JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
Syllabus for Pre-Ph. D Examination
CSE

PAPER – II		Subject Code
S. No	**Subject**	
1	Advanced Databases	**1305101**
2	Artificial Intelligence & Soft Computing	**1305102**
3	Code Optimization	**1305103**
4	Data Mining & Knowledge Discovery	**1305104**
5	Digital Image Processing	**1305105**
6	Distributed Computing	**1305106**
7	Distributed Databases	**1305107**
8	Distributed Operating System	**1305108**
9	ERP & Supply Chain Management	**1305109**
10	Human Computer Interaction	**1305110**
11	Information Retrieval	**1305111**
12	Multi-Media Application Development	**1305112**
13	Network Security	**1305113**
14	Object Oriented Software Engineering	**1305114**
15	Soft Computing	**1305115**

PAPER – III		Subject Code
S. No	**Subject**	
1	Advanced Computer Architecture	**1305201**
2	Advanced Data Structures and Algorithms	**1305202**
3	Advanced Unix Programming	**1305203**
4	Advances in Computing	**1305204**
5	Bio-Informatics	**1305205**
6	Computational Geometry	**1305206**
7	Computer Communication	**1305207**
8	Fault Tolerant Systems	**1305208**
9	Machine Learning	**1305209**
10	Mobile Computing	**1305210**
11	Parallel Computing and Algorithms	**1305211**
12	Pattern Recognition	**1305212**
13	Scalable Parallel Computing Architectures	**1305213**
14	Secured Data Base Application Development	**1305214**
15	Wireless Networks and Mobile Computing	**1305215**

PAPER – II
ADVANCED DATABASES

UNIT I: Introduction:
Distributed Data Processing, Distributed Databases System, promises of DDBS, Problem areas.
Overview of Relational DBMS: Relational Databases Concepts, Normalization, Integrity rules, Relational data languages.

UNIT II: Distributed DBMS Architecture:
Architectural Models for Distributed DBMS, DDMBS Architecture.
Distrubuted Database Design:
 Alternative Design Strategies, Distribution Design issues, Fragmentation, Allocation.

UNIT III: Query Processing and Decomposition:
Query processing Objectives, Characterization of query processors, layers of query of query processing, query decomposition, Localization of distributed data.

UNIT IV: Distributed query Optimization:
Query optimization, centralized query optimization, Distributed query optimization algorithms.

UNIT V: Distributed object Database Management Systems:
Fundamental object concepts and Models, Object Distributed Design, Architectural Issues, Object Management, Distributed Object storage, Object query Processing.
 Object Oriented Data Model: Inheritance, object identity, persistent programming languages, persistence of objects, comparing ODDBMS and ORDBMS.

REFERENCE BOOKS
1. Principles of Distributed Database Systems, 2/e, OZSU, Valduriez, Sridhar, Pearson, 2001
2. Distributed Databases, Stefan Seri, Pelagatti Willipse, TMH
3. Database System Concepts, 5/e, Korth, Silberschatz, Sudershan, TMH
4. Database Management Systems, 3/e, Raghuramakrishnan, Johhanes Gehrke, TMH
5. Data Base Principles, Programming, and Performance, 2/e, P O' Neil, E O'Neil, Elsevier

ARTIFICIAL INTELLIGENCE AND SOFT COMPUTING

UNIT I
Introduction:
AI problems, AI technique, Problem as state space search, problem characteristics, production systems, types of production systems, Design of Search programsbHeuristic search techniques: Generate and test, Hill climbing, Best first search, Problem reduction, Constraint satisfaction, Means-Ends Analysis.

UNIT II
Game Playing: Minimax search procedure, adding alpha-beta cut-offs, additional refinements, Iterative deepening, Statistical Reasoning: Probability & Bayes theorem, Certainty factors and Rules based systems, Bayesian Networks.

Knowledge Representation Theorem proving using Predicate logic, Resolution, Natural Deduction, Knowledge representation using Rules, Forward versus Backward Reasoning, Matching, Control Artificial Knowledge , **Knowledge Structures**

UNIT III
Planning: Components of planning system, goal stack planning, nonlinear planning using constraint posting, Hierarchical planning, Reactive systems

Natural Language Processing: Steps in NLP, Syntactic processing, Semantic analysis, Discourse and Pragmatic processing, Statistical NLP, Spell checking.

UNIT IV
Learning: Rote learning-by example, Explanation based learning, Discovery, Analogy, Formal learning theory, NN learning and Genetic learning.

Genetic Algorithms: survival of the fittest principle in Biology, Genetic Algorithms, Significance of Genetic operators, termination parameters, Evolving Neural nets, Ant Algorithms

UNIT V
Fuzzy Set & Logic Theory**:** Classical & Fuzzy set theory, Interval Arithmetic's, Operations on Fuzzy sets
Classical logic theory, Boolean Logic, Multi valued Logic.

Applications of Fuzzy Logic: PQE – Decision Making Investment – Examples

Fuzzy Rule base and Fuzzy Modelling: If-Then Rules, System modelling, Static fuzzy systems, Parameter Identification PLC, closed loop, fuzzy controllers, examples, Fuzzy PID controllers – type1 and type 2 .

REFERENCE BOOKS:
1. Intelligence, 3/e, E.Rich, K.Knight, TMH.
2. Introduction to Fuzzzy Systems, Guanrong Chen, Trung Tat Pham, Chapman & Hall/CRC, 2009.
3. Artificial Intelligence , A Modern Approach, 2/e, Stuart Russel, Peter Norvig, PHI/PEA.
4. Artificial Intelligence, 5/e, George F Luger, PEA.
5. Artificial Intelligence, 3/e, Patrick Henry Winston, PEA.
6. Artificial Intelligence and Expert Systems, Patterson, PHI .
7. Artificial Intelligence,A Systems Approach, Tim Jones, Infinity Science Press .

CODE OPTIMIZATION

Unit I: Introduction:
Review of Compiler Structure, Advanced Issues in Elementary Topics, The Importance of Code Optimization, Structure of Optimizing Compilers, Placement of Optimizations in Aggressive Optimizing Compilers

Compiler Internal Representations and Run time support:
Intermediate Representations, Intermediate Languages, Representing intermediate languages in ICAN, ICAN Naming of Data Structures and Routines that Manipulate Intermediate Code, Other Intermediate-Language Forms, Run-Time Support: Data Representations and Instructions, Register Usage, The Local Stack Frame, The Run-Time Stack, Parameter-Passing Disciplines, Procedure Prologues, Epilogues, Calls, and Returns, Code Sharing and Position-Independent Code, Symbolic and Polymorphic Language Support

Unit II: Control Flow Analysis:
Approaches to Control-Flow Analysis, Depth-First Search, Preorder Traversal, Postorder Traversal, and Breadth-First Search, Dominators, Loops and Strongly Connected Components, Reducibility, Interval Analysis and Control Trees, Structural Analysis

Unit III: Data-Flow Analysis:
Reaching Definitions, Basic Concepts: Lattices, Flow Functions, and Fixed Points, Iterative Data-Flow Analysis, Lattices of Flow Functions, Control-Tree-Based Data-Flow Analysis, Structural Analysis, Interval Analysis, Other Approaches, Du-Chains, Ud-Chains, and Webs, Dealing with Arrays, Structures, and Pointers, Automating Construction of Data-Flow Analyzers

