point Real Sequence, Use of the FFT Algorithm in Linear filtering and Correlation. A Linear filtering approach to Computation of the DFT: The Goertzel Algorithm.

UNIT III

12 Hrs

Implementation of Discrete- Time Systems: Structures for the Realization of Discrete-Time Systems. Structures for FIR Systems: Direct-Form Structures, Cascade-Form Structures, Frequency-Sampling Structures, and Lattice Structure. Structures for IIR Systems: Direct-Form Structures, Signal Flow Graphs and Transposed Structures, Cascade-Form Structures, Parallel-Form Structures, Lattice and Lattice-Ladder Structures for IIR Systems. State-Space System Analysis and Structures: State-Space Descriptions of Systems Characterized by Difference Equations, Solution of the State Space Equations, Relationships between Input-Output and State-Space Descriptions.

UNIT IV

12 Hrs

Design of Digital Filters :General Considerations: Causality and its Implications, Characteristics of Practical Frequency-Selective Filters. Design of FIR Filters: Symmetric And Antisymmetric FIR Filters, Design of Linear-Phase FIR Filters Using Windows, Design of Linear-Phase FIR Filters by the Frequency-Sampling Method, Design of Optimum Equiripple Linear-Phase FIR Filters, Design of FIR Differentiators, Design of Hilbert Transformers, Comparison of Design Methods for Linear-Phase FIR filters.

TEXT BOOKS:

1. John G. Proakis and Dimitris G. Manolakis , Digital Signal Processing, Pearson Education/PHI, Third Edition 2003.

REFERENCE BOOKS:

1. Paulo S. R. Diniz, Eduardo A. B. da Silva And Sergio L. Netto, Digital Signal Processing: System Analysis and Design, Cambridge University Press, 2002.

2. Sanjit K.Mitra , Digital Signal Processing: A Computer Based Approach, Tata McGraw-Hill Edition 2001.

3. Alan V.Oppenheim and Ronald W.Schafer, Digital Signal Processing, Pearson education/PHI, 2003

Total Hours: 48**UNIT I****12 Hrs**

Introduction, What Is Machine Learning?, Examples of Machine Learning Applications

Supervised Learning

Learning a Class from Examples Vapnik-Chervonenkis (VC) Dimension, Probably Approximately Correct (PAC) Learning, Noise, Learning Multiple Classes, Regression, Model Selection and Generalization, Dimensions of a Supervised Machine Learning Algorithm

Bayesian Decision Theory

Introduction, Classification, Losses and Risks, Discriminant Functions, Utility Theory, Value of information, Bayesian Networks, Influence Diagrams, Association Rules

UNIT II**12 Hrs****Parametric Methods**

Introduction, Maximum Likelihood Estimation, Evaluating an Estimator: Bias and Variance, The Bayes' Estimator, Parametric Classification, Regression, Tuning Model Complexity: Bias-Variance Dilemma, Model Selection Procedures

Multivariate Methods

Multivariate Data, Parameter Estimation, Estimation of Missing Values, Multivariate Normal Distribution, Multivariate Classification, Tuning Complexity, Discrete Features, Multivariate Regression

Dimensionality Reduction

Introduction, Subset Selection, Principal Components Analysis, Factor Analysis, Multidimensional Scaling, Linear Discriminant Analysis

UNIT III**12 Hrs****Clustering**

Introduction, Mixture Densities, k-Means Clustering, Expectation-Maximization Algorithm, Mixtures of Latent Variable Models, Supervised Learning after Clustering, Hierarchical Clustering, Choosing the Number of Clusters

Nonparametric Methods

Introduction, Nonparametric Density Estimation. Generalization to Multivariate Data Nonparametric Classification, Condensed Nearest Neighbor, Nonparametric Regression: Smoothing Models, How to Choose the Smoothing Parameter

Decision Trees

Introduction, Univariate Trees, Pruning, Rule Extraction from Trees, Learning Rules from Data, Multivariate Trees

UNIT IV**12 Hrs****Linear Discrimination**

Introduction, Generalizing the Linear Model, Geometry of the Linear Discriminant, Two Classes, Multiple Classes, Pairwise Separation, Parametric Discrimination Revisited, Gradient Descent, Logistic Discrimination, Discrimination by Regression, Support vector machines

Combining Multiple Learners

Rationale, Voting, Error-Correcting Output Codes, Bagging, Boosting, Mixture of Experts Revisited, Stacked Generalization, Cascading

Reinforcement Learning

Introduction, Single State Case: K-Armed Bandit, Elements of Reinforcement Learning, Model-Based Learning, Temporal Difference Learning, Generalization, Partially Observable States

Text Book:

1. Ethem Alpaydin, 2004, 'Introduction to machine Learning', PHI

Reference Book:

1. Tom M Mitchell, 1996, Machine Learning McGraw Hill Publications

Total Hours: 48

UNIT I

12 Hrs

Characterization of Distributed Systems and System Models: Introduction, Examples of distributed systems, Resource sharing and the Web, Challenges, Architectural models, Fundamental models. Networking and Internetworking: Types of Networks, Networks principles, Internet protocols, Network case Studies (Ethernet, wireless LAN and ATM). Interprocess Communication: Introduction, The API for the Internet protocols, External data representation and marshalling, Client-Server communication, Group communication

UNIT II

12 Hrs

Distributed Objects and Remote Invocation : Communication between distributed objects, Remote procedure call, events and notifications, JAVA RMI case study. Operating System Support and Security: The Operating system layer, protection, processes and threads, communication and invocation , operating system architecture, overview of security techniques, cryptographic algorithms, digital signatures, cryptography pragmatics, case studies: Needham-Schroeder, Kerberos, SSL and Millicent.

UNIT III

12 Hrs

Distributed File Systems : File service architecture, Sun Network file system, Andrew file system, Recent advances. Transactions and Concurrency Control : Transactions, nested transactions, locks, optimistic concurrency control, timestamp ordering, comparison of methods for concurrency control.

UNIT IV

12 Hrs

Distributed Transactions :Flat and nested distributed transactions, atomic commit protocols, concurrency control in distributed transactions, distributed deadlocks, transaction recovery. Distributed Shared Memory:Design and Implementation issues, sequential consistency and Ivy, Release consistency and Munin, other consistency models
CASE Studies: COBRA , Mach

TEXT BOOK:

1. George Coulouris, Jean Dollimore, Tim Kindberg: “Distributed Systems, Concept and Design”, 3rd edition, Pearson Education, 2005.

Reference:

1. Andrew S. Tanenbaum & Marten van Steen, Distributed Systems – Principles and Paradigms, PHI, 2002.

Total Hours: 48

UNIT – I

12 Hrs

INTRODUCTION, DATA – 1: What is Data Mining? Motivating Challenges; The origins of data mining; Data Mining Tasks. Types of Data; Data Quality.

DATA – 2: Data Preprocessing; Measures of Similarity and Dissimilarity

UNIT – II

12 Hrs

CLASSIFICATION: Preliminaries; General approach to solving a classification problem; Decision tree induction; Rule-based classifier; Nearest-neighbor classifier.