Unit IV: Dependence Analysis and Optimization:
Dependence Analysis and Dependence Graph: Dependence Relations, Basic-Block Dependence DAGs, Dependences in Loops, Dependence Testing, Program-Dependence Graphs
Introduction to Optimization: Importance of Individual Optimizations, Order and Repetition of Optimizations, Early Optimizations: Constant-Expression Evaluation, Scalar Replacement of Aggregates, Algebraic Simplifications and Reassociation, Value Numbering, Copy Propagation, Sparse Conditional Constant Propagation

Unit V: Procedural/Inter-procedural Analysis and Optimizations
Tail-Call Optimization and Tail-Recursion Elimination, Procedure Integration, In-Line Expansion, Leaf-Routine Optimization and Shrink Wrapping, Interprocedural Control-Flow Analysis: The Call Graph, Interprocedural Data-Flow Analysis, Interprocedural Constant Propagation, Interprocedural Alias Analysis, Interprocedural Optimizations, Interprocedural Register Allocation

REFERENCE BOOKS :
1. Advanced Compiler Design and Implementation, Muchnick, Elsevier, 2008.
2. Engineering a Compiler, Keith D Cooper, Linda Torczon, Elsevier.
3. Compiler Design in C, Allen Holub, PHI, 1990.
4. Compilers Principles, Techniques and Tools, Aho, Sethi, Ullman, PEA, 2006.

5. Crafting a compiler with C, Charles N. Fischer, Richard J. Leblanc, Benjamin Cummings, Wesley.

DATA MINING AND KNOWLEDGE DISCOVERY

Unit I: **Introduction to Data Mining:**
Types of Data, Data Quality, Data Processing, Measures of Similarity and Dissimilarity
Exploring Data: Data Set, Summary Statistics, Visualization, OLAP and multi dimensional data Analysis

Unit II: Classification:
Basic Concepts, Decision Trees, and model evaluation: General approach for solving a classification problem, Decision Tree induction, Model over fitting: Due to presence of noise, due to lack of representation samples, Evaluating the performance of classifier.
 Classification-Alternative techniques:
Nearest Neighbourhood classifier, Bayesian Classifier, Support Vector Machines: Linear SVM, Separable and Non Separable case.

Unit III: Association Analysis:
Problem Definition, Frequent Item-set generation, Rule generation, compact representation of frequent item sets, FP-Growth Algorithms, Handling categorical, continuous attributes, concept hierarchy, sequential, sub-graph patterns

Unit IV: Clustering: Overview, K-means, Agglomerative Hierarchical clustering, DBSCAN
Cluster Evaluation: Overview, Unsupervised Cluster evaluation using cohesion and separation, using the proximity matrix, Scalable clustering algorithms.

Unit V: Web Data mining:
Introduction, Web terminology and characteristics, web content mining, web usage mining, web structure mining, Search Engines: Characteristics, Functionality, Architecture, Ranking of web pages, Enterprise search

REFERENCE BOOKS:
1. Introduction to Data Mining, Pang-Ning Tan, Michael Steinbach, Vipin Kumar, PEA.
2. Introduction to Data Mining with Case Studies, GK Gupta , Prentice Hall.
3. Data Mining: Introductory and Advanced Topics, Margaret H Dunham, PEA, 2008.
4. Fundamentals of data warehouses, 2/e, Jarke, Lenzerini, Vassiliou, Vassiliadis, Springer.
5. Data Mining Theory and Practice, Soman, Diwakar, Ajay, PHI, 2006.
6. Data Mining, Concepts and Techniques, 2/e, Jiawei Han , Micheline Kamber , Elsevier,2006.

DIGITAL IMAGE PROCESSING

Unit I: **Digital Image fundaments:**
Introduction, An image model, sampling & quantization, basic relationships between Pixels, imaging geometry.

Unit II: **Image Transforms:**
Properties of 2 – D Fourier transform FFT algorithm and other separable image transforms. Walsh transforms. Hadamard, Cosine, Haar, Slant transforms, KL transforms and their properties.

Unit III: **Image Enhancement and restoration:**
Background, enhancement by point processing, histogram processing, spatial filtering and enhancement in frequency domain, color image processing, Degradation model, Algebraic approach to restoration, inverse filtering, least mean squares and interactive restoration, geometric transformations

Unit IV: **Image Representation and compression:**
Various schemes for representation, boundary descriptors, and regional descriptors , Fundamentals of image compression modes, error free compression, lossy compression, image compression standards.

Unit V: **Image segmentation and reconstruction:**
Detection of discontinuities, edge linking and boundary detection thresholding, region – oriented segmentation,   Image reconstruction from Projections, Radon Transforms; Convolution/Filter back – Project Algorithms.

REFERENCE BOOKS
1.   Fundamentals of Digital Image Processing, A.K.JAIN, PHI
2.   Fundamentals of Digital Image Processing, Anna durai, shanmuga lakshmi, Pearson
3. Introduction to Digital Image Processing, Alasdair, McAndrew, Cengage
4. Digital Image Processing, 3/e, GONZALEX, WOODS, Addison Wesley
5. Digital Image Processing, Castleman, Pearson
6. Digital Image Processing, S Jayaraman, SEsakkirajan, T Veerakumar,TMH

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DISTRIBUTED COMPUTING

Unit I: Introduction to distributed programming:
 Anatomy of a Distributed Application, Requirements for Developing Distributed Applications, What Does Java Provide?
Introduction to sockets programming: Sockets and Streams, URLs, URLConnections, and ContentHandlers, The ClassLoader

Unit II: Distributing Objects:
Why Distribute Objects?, What's So Tough About Distributing Objects?, Features of Distributed Object Systems, Distributed Object Schemes for Java, CORBA, Java RMI, RMI vs. CORBA
Threads: Thread and Runnable, Making a Thread, Managing Threads at Runtime, Networked Threads

Unit III: **Message-Passing Systems**:
 Messages Defined, Why Do We Need Messages?, Message Processing, Fixed Protocols, Adaptable Protocols, Message Passing with Java Events, Using Remote Objects
Databases: An Overview of JDBC, Remote Database Applications, Multi-Database Applications

Unit IV: RMI:
The Basic Structure of RMI, The Architecture Diagram Revisited, Implementing the Basic Objects, The Rest of the Server, The Client Application
The RMI Registry: Why Use a Naming Service? The RMI Registry, The RMI Registry Is an RMI Server, Examining the Registry, Limitations of the RMI Registry, Security Issues
 Naming Services: Basic Design, Terminology, and Requirements, Requirements for Our Naming Service, Federation and Threading, The Context Interface, The Value Objects, ContextImpl, Switching Between Naming Services, The Java Naming and Directory Interface (JNDI)
The RMI Runtime: Reviewing the Mechanics of a Remote Method Call, Distributed Garbage Collection, RMI's Logging Facilities, Other JVM Parameters

Unit V: Service Oriented Architecture:
Introduction, Defining a Service, Defining SOA, Identifying Service Candidates, Identifying Different Kinds of Services, Modeling Services, Making a Service Composable, Supporting Your SOA Efforts, Selecting a Pilot Project, Establishing Governance

REFERENCE BOOKS:
1. Java Distributed Computing, Jim Farley, O'Reilly.
2. Java RMI Designing and Building,The Basics of RMI Applications, William Grosso, O'Reilly.
3. Java SOA Cookbook SOA Implementation Recipes, Tips, Techniques, Eben Hewitt, O'Reilly, 2009.
4. Service Oriented Architecture With Java, Malhar Barai, Vincenzo Caselli, Binildas A. Christudas, Packt Publishing, 2008.
5. Distributed Programming with Java, Qusay H. Mahmoud, Manning Publisher 2000.
6. Java in Distributed Systems, Concurrency, Distribution and Persistence, Marko Boger, 2001.

7. Developing Distributed and E-commerce Applications, Darrel Ince, 2/e, Wesly, 2004.
8. Java Message Service (O'Reilly Java Series), Richard Monson-Haefel, David Chappell.
9. Sun SL 301 Distributed Programming with Java.
10. Java Tutorial, http://java.sun.com/docs/books/tutorial/index.html

DISTRIBUTED DATABASES

Unit I: **Introduction :**
Features of distributed databases, features of Centralized databases, level of distributed transparency - Reference Architecture, types of Data Fragmentation, distribution Transparency, Access primitives, and Integrity constraints.

Unit II: **Distributed Database design** :
A frame work, the design of database fragmentation, the allocation of fragments.

Unit III: **Query Processing :**
Translation of global queries into fragment queries, query optimization.
Distributed Transaction Management : A framework, transaction atomicity, 2-phase commit.

Unit IV: **Concurrency control:**
Foundations, distributed deadlocks, timestamps.
Reliability: Basic concepts, commit protocols, consistent view of Network, Detection and Resolution of Inconsistencies, check points and cold restart.

Unit V: **Commercial Systems:**
Tranclem's ENCOMPASS Distributed database systems, IBM's Inter system communication, feature of distributed ingress and Oracle.
Heterogeneous databases: General problems – brief study of multi base.

REFERENCE BOOKS:
1. Distributed Database systems Principles and Systems, Ceri S. Pelagatti. G, MGH.
2. Principles of Distributed Database Systems, 2/e, M. Tamer Ozsu, Sridhar, PEA.
3. Database system Concepts, 5/e,Silberschatz, F.Korth, Sundrashan,MGH,2006.
4. Modern database Management, 7/e, Hoffer, Prescott, McFadden, PEA,2007.

DISTRIBUTED OPERATING SYSTEMS

Unit I: Processes
THREADS: Introduction to Threads, Threads in Distributed Systems; CLIENTS: User Interfaces, Client-Side Software for Distribution Transparency SERVERS: General Design Issues, Object Servers; CODE MIGRATION: Approaches to Code Migration, Migration and Local Resources, Migration in Heterogeneous Systems, Example: D'Agents
SOFTWARE AGENTS: Software Agents in Distributed Systems, Agent Technology

Unit II: Naming Systems
NAMING ENTITIES: Names, Identifiers, and Addresses, Name Resolution, The Implementation of a Name Space, Example: DNS, X.500
LOCATING MOBILE ENTITIES: Naming versus Locating Entities, Simple Solutions, Home-Based Approaches, Hierarchical Approaches
REMOVING UNREFERENCED ENTITIES: The Problem of Unreferenced Objects, Reference Counting, Reference Listing, Identifying Unreachable Entities

Unit III: Synchronization
Clock synchronization, logical clocks, global state, election algorithms, mutual exclusion, distributed transactions

Unit IV: Consistency and Replication
Introduction, Data-Centric Consistency Models, Client-Centric Consistency Models, Distribution Protocols, Consistency Protocols, Examples: Orca and Causally-Consistent Lazy Replication

Unit V: Fault Tolerance
Introduction to Fault Tolerance, Process Resilience, Reliable Client-Server Communication, Reliable Group Communication, Distributed Commit, Recovery

REFERENCE BOOKS:
1. Distributed Systems , Principles and Paradigms, 2/e, Tanenbaum, Maarten Van Steen, PHI.
2. Advanced concepts in Operating Systems, Mukesh Singhal, Niranjan G. Shivaratri, TMH, 2005.
3. Distributed Operating Systems and Algorithm Analysis, Chow, Johnson, PEA
4. Distributed Systems Concepts and Design, 4/e, George Coulouris, Dollimore, Kindberg, PEA.
5. Distributed Operating Systems, Pradeep K. Sinha, PHI,2009.
6. Operating Systems, Internals & Design Principles, 6/e, William Stallings, PEA.
7. Distributed Systems Computing over Networks, Joel M.Crichlow, PHI.

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ERP & SUPPLY CHAIN MANAGEMENT

Unit I: Introduction to ERP
Overview, Benefits of ERP, ERP and Related Technologies, Business Process Reengineering, Data Warehousing, Data Mining, On–line Analytical Processing, Supply Chain Management.
Business Modules: Business Modules in an ERP Package, Finance, Manufacturing, Human Resource, Plant Maintanance, Materials Management, Quality Management, Sales and Distribution

Unit II: ERP Implementation
Implementation Life Cycle – Implementation Methodology – Hidden Costs – Organizing Implementation – Vendors, Consultants and Users – Contracts – Project Management and Monitoring.

Unit III: Fundamentals of Supply Chain Management
Supply chain networks, Integrated supply chain planning, Decision phases in supply chain, process view of a supply chain, supply chain flows, Overview of supply chain models, Supply chain planning: Strategic, operational and tactical, Understanding supply chain through process mapping and process flow chart.
Supply chain strategies, value chain, Supply chain drivers and obstacles, Strategic Alliances and Outsourcing, purchasing aspects of supply chain, Supply chain performance measurement: The balanced score card approach, Performance Metrics.

Unit IV: Planning and Managing Inventories
Introduction to Supply Chain Inventory Management. Inventory theory models: Economic Order Quantity Models, Reorder Point Models and Multiechelon Inventory Systems, Relevant deterministic and stochastic inventory models and Vendor managed inventory models.

Unit V: Distribution Management
Role of transportation in a supply chain - direct shipment, warehousing, cross-docking; push vs. pull systems; transportation decisions (mode selection, fleet size), market channel structure, vehicle routing problem. Facilities decisions in a supply chain.

REFERENCE BOOKS:
1. ERP Demystified, 2/e, Alexis Leon, TMH, 2007.
2. Supply Chain Management: Strategy, Planning, Operation, Sunil Chopra, Peter Meindel, PEA, 2002.
3. Enterprise Resource Planning, Concepts and Planning, Vinod Kumar, Venkata Krishnan, PHI.
4. Enterprise wide Resource Planning Theory and Practice, Altekar, PHI.
5. Enterprise Resource Planning Concepts and Practice, 7/e, Vinod Kumar, PHI.
6. Enterprise Resource Planning,Mary Sumner, PEA.
7. Designing and Managing the Supply Chain: Concepts, Strategies, and Case Studies, 2/e, David Simchi-evi, Philip Kaminsky, Edith Simchi-Levi, TMH/Irwin, New York, 2003.
8. Supply Chain Management Based on SAP Systems, Knolmayer, Mertens, Zeier, Springer.
9. Supply Chain Management with APO, Thomas Dickerssbach,Springer.

HUMAN COMPUTER INTERACTION

UNIT I: Introduction:
Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design
The graphical user interface: Popularity of graphics, direct manipulation, graphical system, Characteristics, Web user –interface popularity, characteristics- Principles of user interface.

UNIT II: Design process:
Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions.

UNIT III: Screen Designing :
Design goals, Screen planning and purpose, organizing screen elements, ordering of screen data and content, screen navigation and flow, Visually pleasing composition, amount of information, focus and emphasis, presentation information simply and meaningfully, information retrieval on web, statistical graphics, Technological consideration in interface design.