ASSOCIATION ANALYSIS – 1: Problem Definition; Frequent Itemset generation; Rule Generation; Compact representation of frequent itemsets; Alternative methods for generating frequent itemsets.

UNIT – III

12 Hrs

ASSOCIATION ANALYSIS – 2: FP-Growth algorithm, Evaluation of association patterns; Effect of skewed support distribution; Sequential patterns.

CLUSTER ANALYSIS: Overview, K-means, Agglomerative hierarchical clustering, DBSCAN, Overview of Cluster Evaluation.

UNIT – IV

12 Hrs

FURTHER TOPICS IN DATA MINING: Multidimensional analysis and descriptive mining of complex data objects; Spatial data mining; Multimedia data mining; Text mining; Mining the WWW. Outlier analysis.

APPLICATIONS: Data mining applications; Data mining system products and research prototypes; Additional themes on Data mining; Social impact of Data mining; Trends in Data mining.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. K.P.Soman, Shyam Diwakar, V.Ajay, **Insight into Data Mining – Theory and Practice** , PHI publishers, 2006.

PCS009E CRYPTOGRAPHY AND NETWORK SECURITY 04 Credits

Total Hours: 48

UNIT I

12 Hrs

Symmetric Ciphers: Overview: Services, Mechanisms and Attacks, The OSI Security Architecture, A Model of Network Security. Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Rotor Machines, Steganography. Block Cipher and the Data Encryption Standard: Simplified DES, Block Cipher Principles.

UNIT II

12 Hrs

The Data Encryption Standard, The Strength of DES, Differential and Linear Cryptanalysis. Symmetric Ciphers: Triple DES, Blowfish. Confidentiality Using Conventional Encryption: Placement of Encryption Function, Traffic Confidentiality, Key Distribution, Random Number Generation.

Public-Key Encryption, Digital signatures and Authentication Protocols: Number Theory: Prime Numbers, Fermat's and Euler's Theorems, Testing for Primality. Public-Key Cryptography and RSA: Principles of Public Key Cryptosystems, The RSA Algorithm, Key Management, Diffie Hellman Key Exchange.

UNIT III

12 Hrs

Message Authentication: Authentication Requirements, Authentication Functions, Message Authentication Codes, MD5 Message Digest Algorithm. Digital Signatures and Authentication Protocols: Digital Signatures, Authentication Protocols, Digital Signature Standard.

Network Security: Authentication Applications: Kerberos, X.509 Directory Authentication Service. Electronic Mail Security: Pretty Good Privacy.

UNIT IV

12 Hrs

IP Security: Overview, IP Security Architecture, Authentication Header, Encapsulation Security Payload. Web Security: Web Security Requirements, Secure Sockets Layer and Transport Layer Security, Secure Electronic Transaction.

Text book

1. William Stallings, Cryptography and Network Security

Total Hours: 48

UNIT I

12 Hrs

Introduction: Machine Perception, Pattern Recognition systems, Design cycle, learning and adaptation. **Bayesian Decision Theory** :Introduction, bayesian Decision theory - continuous features, classifiers, discriminant functions, and decision surfaces, normal density and discriminant functions, Bayes decision theory - discrete features

Maximum likelihood and Bayesian parameter estimation:

Introduction, maximum likelihood estimation, Bayesian Estimation, Bayesian parameter estimation, problem of dimensionality, sufficient and exponential family, complex analysis & discriminants.

UNIT II

12 Hrs

Nonparametric Techniques:

Introduction, Density Estimation, Parzen Windows, k_n -nearest neighbour estimation, nearest neighbor rule, metrics and nearest-neighbor classification, fuzzy classification, reduced coulomb energy, approximations by series expansions

Linear discriminant functions

Introduction, linear discriminant functions, generalized linear discriminant functions,

UNIT III

12 Hrs

minimizing the Perceptron criterion function, relaxation procedures, nonseparable behaviours, minimum squared-error procedures, Ho- Kashyap procedures

Unsupervised learning and clustering: Mixture densities and identifiability, maximum-likelihood estimates, application to normal mixtures, unsupervised Bayesian learning, data decryption and clustering.

UNIT IV

12 Hrs

criterion functions and clustering, hierarchical clustering, on-line clustering. Component analysis, low-dimensional representations and multidimensional scaling. Syntactic **pattern Recognition**. Overview, qualifying structure in pattern description and recognition, grammar based approach, elements of formal grammar. **Neural' Patter Recognition:** Learning Grammars, Problem formulation, grammatical Interference approach, procedures to generate constrained grammars.

Text Books:

1. Richard O. Duda, Peter E. Hart and David G Stork, Pattern Classification, John Wiley & Sons, Inc.2nd Ed. 2001.
2. Robert Schalkoff, Pattern Recognition: Statistical, Structural and Neural Approaches, John Wiley & Sons, Inc.1992. Chapters: 3 and 9.

Total Hours: 48

UNIT I

12 Hrs

Introduction to Multi-Core Architecture: Motivation for Concurrency in Software, Parallel Computing Platforms , Parallel Computing in microprocessors, Differentiating Multi-Core Architectures from Hyper-Threading Technology, Multi-threading on Single-Core versus Multi-Core Platforms. **System Overview of Threading :** System View of Threads, Threading above the Operating System, Threads inside the OS, Threads inside the Hardware, Application Programming Models and Threading, Virtual Environment: VMs and Platforms, Runtime Virtualization, Multi-Core Programming, System Virtualization.

UNIT II

12 Hrs

Fundamental Concepts of Parallel Programming: Designing for Threads, Task Decomposition, Data Decomposition, Data Flow Decomposition, Implications of Different Decompositions, Challenges You'll Face, Parallel Programming Patterns, A Motivating Problem: Error Diffusion, Analysis of the Error Diffusion Algorithm, An Alternate Approach: Parallel Error Diffusion 48
Other Alternatives.

Threading and Parallel Programming Constructs : Synchronization, Critical Sections, Deadlock , Synchronization Primitives, Semaphores, Locks, Condition Variables, Messages, Flow Control-based Concepts , Fence, Barrier, Implementation-dependent Threading Features.

UNIT III

12 Hrs

Threading APIs: Threading APIs for Microsoft Windows , Win32/MFC Thread APIs, Threading APIs for Microsoft .NET Framework Creating Threads, Managing Threads, Thread Pools, Thread Synchronization, POSIX Threads, Creating Threads, Managing Threads, Thread Synchronization, Signaling, Compilation and Linking.

OpenMP†: A Portable Solution for Threading : Challenges in Threading a Loop, Loop-carried Dependence, Data-race Conditions, Managing Shared and Private Data, Loop Scheduling and Portioning, Effective Use of Reductions, Minimizing Threading Overhead, Work-sharing Sections, Performance-oriented Programming, Using Barrier and Nowait, Interleaving Single-thread and Multi-thread Execution, Data Copy-in and Copy-out, Protecting Updates of Shared Variables, Intel Taskqueuing Extension to OpenMP, OpenMP Library Functions
OpenMP Environment Variables, Compilation, Debugging, Performance analysis.