UNIT IV: Windows:
Windows new and Navigation schemes selection of window, selection of devices based and screen based controls.

UNIT V: Components :
Components text and messages, Icons and increases, Multimedia, colors, uses problems, choosing colors.
Interaction Devices:
Keyboard and function keys, pointing devices, speech recognition digitization and generation, image and video displays, drivers.

REFERENCE BOOKS :
1. The Essential guide to user interface design, Wilbert O Galitz, Wiley DreamaTech.
2. Designing the user interface. 3/e, Ben Shneidermann , PEA.
3. Human Computer Interaction. Alan Dix, Janet Fincay, Gre Goryd, Abowd, Russell Bealg, PEA.
4. Interaction Design PRECE, ROGERS, SHARPS, Wiley Dreamtech.
5. User Interface Design, Soren Lauesen , PEA.

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INFORMATION RETRIEVAL

Unit I : Introduction to Information storage and retrieval systems:
Domain Analysis of IR systems, IR and other types of Information Systems, IR System Evaluation
Introduction to Data structures and algorithms related to Information Retrieval: Basic Concepts, Data structures, Algorithms.

Unit II: Inverted Files and Signature Files:
Introduction, Structures used in Inverted Files, Building an Inverted file using a sorted array, Modifications to the Basic Techniques.
Signature Files: Concepts of Signature files, Compression, Vertical Partitioning, Horizontal Partitioning.

Unit III: New Indices for Text, Lexical Analysis and Stoplists:
PAT Trees and PAT Arrays: Introduction, PAT Tree structure, Algorithms on the PAT Trees, Building PAT Trees as PATRICA Trees, PAT representation as Arrays. Lexical Analysis, Stoplists.

Unit IV: Stemming Algorithms and Thesaurus Construction:
Types of Stemming algorithms, Experimental Evaluations of Stemming, Stemming to Compress Inverted Files.
Thesaurus Construction: Features of Thesauri, Thesaurus Construction, Thesaurus construction from Texts, Merging existing Thesauri.

Unit V: String Searching Algorithms:
Introduction, Preliminaries, The Naive Algorithm, The Knutt-Morris-Pratt Algorithm, The Boyer-Moore Algorithm, The Shift-Or Algorithm, The Karp-Rabin Algorithm.

REFERENCE BOOKS
1. Modern Information Retrieval,Ricardo Baeza-Yates, Neto, PEA,2007.
2. Information Storage and Retrieval Systems: Theory and Implementation, Kowalski, Gerald, Mark Academic Press, 2000.
3. Information Retrieval: Algorithms and Heuristics , Grossman, Ophir Frieder, 2/e, Springer, 2004.
4. Information Retrieval Data Structures and Algorithms , Frakes, Ricardo Baeza-Yates, PEA
5. Information Storage and Retieval, Robert Korfhage, John Wiley & Sons.
6. Introduction to Information Retrieval, Manning, Raghavan, Cambridge University Press.

MULTIMEDIA AND APPLICATION DEVELOPMENT

UNIT I : Fundamental concepts in Text and Image:
Multimedia and hypermedia, world wide web, overview of multimedia software tools. Graphics and image data representation graphics/image data types, file formats, Color in image and video: color science, color models in images, color models in video.

UNIT II: Fundamental Concepts in Cideo and Digital Audio:
Types of video signals, analog video, digital video, digitization of sound, MIDI, quantization and transmission of audio.

UNIT III: Application Development:
An OOP Application Frame work, Using Components with ActionScript MovieClip Subclasses.

UNIT IV: Multimedia Data Compression:
Lossless compression algorithm: Run-Length Coding, Variable Length Coding, Dictionary Based Coding, Arithmetic Coding, Lossless Image Compression, Lossy compression algorithm: Quantization, Transform Coding, Wavelet-Based Coding, Embedded Zerotree of Wavelet Coefficients Set Partitioning in Hierarchical Trees (SPIHT). **Basic Video Compression Techniques:** Introduction to video compression, video compression based on motion compensation, search for motion vectors, MPEG, Basic Audio Compression Techniques.

UNIT V: Multimedia Networks:
Basics of Multimedia Networks, Multimedia Network Communications and Applications: Quality of Multimedia Data Transmission, Multimedia over IP, Multimedia over ATM Networks, Transport of MPEG-4, Media-on-Demand (MOD).

REFERENCE BOOKS :
1. Fundamentals of Multimedia , Ze-Nian Li , Mark S. Drew, PHI/PEA.
2. Essentials ActionScript 2.0, Colin Moock, SPD O,REILLY.
3. Digital Multimedia, Nigel chapman & jenny chapman, Wiley-Dreamtech.
4. Macromedia Flash MX Professional 2004 Unleashed, PEA.
5. Multimedia & Communications Technology, Steve Heath, Elsevier (Focal Press).
6. Multimedia Applications, Steinmetz, Nahrstedt, Springer.
7. Multimedia Basics, Weixel Thomson.
8. Multimedia Technology & Applications, David Hilman , Galgotia.
9. Multimedia Technologies, Banerji, Mohan Ghosh, MGH.

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NETWORK SECURITY

Unit I: **Introduction to Network Security:**
Attacks, services, Security. A model of Inter network Security, Principles of Symmetric and public key cryptography, Steganography, One time PADS.

Unit II: Crypto Graphic Algorithms (Block Cipher):
RC2, GOST, CAST, BLOW FISH, SAFEER, RC5, NEWDES, CRAB, Theory of Block Cipher design.

Unit III: Key Management and digital Signature Algorithms :.
Key lengths, Generating Keys, Transferring, Verification, Updating, Storing, Backup, Compromised, Lifetime of, Destroying Keys, key Exchange Protocols, Secure multiparty Communication, Public key Management. Authentication, Formal Analysis of Authentication, Digital Signature, DSA, DSA variants,One – Schnorr – Shamir digital Signatures, Esign,

Unit IV: IP and Web security:
IP Security Architecture, Authentication Header, Encapsulating Security, Pay load Key Management Issues. Web Security Web Security requirements, Secure Sockets Layer and Transport Layer Security, Secure Electronic Transaction

Unit V: Mail Security:
PGP, SNMP,SMIME, Intruders, Viruses and Related Threats, Firewall Design Principles, Trusted Systems.

REFERENCE BOOKS:
1. Applied Cryptography, 7/e, Bruce SCHNEIER John Wiley & Sons Inc.
2. Cryptography and Network Security, William Stallings, PHI.
3. Introduction to cryptography with coding Theory, 7/e, Wade Trappe, C. Washington, PEA.
4. Cryptography and Information Security, V.K. Pachghare, PHI.
5. Cryptography and Network Security, Forouzan, TMH, 2007.
6. Cryptography and Network Security, 2/e, Kahate , TMH.
7. Modern Cryptography, Wenbo Mao, PEA

OBJECT ORIENTED SOFTWARE ENGINEERING

Unit I: Introduction to Classical Software Engineering :
Introduction to OO Paradigm. Different phases in structured paradigm and OO Paradigm. Software Process and different life cycle models and corresponding strengths and weaknesses.

Unit II: Planning and Estimation :
Estimation of Duration and Cost – COCOMO components of software.   Project Management plan – one case Study.

Unit III: Modules to objects:
 Cohesion and Coupling, Data Encapsulation and Information hiding aspects of Objects. Inheritance, polymorphism and Dynamic Binding aspects. Cohesion and coupling of objects. Reusability, Portability and Interoperability aspects.