UNIT IV

12 Hrs

Multi-threaded Debugging Techniques: General Debug Techniques, Designing with Debugging in Mind , Debugging Multi-threaded Applications in Windows, Threads Window , Tracepoints, Breakpoint Filters, Naming Threads, Putting it All Together, Multi-threaded Debugging Using GDB, Notification on Thread Creation. **Single-Core Processor Fundamentals:** Processor Architecture Fundamentals
Comparing Superscalar and EPIC Architecture,

Threading on Intel® Multi-Core Processors : Hardware-based Threading

Threading from Intel , Hyper-Threading Technology, Difference between Multiprocessor and Hyper-Threading Technology, Hyper-Threading Technology Architecture, Multi-Core Processors Architectural Details, Comparison between Multiprocessors and Multi-Core Processors, Multi-Core for Itanium® Architecture, Multiple Processor Interaction , Inter-Processor Power Consumption, Power Metrics, Reducing Power Consumption , Beyond Multi-Core Processor Architecture

Text Books

1. Shameem Akhter and Jason Roberts '**Multi-Core Programming: Increasing Performance through Software Multithreading**, INTEL PRESS

UNIT I

12 Hrs

Introduction Learning and Soft computing, Examples of applications in diverse fields, Basic tools of Soft computing – Neural Networks and Fuzzy logic systems. What is a Neural Network?, Human Brain, Models of Neuron, Neural Networks viewed as directed graphs, Feedback, Network Architectures, Knowledge representation, Artificial Intelligence and Neural Networks. **Learning Processes** : Introduction, Error-correction learning, Memory-based learning, supervised and unsupervised learning processes

UNIT II

12 Hrs

Single Layer Perceptrons Introduction, Adaptive filtering problem, Unconstrained optimization techniques, Linear least-squares filters, Least-mean square algorithm, Learning curves, Learning rate annealing techniques, Perceptron, Perceptron convergence theorem, Relation between the Perceptron and Bayes classifier for a Gaussian environment. **Multilayer Perceptrons** Introduction, Some preliminaries, Back-propagation Algorithm, Summary of back-propagation algorithm, XOR problem

UNIT III

12 Hrs

Introduction to Fuzzy logic : Background, Uncertainty and Imprecision, Statistics and Random Information, Fuzzy Sets and Membership, Processes, Uncertainty in Chance versus Ambiguity. **Classical Sets and Fuzzy Sets**: 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 Hypercubes. **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, Compositional operators, fuzzy inference.

UNIT IV

12 Hrs

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

TEXT BOOKS:

1. "Neural Networks- A Comprehensive Foundation" by Simon Haykin, 2nd Edition, Pearson Education,
2. Artificial Neural Networks by Kishan Mehrotra, Chilkuri K. Mohan, Sanjay Ranka, Penram International Publishing
3. Timothy J. Ross, "Fuzzy Logic with Engineering Applications", McGrawHill, 1997.

REFERENCE BOOKS:

1. Introduction to Artificial Neural Systems by Jacck M. Zurada, Jaico Publishing
2. Artificial Neural Networks by B. Yegnanarayana, PHI, 2001.
3. B Kosko. Neural Networks and Fuzzy' systems: A Dynamical System approach, Prentice Hall 1991.

Total Hours: 48

UNIT I

12 Hrs

Introduction; What we are trying to do and why it is so difficult, image representations and nomenclature, relationship of image processing and computer vision to 2-D, relationship to human visual system. **A geometrical model for imaging and some applications;** The perspective projective transform, stereo vision, Image plane- Image plane transformations, applications, radiometric image formation.

UNIT II

12 Hrs

Image grey level and early processing fundamentals; Introduction, basic linear system and discrete transform concepts, convolution, correlation and related operations, discrete versions of convolution and correlation, sampling.

UNIT III

12 Hrs

Image grey level modeling and processing fundamentals; introduction, operators and models for enhancement and restoration, conversion of grey level to binary images, image compression and encoding techniques, projections and reconstructions.

UNIT IV

12 Hrs

Image motion; introduction, elementary approaches to image motion features extraction, optical flow formulations and ramifications, 3-D to 2-D motion models and estimation approaches. **Image analysis;** introduction, statistical pattern recognition, segmentation, syntactic pattern recognition, low level or early description.

Text book:

1. Robert J. Schalkoff, *Digital image processing and Computer vision*, John wiley publishers, 1989.

Reference books:

I. D. Forsyth and J. Ponce, Computer Vision - A modern approach, Prentice Hall
Robot Vision, by B. K. P. Horn, McGraw-Hill.

PCS019E SYSTEM SOFTWARE AND COMPILER DESIGN 04Credits

Total Hours: 48

UNIT – I

12 Hrs

MACHINE ARCHITECTURE: Introduction, System Software and Machine Architecture, Simplified Instructional Computer (SIC) - SICMachine Architecture, SIC/XE Machine Architecture.

ASSEMBLERS : Basic Assembler Function - A Simple SIC Assembler, Assembler Algorithm and Data Structures, Machine Dependent Assembler Features - Instruction Formats & Addressing Modes, Program Relocation. Machine Independent Assembler Features – Literals, Symbol-Definition Statements, Program Blocks, Control Sections and Programming Linking, Assembler Design Operations - One-Pass Assembler, Multi-Pass Assembler.

UNIT – II

12 Hrs

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.

MACRO PROCESSOR: Basic Macro Processor 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.

UNIT – III

12 Hrs

Compilers: Basic compiler functions-grammars, lexical analysis, syntactic analysis, code generation, machine dependent compiler features- intermediate form of the program, machine dependent code optimization,, machine independent compiler features- structured variables, machine independent code optimization, storage allocation, block structured languages, compiler design options- Division into passes, interpreters, P-code compilers, Compilers-Compilers.

UNIT – IV

12 Hrs

Lex And Yacc: 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 Y ACC, LEX and Hand- Written Lexers, Using LEX - Regular Expression, Examples of Regular Expressions, A Word Counting Program, Parsing a Command Line, Using Y ACC - 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.

TEXT BOOKS:

1. Leland.L.Beck, System Software, 3rd Edition, Addison-Wesley.

2. John.R.Levine, Tony Mason and Doug Brown, Lex and Yacc, O'Reilly, SPD.

Total Hours: 48

UNIT I

12 Hrs

Introduction

Meeting people's quality expectations, Software Quality: Perspective and Expectations, Quality frameworks and ISO, Correctness and defects, Historical perspective of Quality, Classification: Quality Assurance as dealing with defects, Defect prevention, Defect reduction, Defect Containment.

QA in Context and Quality Engineering

Handling discovered defects during QA activities, QA Activates in Software Processes, Verification and Validation Perspectives, Reconciling the Two Views. Quality Engineering: Activities and Process, Quality Planning: Goal Setting and Strategy Formation, Quality Assessment and Improvement, Quality Engineering in Software Processes.

UNIT II

12 Hrs

Testing Concepts, Issues and Techniques

Purpose, Activities, Processes and Context, Questions about Testing, Functional vs Structural Testing, Coverage - based vs Usage - based Testing.

Test Activities, Management, and Automation

Test Planning and Preparation, Test Execution, Result Checking, and Measurement, Analysis and Follow-up, Activates, People, and Management, Test Automation

Coverage and Usage Testing Based on Checklists and Partitions

Checklist-Based Testing and its Limitations, Testing for partition Coverage, Usage-Based Statistical Testing with Musa's Operational Profiles, Constructing Operational Profiles, A case study.

UNIT III

12 Hrs

Input Domain Partitioning and Boundary Testing

Input Domain Partitioning and Testing, ISimple domain analysis and the Extreme Point Combination Strategy, Testing strategies based on boundary analysis, Other Boundary Test Strategies and Applications.

Coverage and Usage Testing Based On Finite-State Machines and Markov Chains

Finite-State machines and testing, FSM testing: State and transition coverage, A Case study, Markov chains and unified Markov models for testing, Using UMMs for Usage-Based statistical testing, Case study continued.

Control Flow, Data Dependency, and Interaction Testing

Basic Control Flow Testing, Loop Testing, CFT Usage, and Other Issues, Data Dependency and Data flow Testing, DFT: Coverage and Applications.

UNIT IV

12 Hrs

Testing Techniques: Adaptation, Specialization and Integration

Testing Sub-Phases and Applicable Testing Techniques, Specialized Test Tasks and Techniques, Test Integration, Case Study: Hierarchical Web Testing

Defect Prevention and Process Improvement

Basic concepts and Generic Approaches, Root cause Analysis for Defect Prevention, Education and training for defect prevention, Other Techniques for Defect Prevention, Focusing on Software Processes.

Software Inspection

Basic concepts and Generic Process, Fagan inspection, Other Inspections and Related Activities, Defect Detection Techniques, Tool / Process Support, and Effectiveness.

Formal Verification

Basic Concepts: Formal Verification and Formal Specification, Formal Verification: Axiomatic Approach, Other approaches, Application, effectiveness and integration issues.

TEXT BOOKS:

1. Jeff Tian: “**Software Quality Engineering: Testing, Quality Assurance, and Quantifiable Improvement**”, John Wiley and Sons Inc., 2005

REFERENCE BOOKS:

1. Stephan H. Kan: “**Metrics and Models in Software Quality Engineering**”, 2nd Edition, Pearson Education, 2003.

Total Hours: 48

UNIT I

12 Hrs

Past, Present, future: The vine and fig tree dream, pervasive computing, pervasive computing market, m-bussiness, conclusions and challenges. **Application Examples:** Retail, Airline check-in and booking, sales for automation, Healthcare, Tracking, Car Information systems, Email access via WAP and voice. **Device Technology:** Hardware, Human machine interfaces, biometrics, operating systems, Java for pervasive devices.

UNIT II

12 Hrs

Device Connectivity: Protocols, security, Device management. **Web application concepts:** History of world wide web, world wide web architecture, protocols, transcoding, client authentication via the internet.

UNIT III

12 Hrs

WAP and beyond: Introduction, components of the WAP architecture, WAP infrastructure, WAP security issues, wireless markup language, WAP push, products, i-Mode, outlook. **Voice technology:** basics of speech recognition, voice standards, speech applications, speech and pervasive computing, security. **Personal digital assistants:** History, device categories, personal digital assistant operating systems, device characteristics, software components, standards, mobile applications, personal digital assistant browsers.

UNIT IV

12 Hrs

Pervasive web application architecture: Background, scalability and availability, development of pervasive computing web applications, pervasive application architecture. **Example application:** introduction, user interface overview, architecture, implementation. **Access from PCs:** smart card based authentication via the internet, ordering goods. **Access via WAP:** WAP functionality, implementation.

TEXT BOOKS:

1. Jochen Burkhardt et al , “Pervasive Computing: Technology and architecture of mobile internet applications”, Pearson education, 2006.

PCS022E DATABASE MANAGEMENT SYSTEMS. 04 CREDITS

Total Hours: 48

UNIT – I

12 Hrs

Introductory Concepts: Database and information systems, Database Management system architecture. Semantic Database Design: Conceptual modeling, ER modeling, EER model. Relational model: Relational data model and relational database constraints.

UNIT – II

12 Hrs

Relational Model: Relational algebra, Relational Database Design by ER model and EER Model.
SQL99: Schema definition, constraints, queries and views.
Database Design: Functional dependencies and normalization for relational databases,

UNIT – III

12 Hrs

Database design algorithms, further dependencies. Query optimization. OO Relational DBMS concepts: Concepts for object data bases, object database standards, languages and design.

UNIT – IV

12 Hrs

Transaction Processing: transaction processing concepts, Concurrency control techniques, Database recovery. Database security. Distributed database concepts.

REFERENCE BOOKS:

1. Rameez Elmashri, Shamakant B Navathe, 'Fundamentals of Database Systems', Fifth Edition, Pearson Education.
2. C.J Date, 'An Introduction to Database Systems', Sixth Edition, Addison-Wesley.
3. Raghuram Ramakrishna, Gehrke, 'Database Management Systems', Mc. Graw-Hill, Fifth edition.
4. Peter Rob, Carlos Coronel, 'Database Systems: Design, Implementation & Management, Fourth Edition, Thomson Publications.
5. Bipin C desai, 'Introduction to Database Systems', Galgotia, New Delhi.

Total Hours: 48

UNIT I

12 Hrs

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.

UNIT II

12 Hrs

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

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.

UNIT III

12 Hrs

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

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.

UNIT IV

12 Hrs

Software Components of SAN

The switch's Operating system; Device Drivers; Supporting the switch's components; Configuration options for SANs.

Management: Planning Business Continuity; Managing availability; Managing Serviceability; Capacity planning; Security considerations.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Richard Barker and Paul Massiglia: “**Storage Area Network Essentials A Complete Guide to understanding and Implementing SANs**”, John Wiley India, 2002

Total Hours: 48

UNIT-I

12 Hrs

Introduction: the data center, the grid and the distributed/high performance computing, cluster computing and grid computing, Metacomputing-the precursor of grid computing, scientific, business and e-governance grids, web services and grid computing, business computing and the grid-a potential win-win situation. **Technologies and architecture for grid computing:** clustering and grid computing, issues in data grids, key functional requirements in grid computing, standards for grid computing, recent technological trends in large data grids. **World wide grid computing activities and organizations and projects:** organizations developing grid computing toolkit, framework and middleware, grid projects and organizations building and using grid based solutions

UNIT-II

12 Hrs

Web services and the service oriented architecture: History and background, service oriented architecture, how a web service works, SOAP and WSDL, description, creating web services, server side. **Globus tool kit:** history of globus toolkit, version of globus tool kit, application of GT4-cases, GT4-approaches and benefits, infrastructure management, monitoring and discovery, security, data, choreography and coordination, main features of Gt4-functionality, GT4 architecture, GT4 containers. **The grid and the data bases :** issues in database integration with the grid, the requirement of grid enabled data base, storage request broker, how to integrate database with the grid?.