Unit IV: Requiement phase:
Rapid Prototyping method, Specification phase - Specification Document- Formal methods of developing specification document
Analysis phase:
 Use case Modeling - Class Modeling - Dynamic Modeling, Testing during OO Analysis.

Unit V: Design phase:
Data oriented design – Object Oriented design – Formal techniques for detailed design. One case study. Challenges in design phase.

REFERENCE BOOKS
1. Object oriented and Classical Software Engineering, 7/e, Stephen R. Schach, TMH
2. Object oriented and classical software Engineering, Timothy Lethbridge, Robert Laganiere, TMH

SOFT COMPUTING

Unit I: **Introduction:**
Uncertainty and Evidence, Shafer Dumpster belief and possibility Theory, Random sets and mass assignments, Dumpsters Rule, Fuzzy Measures and aggregation operators, Bayesian Networks. Graphical methods.

Unit II: **Automated Learning-1 and 2**
Automated Learning-1: Supervise vs. unsupervised learning, Decision Tree induction, rule induction algorithms.
Automated Learning-2:   Bayesian network learning algorithms, Evolutionary algorithms.

Unit III: **Neural Networks and Fuzzy Methods:**
Neural Networks**:** Adaptive Networks, Supervised Learning NN, Reinforcement Learning, Unsupervised Learning.
Fuzzy set theory, fuzzy control (including model based control), and Fuzzy Decision trees.

Unit IV: **Hybrid systems:**
Neuro Fuzzy Systems, Back propagation Network supported by Fuzzy, GA based weight determination applications.

Unit V: **Genetic Algorithms and Applications**
Encoding, Fitness functions, reproduction, Fuzzy Genetic Algorithms.
Applications: Practical Examples from areas such as Medical, Management, and control, GA in fuzzy logic controller design.

REFERENCE BOOKS
1. Neuro Fuzzy and Soft Computing, A Computational approach to learning and Machine, Jyh-Shing Roger Jang, Cuen Tsai Sun, Eiji Mizurani, PEA.
2. Machine Learning, Tom Mitchell, MGH, 1997.
3. Soft Computing Techniques and Applications, Robert John, R. Birkenhead, Ralph Birkenhead.
4. Neural Networks, Fuzzy logic and genetic algorithms, S Rakasekharan, GA Vijayalakshmi, PHI.
5. Principles of Soft Computing, Sivanandam, Deepa, Wiley India, 2008.
6. Soft Computing and Intelligent Systems Design, Karry, De Silva, PEA, 2004.

PAPER – III

ADVANCED COMPUTER ARCHITECTURE

Unit I: Parallel Computer Models, Program and Network Properties:
Parallel Computer Models: Multiprocessors and Multicomputers, Multivector and SIMD Computers,
Program and Network Properties: Conditions of Parallelism, Program Partitioning and Scheduling, Program Flow Mechanisms, System Interconnect Architectures

Unit II: Principles of Scalable Performance:
Performance Metrics and Measures, Parallel Processing Applications, Speedup Performance Laws, Scalability Analysis and Approaches

Unit III: Processors and Memory Hierarchy:
Advanced Processor Technology, Superscalar and Vector Processors, Memory Hierarchy Technology, Virtual Memory Technology

Unit IV: Bus, Cache, and Shared Memory:
Backplane Bus Systems, Cache Memory Organizations, Shared-Memory Organizations, Sequential and Weak Consistency Models

Unit V: Pipelining and Superscalar Techniques:
Linear Pipeline Processors, Nonlinear Pipeline Processors, Instruction Pipeline Design, Arithmetic Pipeline Design, Superscalar and Super pipeline Design
Multiprocessors and Multicomputers:
Multiprocessor System Interconnects, Cache Coherence and Synchronization Mechanisms, Three Generations of Multicomputers, Message-Passing Mechanisms

REFERENCE BOOKS
1. Kai Hwang, Advanced computer Architecture: Parallelism, Scalability, Programmability, TMH, 2000.
2. Computer Architecture – A quantitative approach, 4/e, John L. Hennessey , David A. Patterson, Morgan Kaufmann / Elsevier, 2007.
3. Parallel Computing Architecture: A hardware/ software approach , David E. Culler, Jaswinder Pal Singh, Morgan Kaufmann / Elsevier, 1997.
4. Computer Organization and Architecture – Designing for Performance, 7/e, William Stallings, PEa, 2006.
5. Computer Organization and Design, 4/e, Patterson , Elsevier, 2008.
6. Computer Architecture & Parallel Processing, Kai Hwang, Faye A. Briggs, TMH

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
Syllabus for Pre-Ph. D Examination
CSE

ADVANCED DATA STRUCTURES AND ALGORITHMS

Unit I: Lists, Stacks, Queues and Trees:
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. Trees: The Search Tree ADT - Binary Search Trees, AVL Trees, Splay Trees, B-Trees.

Unit II: Hashing and Priority Queues:
Hashing: General Idea, Hash Function, Separate Chaining, Hash Tables Without Linked Lists, Rehashing, Extendible Hashing
 Priority Queues: Implementations, Binary Heap, Applications of Priority Queues, d-Heaps, Leftist Heaps, Skew Heaps, Binomial Queues.

Unit III: Sorting:
Sorting: A Lower Bound for Simple Sorting Algorithms, Shellsort, Heapsort, Mergesort, Quicksort, Indirect Sorting, A General Lower Bound for Sorting, Bucket Sort, External Sorting.
The Disjoint Set Class: Equivalence Relations, the Dynamic Equivalence Problem, Basic Data Structure, Smart Union Algorithms, Path Compression, Worst Case for Union-by-Rank and Path Compression, an Application.

Unit IV: 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, Divide and Conquer, Dynamic Programming, Randomized Algorithms, Backtracking Algorithms.

Unit V: Amortized Analysis:
An Unrelated Puzzle, Binomial Queues, Skew Heaps, Fibonacci Heaps, Splay Trees.
Advanced Data Structures and Implementation:Top-Down Splay Trees, Red-Black Trees, Deterministic Skip Lists, AA-Trees, Treaps, k-d Trees, Pairing Heaps.

REFERENCE BOOKS
1. C & Data structures, N.B. Venkateswarulu, EV Prasad, S.Chand.
2. Data Structures and Algorithm Analysis in C++, 3/e, Mark Allen Weiss, PEA , 2007.
3. Data Structures Algorithms and Applications, 2/e, Sartaj Sahni, Universities Press, 2007.
4. Fundamentals of computer Algorithms, 2/e, Ellis Horowitz, Sartaj Sahni, Rajasekharan, Universities Press, 2008.
5. Data Structures and Algorithms, Aho, Ullman, PEA.
6. Data Structures and Algorithms in JAVA, Adam drozdek, Cengage .
7. Data Structures with JAVA^{TM}, Hubbard, Huray, PHI,2009.
8. Data Structures, Gilberg, Forouzan, Thomson.
9. Fundamentals of Data structures algorithms and application Sartaj Sahni, University Press.

ADVANCED UNIX PROGRAMMING

UNIT I: Review of Unix Utilities and Shell Programming:
File handling utilities, security by file permissions, process utilities, disk utilities, networking commands, backup utilities, text processing utilities, Working with the Bourne shell, What is a shell, shell responsibilities, pipes and input redirection, output redirection, here documents, the shell as a programming language, shell meta characters, shell variables, shell commands, the environment, control structures, shell script examples.