UNIT-III

12 Hrs

What is cluster computing?: approaches to parallel computing, how to achieve low cost parallel computing through clusters, definition and architecture of a cluster, what is the functionality a cluster can offer?, categories of clusters. **Cluster middleware an introduction,** levels and layers of single system image, cluster middleware design and objectives, resource management and scheduling, cluster programming environment and tools. **Networking, protocols & I/O for clusters:** networks and interconnection switching devices, design issues in interconnection networking /switching, design architecture-general principal and trade offs, HiPPI, ATM, myrinet, gigabit Ethernet.

Setting up and administering a cluster: how to set up a simple cluster?, design consideration for the front end of a cluster, setting up nodes, clusters of clusters, system monitoring, directory services inside the clusters, & DCE, global clock Sync, administering heterogeneous cluster.

UNIT IV

12 Hrs

Cluster technology for high availability: highly available clusters, high availability parallel computing, mission critical applications, types of errors and failures, cluster architecture and configurations for high availability, faults and error detection

Performance models and simulation: performance measures and metrics, profit effectiveness of parallel computing through clusters. **Process scheduling:** Job Management systems, resource management systems, queues, hosts, resources, jobs and policies, policies of resource utilization, scheduling policies. **Load sharing and load balancing:** Load sharing and load balancing, strategies for load balancing, modeling parameters, recent work.

Text book:

1. C.S.R Prabhu, "Grid and cluster computing", PHI publication, 2008.

Total Hours: 48

UNIT –I

12 Hrs

Introduction- Computational Demands of Modern Science, Advent of Practical Parallel Processing.

PRAM Algorithms- The PRAM Model of Parallel Computation, PRAM algorithms- Parallel Reduction, Prefix sums, List ranking, Preorder Tree Traversal, Merging Two sorted Lists, Graph Coloring.

Parallel Programming Languages- Programming Parallel Processes- An Illustrative example, A sample Application.

UNIT –II

12 Hrs

Matrix Multiplication - Algorithms for processor arrays – Matrix multiplication on The 2D – Mesh SIMD model and Shuffle-Exchange SIMD model, Algorithms for Multiprocessors, Algorithm for Multicomputers – Row- column Oriented Algorithms.

Solving Linear systems- Gaussian Elimination.

Sorting- Enumeration sort, Lower Bounds on Parallel Sorting, Odd-Even Transposition Sort, Quicksort-Based Algorithms – Parallel Quicksort, Hyperquicksort.

UNIT –III

12 Hrs

Dictionary Operations- Complexity of Parallel Search, Searching on Multiprocessors- Ellis's Algorithm, Manber and Ladner's Algorithm.

Graph Algorithms - Searching a Graph- P-Depth search, Breadth-Depth search, Breadth-First Search, Connected Components, All-Pairs Shortest Path, Single source shortest path.

UNIT –IV

12 Hrs

Combinatorial Search- Introduction, Divide and conquer, Parallel branch and Bound Algorithms- Multiprocessor algorithms, Multicomputers Algorithms, Introduction to Parallel Programming with MPI and OpenMP

Text Book:

1. Michael j Quinn, 'Parallel Computing - Theory and Practice', TMH 2002
2. Michael J. Quinn." [Parallel Programming in C with MPI and OpenMP](#)", McGraw Hill (2003), ISBN 0-07-282256-2

Reference Books

3. Gregory V. Wilson 'Practical Parallel Programming ' PHI 2001
4. Barry Wilkinson and Michael Allen. [Parallel Programming: Techniques and Applications Using Networked Workstations and Parallel Computers](#) (2nd Edition), Prentice Hall PTR (2005), ISBN 0-13-140563-2
5. A. Grama, A. Gupta, G. Karypis and V. Kumar.” [Introduction to Parallel Computing](#) “ (2nd edition), Addison Wesley (2002), ISBN 0-201-64865-2.
6. H. El-Rewini and T.G. Lewis. “ Distributed and Parallel Computing” Manning (1997), ISBN 0-13-795592-8.
7. I. Foster. “Designing and Building Parallel Programs”, Addison Wesley (1995), ISBN 0-201-57594-9.
8. Kai Hwang and Zhiwei Xu. Scalable Parallel Computing”, McGraw Hill (1998), ISBN 0-07-031798-

Total Hours: 48

UNIT – I

12 Hrs

INTRODUCTION, DATA – 1: What is Data Mining? Motivating Challenges; The origins of data mining; Data Mining Tasks. Types of Data; Data Quality.

DATA – 2: Data Preprocessing; Measures of Similarity and Dissimilarity

UNIT – II

12 Hrs

CLASSIFICATION: Preliminaries; General approach to solving a classification problem; Decision tree induction; Rule-based classifier; Nearest-neighbor classifier.

ASSOCIATION ANALYSIS – 1: Problem Definition; Frequent Itemset generation; Rule Generation; Compact representation of frequent itemsets; Alternative methods for generating frequent itemsets.

UNIT – III

12 Hrs

ASSOCIATION ANALYSIS – 2: FP-Growth algorithm, Evaluation of association patterns; Effect of skewed support distribution; Sequential patterns.

CLUSTER ANALYSIS: Overview, K-means, Agglomerative hierarchical clustering, DBSCAN, Overview of Cluster Evaluation.

UNIT – IV

12 Hrs

FURTHER TOPICS IN DATA MINING: Multidimensional analysis and descriptive mining of complex data objects; Spatial data mining; Multimedia data mining; Text mining; Mining the WWW. Outlier analysis.

APPLICATIONS: Data mining applications; Data mining system products and research prototypes; Additional themes on Data mining; Social impact of Data mining; Trends in Data mining.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. K.P.Soman, Shyam Diwakar, V.Ajay, **Insight into Data Mining – Theory and Practice**, PHI publishers, 2006.

Total Hours: 48

UNIT I

12 Hrs

INTRODUCTION : What is a Graph? , Application of Graphs, Finite and Infinite Graphs, Incidence and Degree, Isolated Vertex, Pendant Vertex, and Null Graph, Brief History of Graph Theory

PATHS AND CIRCUITS : Isomorphism, Subgraphs, A Puzzle With Multicolored Cubes Walks, Paths, and Circuits, Connected Graphs, Disconnected Graphs, and Components, Euler Graphs, Operations On Graphs, More on Euler Graphs, Hamiltonian Paths and Circuits, The Traveling Salesman Problem

TREES AND FUNDAMENTAL CIRCUITS : Trees, Some Properties of Trees, Pendant Vertices in a Tree, Distance and Centers in a Tree, Rooted and Binary Trees, On Counting Trees, Spanning Trees, Fundamental Circuits, Finding All Spanning Trees of a Graph, Spanning Trees in a Weighted Graph.

UNIT II

12 Hrs

CUT-SETS AND CUT-VERTICES : Cut-Sets, Some Properties of a Cut-Set, All Cut-Sets in a Graph, Fundamental Circuits and Cut-Sets, Connectivity and Separability, Network Flows, I-Isomorphism , Isomorphism

PLANAR AND DUAL GRAPHS : Combinatorial Vs. Geometric Graphs Planar, Graphs Kuratowski's Two Graphs, Different Representations of a Planar Graph, Detection of Planarity, Geometric Dual, Combinatorial Dual, More on Criteria of Planarity, Thickness and Crossings

MATRIX REPRESENTATION OF GRAPHS : Incidence Matrix, Submatrices of $A(G)$, Circuit Matrix, Fundamental Circuit Matrix and Rank of B , An Application to a Switching Network, Cut-Set Matrix, Relationships among A_f , B_f , and C_f , Path Matrix, Adjacency Matrix

UNIT III

12 Hrs

COLORING, COVERING, AND PARTITIONING : Chromatic Number, Chromatic Partitioning, Chromatic Polynomial, Matchings, Coverings, The Four Color Problem

DIRECTED GRAPHS : What Is a Directed Graph'?, Some Types of Digraphs, Digraphs and Binary Relations, Directed Paths and Connectedness, Euler Digraphs, Trees with Directed Edges, Fundamental Circuits in Digraphs, Matrices A, B, and C of Digraphs, Adjacency Matrix of a Digraph, Paired Comparisons and Tournaments, Acyclic Digraphs and Decyclization

UNIT IV

12 Hrs

NUMERATION OF GRAPHS : Types of Enumeration, Counting Labeled Trees , Counting Unlabeled Trees , Polya's Counting Theorem, Graph Enumeration With Polya's Theorem

GRAPH THEORETIC ALGORITHMS AND COMPUTER PROGRAMS : Algorithms, Input: Computer Representation of a Graph . The Output , Some Basic Algorithms, Algorithm 1: Connectedness and Components, Algorithm 2: A Spanning Tree, Algorithm 3: A Set of Fundamental Circuits, Algorithm 4: Cut-Vertices and Separability, Algorithm 5: Directed Circuits, Shortest-Path Algorithms, Algorithm 6: Shortest Path from a Specified Vertex to Another Specified Vertex, Algorithm 7: Shortest Path between All Pairs of Vertices Depth-First Search on a Graph, Algorithm 8: Planarity Testing, Algorithm 9: Isomorphism

Text Book

1. Narsing DEO, 2008, "GRAPH THEORY", Eastern Economy Edition,

References

1. Gary Chartrand, Ping Zhang, 2006 " Introduction to Graph Theory", Tata McGraw-Hilledition

Note: The Evaluation is to be done with 50% weightage to CIE and 50% weightage to SEE. The CIE for 50 marks will be evaluated with the following components

- iv. Two CIE tests for 15 marks each
- v. Lab Assignments for 15 marks
- vi. Theory assignment for 5 marks

The SEE will be evaluated by a term end exam of 100 marks, which will be reduced to a maximum of 50 marks.

Total Hous: 48

UNIT-I

12 Hrs

Introduction: Applications: Vehicles, Emergencies, Business, Replacement of wired networks, Infotainment and more, Location dependent services, Mobile and wireless devices; A short history of wireless communication, A market for mobile communications, Some open research topics; A simplified reference model. Wireless Transmission: Frequencies for radio transmission, Regulations; Signals, Antennas; Signal propagation, Path loss of radio signals, Additional signal propagation effects, Multipath propagation; Multiplexing: Space division multiplexing, Frequency division multiplexing, Time division multiplexing, Code division multiplexing; Modulation: Amplitude shift keying, Frequency shift keying, Phase shift keying, Advanced frequency shift keying, Advanced phase shift keying, Multicarrier modulation; Spread spectrum: Direct sequence spread spectrum, Frequency hopping spread spectrum; Cellular systems. Medium Access Control: Motivation for a specialized MAC: Hidden and exposed terminals, Near and far terminals, SDMA; FDMA; TDMA: Fixed TDM, Classical Aloha, Slotted Aloha, Carrier sense multiple access, Demand assigned multiple access, PRMA packet reservation multiple access, Reservation TDMA, Multiple access with collision avoidance, Polling, Inhibit sense multiple access, CDMA: Spread Aloha multiple access, Comparison of S/T/F /CDMA.

UNIT-II

12 Hrs

Telecommunications Systems: GSM, Mobile services, System architecture, Radio interface, Protocols Localization and calling, Handover, Security, New data services; DECT: System architecture, Protocol architecture; TETRA; UMTS and IMT-2000: UMTS releases and standardization, UMTS Systems Architecture, UMTS radio Interface, UTRAN, Core Network Handover. Satellite Systems: History; Applications; Basics: GEO, LEO, MEO, Routing Localization; Handover. Broadcast Systems: Overview; Cyclic repetition of data; Digital audio broadcasting: Multimedia object transfer protocol; Digital video broadcasting: DVB data broadcasting; DVB for Convergence of broadcasting and Mobile Communications.

UNIT-III

12 Hrs

Wireless LAN: Infrared vs. radio transmission; Infrastructure and ad hoc network; IEEE 802.11: System architecture, Protocol architecture, Physical layer, Medium access control layer, MAC management, 802.11 b, 802.11a, Newer developments; HIPERLAN: Historical: HIPERLAN 1, WATM, BRAN, HiperLAN2; Bluetooth: User scenarios, architecture, Radio Layer.

UNIT-IV

12 Hrs

Wireless LAN(continued):Base band Layer, Link manager protocol, L2CAP, Security, SDP, Profiles, IEEE 802.15.Mobile Network Layer: Mobile IP: Goals, assumptions, and requirements, Entities and terminology, IP packet delivery, Agent discovery, Registration, Tunneling and encapsulation, Optimizations, Reverse tunneling, IPv6, IP micro-mobility support; Dynamic host configuration protocol; Mobile Ad-hoc networks: Routing, Destination sequence distance vector, Dynamic source routing, Alternative metrics, Overview of Ad-Hoc routing protocols. Mobile Transport Layer: Traditional TCP: Congestion, control, Slow start, Fast retransmit/fast recovery, Implications on mobility; Classical TCP Improvements: Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission/time-out freezing, Selective retransmission, Transaction oriented TCP; TCP over 2.5/3G wireless networks.

TEXT BOOK:

1. Jochen Schiller, Mobile Communications, Pearson 2004.

(Chapters: 1.1 to 1.5, 2.1 to 2.8, 3.1 to 3.6, 4.1 to 4.4, 5.1 to 5.6, 6.1 to 6.5,7.1 to 7.5, 8.1 to 8.3, 9.1 to 9.3)

Total Hours: 48

UNIT –I

12 Hrs

Basic Real-Time Concepts:

Basic Computer Architecture-Bus Transfer Mechanism, Input and Output, Memory, CPU Operation; Some Terminology- Software Concepts, System Concepts, Real-Time Definitions, Events and Determinism, Synchronous and Asynchronous Events, Determinism, Time-Loading; Real-Time Design Issues; Example Real-Time Systems; Brief History-Software, Hardware.

Language Issues : Language features:parameter passing,recursion,dynamic allocation,typing,exception handling,abstract data typing,modularity

Real- Time Specification And Design Techniques

Natural Languages; Mathematical Specification; Flowcharts; Structure Charts; Pseudocode and Programming Design Languages; Finite State Automata; Data Flow Diagrams- DeMarco's Rules, Hatley and Pribhai's Extensions; Petri Nets; Warnier-Orr Notation- Indexed Loop; Statecharts- Depth, Orthogonality, Broadcast Communication; Sanity in Using Graphical Techniques.