UNIT II: Unix Files:
Unix file structure, directories, files and devices, System calls, library functions, low level file access, usage of open, creat, read, write, close, lseek, stat, fstat, octl, umask, dup, dup2. The standard I/O (fopen, fclose, fflush, fseek, fgetc, getc, getchar, fputc, putc, putchar, fgets, gets), formatted I/O, stream errors, streams and file descriptors, file and directory maintenance (chmod, chown, unlink, link, symlink, mkdir, rmdir, chdir, getcwd), Directory handling system calls (opendir, readdir, closedir, rewinddir, seekdir, telldir)

UNIT III: Unix Process: Threads and Signals: What is process, process structure, starting new process, waiting for a process, zombie process, process control, process identifiers, system call interface for process management, fork, vfork, exit, wait, waitpid, exec, system, Threads, Thread creation, waiting for a thread to terminate, thread synchronization, condition variables, cancelling a thread, threads vs. processes, Signals, Signal functions, unreliable signals, interrupted system calls, kill and raise functions, alarm, pause functions, abort, sleep functions.

UNIT IV: Data Management: Management Memory (simple memory allocation, freeing memory) file and record locking (creating lock files, locking regions, use of read/ write locking, competing locks, other commands, deadlocks).
Interprocess Communication: Introduction to IPC, IPC between processes on a single computer system, IPC between processes on different systems, pipes, FIFOs, streams and messages, namespaces, introduction to three types of IPC (systemV) message queues, semaphores and shared memory.
Message Queues: message structure, working message queues, Unix systemV messages, Unix kernel support for messages, Unix APIs for messages, client/server example.

UNIT V: Semaphores: Unix systemV semaphores, Unix kernel support for semaphores, Unix APIs for semaphores, file locking with semaphores.
Shared Memory: Unix systemV shared memory, working with a shared memory segment, Unix kernel support for shared memory, Unix APIs for shared memory, semaphore and shared memory example.
Sockets: Berkeley sockets, socket system calls for connection oriented protocol and connectionless protocol, example client/server program, advanced socket system calls, socket options.

REFERENCE BOOKS
1. Advanced Programming in the UNIX Environment, Stevens , PEA/PHI.
2. Unix Network Programming, Stevens PEA/PHI.
3. Advanced Unix programming, N.B. Venkateswarlu, BSP.
4. Unix Concepts and Applications, 3/e, Sumitabha Das, TMH.
5. Practical UNIX and Internet Security, 2/e, Simson Garfinkel, Gene Spafford, O'Reilly.

ADVANCES IN COMPUTING

UNIT I: Grid Computing:
Data & Computational Grids, Grid Architectures and its relations to various Distributed Technologies
Autonomic Computing, Examples of the Grid Computing Efforts (IBM)

UNIT II: Cluster Computing 1:
Cluster setup & its Administration, Performance Models & Simulations; Networking, Protocols & I/O, Lightweight Messaging systems, Active Messages
Cluster Computing 2:
Distributed shared memory, parallel I/O Clusters, Jib and Resource management system, scheduling parallel jobs on clusters

UNIT III:Cluster Computing 3:
Load sharing and Fault tolerance manager, parallel programming scheduling techniques, Dynamic load balancing

UNIT IV: Pervasive Computing :
Pervasive Computing concepts & Scenarios, Hardware & Software, Human - machine interface
Device connectivity, Java for Pervasive devices, Application examples

UNIT V: Cloud Computing:
History, Working of cloud computers, pros and cons of cloud computing, developing cloud services, cloud computer web based applications

REFERENCE BOOKS:
1. J. Joseph & C. Fellenstein, Grid Computing, PEA.
2. Raj Kumar Buyya, High performance cluster computing, PEA.
3. J.Burkhardt et .al, Pervasive computing, PEA.
4. Vishal Sahni, Quantum computing, TMH.
5. Marivesar, Approaching quantum computing, PEA.
6. Neilsen & Chung L, Quantum computing and Quantum Information, Cambridge University Press.
7. A networking approach to Grid Computing , Minoli, Wiley.

BIO-INFORMATICS

UNIT I: INTRODUCTION:

The Central Dogma, The Killer Application, Parallel Universes – Watson's Definition – Top Down Versus Bottom up – Information Flow , Convergence Databases , Data Management , Data Life Cycle , Database Technology , Interfaces , Implementation

Networking: Geographical Scope, Communication Models, Transmissions Technology, Protocols, Bandwidth, Topology ,

UNIT II: NETWORKS AND SEARCH ENGINES

Networks: Networks, Hardware , Contents , Security , Ownership , Implementation , Management

Search Engine process: The search process, Search Engine Technology, Searching and Information Theory, Computational methods, Search Engines and Knowledge Management

UNIT III: DATA VISUALIZATION AND STATISTICS

Data Visualization, sequence visualization, structure visualization, Animation Versus simulation, General Purpose Technologies.

Statistic Information: Statistical concepts , Microarrays , Imperfect Data , Variability , Approximation , Interface Noise , Assumptions , Sampling and Distributions , Hypothesis Testing , Quantifying Randomness , Data Analysis , Tool selection statistics of Alignment

UNIT IV: DATA MINING AND PATTERN MATCHING

Clustering and Classification , Selection and Sampling , Preprocessing and Cleaning , Transformation and Reduction , Data Mining Methods , Evaluation , Visualization , Designing new queries , Pattern Recognition and Discovery , Machine Learning , Text Mining .

Pattern matching: Pair wise and Multiple sequence alignment , Local versus global alignment , Multiple sequence alignment , Computational methods , Dot Matrix and Substitution matrices , Dynamic Programming , Bayesian methods , Dynamic Programming , Progressive and Iterative strategies , Tools , Nucleotide and Polypeptide pattern matching ,

UNIT - V: MODELING AND SIMULATION:

Drug Discovery , components , Numeric considerations , Algorithms ,Protein structure , AbInitio Methods , Heuristic methods , Systems Biology , Tools , Collaboration and Communications , standards , Security , Intellectual property.

REFERENCE BOOKS

1. Bio Informatics Computing, Bryan Bergeron, PHI, 2003.
2. Introduction to Bio Informatics, Attwood, Smith, Longman, 1999.
3. Bio-Informatics, D Srinivasa Rao, Biotech.
4. Bio Informatics Computing, Bergeron, PHI
5. Bio Informatics, Managing scientific Data, Lacroix, Terence Critchlow, Elsevier
6. Bio Informatics Methods and Applications, Rastogi, Mendiratta, Rastogi, PHI

COMPUTATIONAL GEOMETRY

Unit I: Basic Geometric Concepts:
Points, lines, polygons; subdivisions; arrangements; polytopes; cell complexes.
Projective Geometry : Projective Geometry-geometric transformations

Unit II: Geometric Searching:
Fractional cascading; segment tree; interval tree, range tree; priority search tree. Non-orthogonal range searching , k-d trees - applications

Unit III: Point Location:
Slab method; trapezoid method; chain method; bridged chain method.
Plane-Sweep Algorithms: Intersection of segments; intersection of rectangles; trapezoidation.

Unit IV: Proximity:
Closest pair; furthest pair; Voronoi diagrams; triangulations. Voronoi diagrams and Delaunay Triangulations - Constructing voronoi diagram- Applications.

Unit V: Graph Drawing:
Planar drawings; straight-line drawings; orthogonal drawings; polyline drawings; upward drawings; hierarchical drawings; visibility representations.
Convex hulls : Preliminaries, algorithms for convex hulls-grahams scan-Jarvis march, quick hull techniques, divide and conquer methods, dynamic convex hull algorithms, Applications of computational geometry in web applications.

REFERENCE BOOKS:
1. Computational Geometry, an Introduction", 2/e, Franco P. Preparata, Michael Ian Shamos, Springer-Verlag 1988 (ISBN: 0-387-96131-3)
2. Computational Geometry Algorithms and Applications, 2/e., de Berg, van Kreveld, Overmars, and Schwarzkopf (Springer-Verlag, 2000).
3. Graph Drawing, Algorithms for the Visualization of Graphs, Giuseppe Di Battista, Peter Eades, Roberto Tamassia, Ioannis G. Tollis, Prentice-Hall 1999 (ISBN: 0-13-301615-3)
4. Computational Geometry in C , 2/e, Joseph O'Rourke, Cambridge University Press

COMPUTER COMMUNICATIONS

Unit I: Introduction :
Network Hardware reference model – Transmission media – Narrowband ISDN – Broad band ISDN – ATM.

Unit II: Data Link Layer and Channel allocation Methods:
The data Link layer – Design Issues – Error detection and correction – Elementary Data Link Protocols – Sliding window protocols – Data link layer in HDLC, Internet and ATM. Channel allocation methods – TDM, FDM, ALOHA, Carrier sense Multiple access protocols, Collision Free protocols – IEEE standard BO2 for LANS – Ethernet, Token Bus, Token ring – Bridges.

Unit III: Network Layer and internetworking:
NETWORK LAYER Routing Algorithms – Shortest path, Flooding, Flow based Distance vector, Link state, Hierarchical, Broadcast routing, Congestion Control algorithms-General principles of congestion control, Congestion prevention polices, Choke packets and Load shedding.
Tunneling, internetworking, Fragmentation, network layer in the internet – IP protocols, IP address, Subnets, Internet control protocols, DSPF, BOP, Internet multicasting, Mobile IP. Network layer in the ATM Networks – cell formats, connection setup, routing and switching, service categories, and quality of service, ATM LANs.

Unit IV: Transport Layer : The Transport Layer Elements of transport protocols – addressing, establishing a connection, releasing connection, flow control and buffering and crash recovery, END TO END PROTOCOLS – UDP, reliable Byte Stream (TCP) end to end format, segment format, connection establishment and termination, sliding window revisited, adaptive retransmission, TCP extension, Remote Procedure Call – BLAST, CHAN, SELECT, DCE.

Unit V: Application Layer : Application Layer – Network Security – Cryptographic Algorithms – DES, RSA. Security Mechanisms – Authentication Protocols, Firewalls, Name service (DNS) Domains Hierarchy, Name servers. Traditional Applications – SMTP, MIME, World Wide Web – HTTP, Network Management – SNMP.

REFERENCE BOOKS
1. COMPUTER NETWORKS, Andrew Tanenbaum, 3/e, PHI.
2. COMPUTER NETWORKS – A SYSTEM APPROACH – Larry L. Peterson, Bruce S. Davie, 2/e, Harcourt Asia PTE LTD.
3. Data Communication and Networking, 4/e, Forouzan, TMH
4. An engineering approach to computer networking, Kesav, PEA
5. Data and Computer Communications, 8/e, Stallings, PHI
6. Computer communication and networking technologies, Gallo, Hancock, Cengage
7. Understanding data communications, 7/e, Held, PEA
8. Communication Networks, 2/e, Leon-Garcia, TMH

FAULT TOLERANT SYSTEMS

Unit I: Preliminaries:
Fault Classification, Types of Redundancy, Basic Measures of Fault Tolerance, Hardware Fault Tolerance, The Rate of Hardware Failures, Failure Rate, Reliability, and Mean Time to Failure, Canonical and Resilient Structures , Other Reliability Evaluation Techniques

Unit II: Information Redundancy :
Information Redundancy, Coding, Resilient Disk Systems, Data Replication, Voting: Hierarchical Organization, Primary-Backup Approach, Algorithm-Based Fault Tolerance

Unit III: Fault-Tolerant Networks:
 Measures of Resilience, Common Network Topologies and Their Resilience, Fault-Tolerant Routing

Unit IV: Software Fault Tolerance:
 Acceptance Tests, Single-Version Fault Tolerance, N-Version Programming, Recovery Block Approach, Preconditions, Postconditions, and Assertions, Exception-Handling, Software Reliability Models, Fault-Tolerant Remote Procedure Calls

Unit V: Checkpointing:
 What is Checkpointing? , Checkpoint Level, Optimal Checkpointing-An Analytical Model, Cache-Aided Rollback Error Recovery (CARER), Checkpointing in Distributed Systems, Checkpointing in Shared-Memory Systems, Checkpointing in Real-Time Systems

REFERENCE BOOK:
1. Fault Tolerant Systems, Israel koren, Mani Krishna, Elsevier, 2007
2. Fault Tolerant and Fault testable hardware design, Lala, BSP
3. Reliablity of Computer systems and networks(Fault Tolerance, analysis and Design), Martin L Shooman, Willey
4. FaultTolerant computer system Design, DK Pradhan(Ed), PHI, 1996
5. Software Fault tolerance Techniques and implementation, LL Pullam, Architect House
6. Reliable computer systems: Design and evaluation, siewiorek, swarz,AK Peters
7. Probability and statistics with reliability queuing and computer science applications, John wiley.
8. An Introduction to reliability and maintainability Engineering, Ebeling, MGH

MACHINE LEARNING

UNIT I: Introduction :

Well-posed learning problems, Designing a learning system, Perspectives and issues in machine learning
*Concept learning and the general to specific ordering – **Introduction, A concept learning task, Concept learning as search, Find-S: finding a maximally specific hypothesis, Version spaces and the candidate elimination algorithm, Remarks on version spaces and candidate elimination, Inductive bias.***

UNIT II: Decision Tree learning:

Introduction, Decision tree representation, Appropriate problems for decision tree learning, The basic decision tree learning algorithm, Issues in decision tree learning

UNIT III: Artificial Neural Networks:

Introduction, Neural network representation, Appropriate problems for neural network learning, Perceptions, Multilayer networks and the back propagation algorithm, Remarks on the back propagation algorithm, An illustrative example face recognition
Advanced topics in artificial neural networks
Evaluation Hypotheses : Motivation, Estimation hypothesis accuracy, Basics of sampling theory, A general approach for deriving confidence intervals, Difference in error of two hypotheses, Comparing learning algorithms

UNIT IV: Bayesian learning:

Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum likelihood and least squared error hypotheses, Maximum likelihood hypotheses for predicting probabilities, Minimum description length principle, Bayes optimal classifier, Gibs algorithm, Naïve bayes classifier, An example learning to classify text, Bayesian belief networks The EM algorithm

UNIT V: Computational learning theory :

Introduction, Probability learning an approximately correct hypothesis, Sample complexity for Finite Hypothesis Space, Sample Complexity for infinite Hypothesis Spaces - **Instance-Based Learning**- Introduction, k -Nearest Neighbor Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks on Lazy and Eager Learning
Genetic Algorithms :
Motivation, Genetic Algorithms, Hypothesis Space Search, Genetic Programming, Models of Evolution and Learning, Parallelizing Genetic Algorithms

REFERENCE BOOK:

1. Machine Learning ,Tom M. Mitchell, MGH
2. Machine Learning, An Algorithmic Perspective, Stephen Marsland, Taylor & Francis(CRC)
3. Introduction to Machine Learning, Ethem Alpaydin, PHI, 2004

MOBILE COMPUTING

Unit 1: Introduction to Mobile Communications and Computing:
Mobile Computing (MC): Introduction to MC, novel applications, limitations, and architecture GSM: Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services.
(Wireless) Medium Access Control:
Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA.