UNIT –II

12 Hrs

Real- Time Kernels

Polled Loop System- Polled Loop with Interrupts; Phase/State- Driven Code; Coroutines; Interrupt-Driven Systems- Context Switching, Round-Robin Systems, Preemptive Priority Systems, Major and Minor Cycles, Hybrid Systems; Foreground/Background Systems- Background Processing, Initialization, Real- Time operation; Full-Featured Real Time Operating Systems- Task- Control Block Model; Build or Buy? POSIT.

Intertask Communication And Synchronization

Buffering Data- Time-Relative Buffering, Ring Buffers; Mailboxes Mailbox Implementation, Other Operations on Mailboxes, Queues; Critical Regions; Semaphores- Mailboxes and Semaphores, Counting

Semaphores, Problems with Semaphores, The Test- and- Set Instruction; Event Flags and Signals; Deadlock- Avoidance, Detect and Recover.

Real-Time Memory Management

Process Stack Management- Task-Control Block Model, Managing the Stack, Run-Time Ring Buffer, Maximum Stack Size, Multiple Stack Arrangements, Task-Control Block Model;

UNIT –III

12 Hrs

Real-Time Memory Management :contd :Dynamic Allocation-Swapping, Overlays, MFT, MVT, Demand Paging, Working Sets, Real Time Garbage Collection, Contiguous File Systems; Static Schemes.

System Performance Analysis And Optimization

Response-Time Calculation- Polled Loops, Coroutines / Phase- Driven Code, Interrupt Systems; Interrupt Latency- Propagation Delay, Macroinstruction Execution Times, Interrupts Disabled, Preemption, Low Priority Interrupts High; Time-Loading and Its Measurement Using a Logic Analyzer, Instruction Counting, Pictorial Representation, Instruction Execution Time Simulators, Deterministic Performance; Scheduling Is NP-Complete; Reducing Response Times and Time Loading- Compute at Slowest Cycle, Scaled Arithmetic, Binary Angular Measurement, Look-Up Tables, Basic Optimization Theory, Other Optimization Techniques, Combination Effects, Speculative Execution; Analysis of Memory Requirements- Memory-Mapped I/O and DMA Memory, Program Area, RAM Area, Stack Area, Memory Management Schemes; Reducing Memory-Loading- Variable Selection, Reuse Variables, Memory Fragmentation, Self-Modifying Code; I/O Performance.

QUEUING MODELS

Probability Functions- Continuous; Discrete; Basic Buffer Size Calculation- Handling Bursts of Data, Variable Buffer Size Calculation; Classical Queuing Theory- The M/M/1 Queue, Service and Production Rates, More Buffer Calculations, Response- Time Modeling, Other Queuing Models; Little's Law; Erlang's Formula.

UNIT –IV

12 Hrs

Reliability, Testing, And Fault Tolerance

"Faults, Failures, Bugs and Effects; Reliability- Formal Definition, Calculating System Reliability; Testing- Unit Level Testing, System Level Testing, Statistically Based Testing, Cleanroom Testing, Stress Testing; Fault Tolerance- General Problems Handling, N-Version Programming, Built-In-Test Software, CPU Testing, Memory Testing, Spurious and Missed Interrupts, Dealing with Bit Failures.

Hardware /Software Integration

Goals of Real-Time System Integration- System Unification, System Validation; Tools- Millimeters, Oscilloscope, Logic Analyzer, In-Circuit Emulator, Software Simulators, Hardware Prototypes/ Simulators, Debuggers; Methodology- Establishing a Baseline, Backoff Method, Patching; The Software Heisenberg Uncertainty Principle- Real-World Analogies, The Software Heisenberg Uncertainty Principle, Testing of Software, Time- and Memory-Loading, Other Implications.

REAL-TIME APPLICATIONS

Real-Time Systems as Complex Systems; The First Real-Time Application; Real-Time Databases; Real-Time Image Processing- Virtual Reality, Multimedia; Real-Time UNIX; Building Real-Time Applications with Real-Time Programming Languages.

TEXT BOOK:

1. Phillip A. Laplante, ' *Real- Time Systems Design and Analysis- An Engineer's Handbook*, ' PHI Publications, Second Edition, 2000
(Chapters 1,3,5; 6,7,8,9,10,11,13,14)

Total Hours: 48

UNIT-I

12 Hrs

Introduction: Multimedia Elements; Multimedia Applications; Multimedia Systems Architecture; Evolving Technologies for Multimedia Systems; Defining Objects for Multimedia Systems; Multimedia Data Interface Standards; The need for Data Compression; Multimedia Databases. **Media and Data Streams:**Media: Perception Media, Representation Media, Presentation Media, Storage Media, Transmission Media, Information Exchange Media, Presentation Spaces & Values, and Presentation Dimensions; Key Properties of a Multimedia System: Discrete & Continuous Media, Independence Media, Computer Controlled Systems, Integration; Characterizing Data Streams: Asynchronous Transmission Mode, Synchronous Transmission Mode, Isochronous Transmission Mode; Characterizing Continuous Media Data Streams. **Audio Technology:** Sound: Frequency, Amplitude, Sound Perception and Psychoacoustics; Audio Representation on Computers; Three Dimensional Sound Projection; Music and MIDI Standards; Speech Signals; Speech Output; Speech Input; Speech Transmission. **Graphics and Images:** Capturing Graphics and Images Computer Assisted Graphics and Image Processing; Reconstructing Images; Graphics and Image Output Options.

UNIT-II

12 Hrs

Video Technology & Computer-Based Animation: Basics; Television Systems; Digitalization of Video Signals; Digital Television; Basic Concepts; Specification of Animations; Methods of Controlling Animation; Display of Animation; Transmission of Animation; Virtual Reality Modeling Language. **Data Compression:** Storage Space; Coding Requirements; Source, Entropy, and Hybrid Coding; Basic Compression Techniques; JPEG : Image Preparation, Lossy Sequential DCT -based Mode, Expanded Lossy DCT -based Mode, Lossless Mode, Hierarchical Mode; H.261 (Px64) and H.263: Image Preparation, Coding Algorithms, Data Stream, H.263+ and H.263L; MPEG : Video Encoding, Audio Coding, Data Stream, MPEG-2, MPEG-4, MPEG-7; Fractal Compression.

UNIT-III

12 Hrs

Optical Storage Media: History of Optical Storage; Basic Technology; Video Discs and Other WORMs; Compact Disc Digital Audio; Compact Disc Read Only Memory; CD-ROM Extended Architecture; Further CD-ROM-Based Developments; Compact Disc Recordable; Compact Disc Magneto-Optical; Compact Disc Read/Write; Digital Versatile Disc. **Content Analysis:** Simple Vs. Complex Features; Analysis of Individual Images; Analysis of Image Sequences; Audio Analysis; Applications. **Data and File Format Standards:** Rich-Text Format; TIFF File Format; Resource Interchange File Format (RIFF);

UNIT-IV

12 Hrs

Data and File Format Standards (continued): MIDI File Format; JPEG DIB File Format for Still and Motion Images; A VI Indeo File Format; MPEG Standards; TWAIN. **Multimedia Application Design:** Multimedia Application Classes; Types of Multimedia Systems; Virtual Reality Design_ Components of Multimedia Systems; Organizing Multimedia Databases; Application Workflow Design Issues; Distributed Application Design Issues.

TEXT BOOKS:

1. Ralf Steinmetz, Klara Narstedt, "Multimedia Fundamentals: Vol I-Media Coding and Content Processing", Pearson Education JPHI, 2nd Edition, 2003.
2. Prabhat K Andleigh, Kiran Thakrar, "Multimedia Systems Design", PHI, 2003.

REFERENCE BOOKS:

1. KR Rao, Zoran S. Bojkovic and Dragorad A. Milovanovic, "Multimedia Communication Systems: Techniques, Standards, and Networks", Pearson, 2002.
2. Nalin K Sharad, "Multimedia information Networking", PHI, 2002.

PCS031E FINITE AUTOMATA AND FORMAL LANGUAGES 04 Credits

Total Hours: 48

UNIT – I

12 Hrs

Introduction to Finite Automata: Introduction to Finite Automata; The central concepts of Automata theory; Deterministic finite automata; Nondeterministic finite automata; An application of finite automata; Finite automata with Epsilon-transitions.

Regular Expressions: Regular expressions; Finite Automata and Regular Expressions; Applications of Regular Expressions.

UNIT – II

12 Hrs

Regular Languages, Properties of Regular Languages: Regular languages; Proving languages not to be regular languages; Closure properties of regular languages; Decision properties of regular languages; Equivalence and minimization of automata.

Context-Free Grammars and Languages: Context –free grammars; Parse trees; Applications; Ambiguity in grammars and Languages.

UNIT – III

12 Hrs

Pushdown Automata: Definition of the Pushdown automata; The languages of a PDA; Equivalence of PDA's and CFG's; Deterministic Pushdown Automata.

Properties of Context-Free Languages: Normal forms for CFGs; The pumping lemma for CFGs; Closure properties of CFLs.

UNIT – IV

12 Hrs

Introduction To Turing Machine: Problems that Computers cannot solve; The turning machine; Programming techniques for Turning Machines; Extensions to the basic Turning Machines; Turing Machine and Computers.

Undecidability: A Language that is not recursively enumerable; An Undecidable problem that is RE; Post's Correspondence problem; Other undecidable problems.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. **An Introduction to Formal Languages and Automata**, Peter Linz, Norosa Publication, 3rd Edition, 5th printing, 2003.

2. **Fundamentals of the Theory of Computation, Principles and Practice**, Raymond Greenlaw, H.James Hoover, Morgan Kaufmann, 1998.
3. **Introduction to Languages and Automata Theory**, John C Martin, 3rd Edition, Tata McGraw-Hill, 2007.
4. **Introduction to Computer Theory**, Daniel I.A. Cohen, 2nd Edition, John Wiley & Sons, 2004.

Total Hours: 48

UNIT I

12 Hrs

Introduction: Applications: A short history of wireless communication **Wireless Transmission:** Frequency for radio transmission, Signals, Antennas, Signal propagation, Multiplexing, Modulation, Spread spectrum, Cellular systems. **Medium Access Control:** Motivation for a specialized MAC: Hidden and Exposed terminals. Near and Far terminals; SOMA, FOMA, TOMA: 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.

UNIT II

12 Hrs

GSM and Similar Architectures

GSM – Services and System Architectures, Radio Interfaces, Protocols, Localization, Calling, Handover, General Packet Radio Service, High-speed circuit-switched data, DECT.

Wireless Medium Access Control and CDMA – based Communication

Medium Access Control, Introduction to CDMA – based Systems, OFDM

Mobile IP Network Layer

IP and Mobile IP Network Layers Packet Delivery and Handover Management, Registration, Tunneling and Encapsulation, Route Optimization, Dynamic Host Configuration Protocol.

Mobile Transport Layer

Indirect TCP, Snooping TCP, Mobile TCP, Other Methods of TCP – layer Transmission for Mobile Networks.

UNIT III

12 Hrs

Databases: Database Hoarding Techniques, Data Caching, Client – Server Computing and Adaptation, Transactional Models, Query Processing, Data Recovery Process, Issues relating to Quality of Service.

Data Dissemination and Broadcasting Systems : Communication Asymmetry, Classification of Data – Delivery Mechanisms, Data Dissemination Broadcast Models, Selective Tuning and Indexing Techniques, Digital Audio Broadcasting, Digital video Broadcasting.

Data Synchronization in Mobile Computing Systems : Synchronization, Synchronization Protocols, SyncML – Synchronization Language for Mobile Computing, Synchronized Multimedia Markup Language (SMIL).

UNIT IV

12 Hrs

Mobile Devices, Server and Management: Mobile agent, Application Server, Gateways, Portals, Service Discovery, Device Management, Mobile File Systems, Security

Wireless LAN, Mobile Internet Connectivity and Personal Area Network : Wireless LAN (WiFi) Architecture and Protocol Layers, WAP 1.1 and WAP 2.0 Architectures, Bluetooth – enabled Devices Network, Zigbee.

Mobile Operating Systems : Operating System, PalmOS, Windows CE, Symbian OS, Linux for Mobile Devices.

TEXT BOOK:

1. Raj Kamal, “**Mobile Computing**”, Oxford University Press, 2007.
2. Asoke Talkukder, Roopa R Yavagal, “**Mobile Computing – Technology, Applications and Service Creation**”, Tata McGraw Hill, 2007
3. Schiller, “**Mobile Communication**”, Pearson Publication, 2004.

THIRD SEMESTER

Industrial Training

Every students has to under go a Industrial training in between end of second semester and beginning of third Semester and submit a report on the same

Project Phase I

The Phase I include

1. Deciding the broad area for project work
2. Sufficient literature Survey (Minimum of 10-15 literatures includes Research papers, technical reports, white papers, manuals and survey reports.
3. Identification of Issues and defining problem.
4. A report containing summary of survey made covering issues and problem definition with print outs of all literature documents.
5. presentation on survey made.

Scheme of Evaluation for Project Phase I

1. Report Evaluation (Survey of minimum of 25 papers of relevant research area)	: 25 Marks
2. Seminar	:25 Marks
3. Synopsis Submission	: 25 Marks
4. Progress plan Report	:25 Marks
TOTAL	:100 Marks

IV SEMESTER

Guidelines for Project Phase II and Scheme of Evaluation

CIE:50 Marks

Project progress Presentation I	10 Marks
Project progress Presentation II	10 Marks
Project progress Presentation III	10 Marks
Project Presentation IV	10 Marks
Report Writing	10 Marks
TOTAL	50 Marks

SEE out of 100 Marks :

70 Marks for Report Evaluation

30 Marks for Viva Voce examination

Total 100 Marks.

Final Marks= CIE Marks out of 50+ 50% of SEE (50% of out of 100)

Basaveshwar Engineering College, Bagalkot.



Department of Computer Science and Engineering

M.Tech (Computer Science and Engineering)

Scheme and Syllabus of I – IV Semesters (Autonomous)

2009-10 Onwards