Unit II: Mobile Network Layer:
Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP).
Mobile Ad hoc Networks (MANETs):
Overview, Properties of a MANET, spectrum of MANET applications, routing and various routing algorithms, security in MANETs

Unit III: Mobile Transport Layer:
Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission /time-out freezing, Selective retransmission, Transaction oriented TCP.

Unit IV: Database Issues:
Hoarding techniques, caching invalidation mechanisms, client server computing with adaptation, power-aware and context-aware computing, transactional models, query processing, recovery, and quality of service issues.
Data Dissemination:
Communications asymmetry, classification of new data delivery mechanisms, push-based mechanisms, pull-based mechanisms, hybrid mechanisms, selective tuning (indexing) techniques.

Unit V: Protocols and Tools:
Wireless Application Protocol-WAP. (Introduction, protocol architecture, and treatment of protocols of all layers), Bluetooth (User scenarios, physical layer, MAC layer, networking, security, link management) and J2ME.

REFERENCE BOOKS:
1. Mobile Communications, 2/e, Jochen Schiller, 2004, *Addison-Wesley*.
2. Handbook of Wireless Networks and Mobile Computing, Stojmenovic , Cacute, *Wiley*, 2002
3. Mobile Computing Principles, Designing and Developing Mobile Applications with UML and XML, Reza Behravanfar, Cambridge, University Press, 2004.
4. Fundamentals of Mobile and Pervasive Computing, Adelstein, Frank, Gupta, Sandeep KS. Richard Golden , Schwiebert, Loren, TMH , 2005.
5. Principles of Mobile Computing, 2/e, Hansmann, Merk, Nicklous, Stober, *Springer*, 2003.
6. Mobile and Wireless Design Essentials, Martyn Mallick, Wiley *DreamTech*, 2003
7. Mobile Computing, Rajkamal, Oxford, 2008
8. Adhoc Wireless Networks, 2/e, Sivaram murthy, manoj, PEA, 2009

PARALLEL COMPUTING & ALGORITHMS

UNIT I: **Introduction:**
Computational demand in various application areas, advent of parallel processing, terminology-pipelining, Data parallelism and control parallelism-Amdahl's law. Basic parallel random access Machine Algorithms-definitions of P, NP and NP-Hard, NP-complete classes of sequential algorithms-NC –class for parallel algorithms.

UNIT II:
Organizational features of Processor Arrays, Multi processors and multicomputers. Mapping and scheduling aspects of algorithms. Mapping into meshes and hyper cubes-Load balancing-List scheduling algorithm

UNIT III:
Elementary Parallel algorithms on SIMD and MIMD machines, Analysis of these algorithms.

UNIT IV:
Matrix Multiplication algorithms on SIMD and MIMD models
Fast Fourier Transform algorithms. Implementation on Hyper cube architectures

UNIT V:
Parallel sorting methods---Odd-even transposition Sorting on processor arrays. Biotonic – merge sort on shuffle –exchange ID –Array processor,2D-Mesh processor and Hypercube Processor Array
Parallel Quick-sort on Multi processors. Hyper Quick sort on hypercube multi computers. Parallel search operations.

REFERENCE BOOKS:
1. Parallel computing theory and practice, MICHAEL J.QUINN
2. Programming Parallel Algorithms, Guy E. Blelloch, Communications of the ACM
3. Algorithms for Parallel processing, Michael T Heath, Abhiram Ranade, Schreiber(Ed), Springer.
4. Handbook of Parallel Computing Models, algorithms and applications, Samgithevar Rajasekharan, John Reif(Ed), Taylor and Franics group.
5. Parallel Processing and Parallel Algorithms: Theory and Computation, Seyed H. Roosta, Springer

PATTERN RECOGNITION

UNIT I : Introduction:
Fundamental problems in pattern Recognition system design, Design concepts and methodologies, Simple pattern recognition model.

Decisions and Distance Functions:
Linear and generalized decision functions, Pattern space and weight space, Geometrical properties, implementations of decision functions, Minimum-distance pattern classifications.

Probability - Probability of events:
Random variables, Joint distributions and densities, Movements of random variables, Estimation of parameter from samples.

UNIT - II: DECISION MAKING - Baye's theorem, Multiple features, Conditionally independent features, Decision boundaries, Unequal cost of error, estimation of error rates, the leaving-one-out-techniques, characteristic curves, estimating the composition of populations. Baye's classifier for normal patterns.

Non Parametric Decision Making:
histogram, kernel and window estimation, nearest neighbour classification techniques. Adaptive decision boundaries, adaptive discriminant functions, Minimum squared error discriminant functions, choosing a decision making techniques.

UNIT III: Clustering and Partitioning:
Hierarchical Clustering: Introduction, agglomerative clustering algorithm, the single-linkage, complete-linkage and average-linkage algorithm. Ward's method Partition clustering-Forg's algorithm, K-means's algorithm, Isodata algorithm.

UNIT IV: Pattern Preprocessing and Feature selection:
distance measures, clustering transformation and feature ordering, clustering in feature selection through entropy minimization, features selection through orthogonal expansion, binary feature selection.

UNIT V: Syntactic Pattern Recognition and Application of Pattern Recognition:
Concepts from formal language theory, formulation of syntactic pattern recognition problem, syntactic pattern description, recognition grammars, automata as pattern recognizers, Application of pattern recognition techniques in bio-metric, facial recognition, IRIS scon, Finger prints, etc.,

REFERENCES BOOKS:
1. Pattern recognition and Image Analysis, Gose. Johnsonbaugh Jost, PHI.
2. Pattern Recognition Principle, Tou. Rafael. Gonzalez, Pea.
3. Pattern Classification, Richard duda, Hart., David Strok, Wiley.

SCALABLE PARALLEL COMPUTING ARCHITECTURES

Unit I: Parallel Computer Models, Program and Network Properties: Parallel Computer Models: Multiprocessors and Multicomputer, Multivector and SIMD Computers, PRAM and VLSI Models, Architectural Development Tracks
Program and Network Properties: Conditions of Parallelism, Program Partitioning and Scheduling, Program Flow Mechanisms, System Interconnect Architectures.

Unit II: Principles of Scalable Performance, Parallel Models, Languages and Compilers : Principles of Scalable Performance: Performance Metrics and Measures, Parallel Processing Applications, Speedup Performance Laws, Scalability Analysis and Approaches.
Parallel Models, Languages and Compilers: Parallel Programming Models, Parallel Languages and Compilers, Dependence Analysis of Data Arrays, Code Optimization and Scheduling, Loop Parallelization and Pipelining.

Unit III: Processors and Memory Hierarchy: Advanced Processor Technology, Superscalar and Vector Processors, Memory Hierarchy Technology, Virtual Memory Technology.
 Bus, Cache, and Shared Memory: Backplane Bus Systems, Cache Memory Organizations, Shared-Memory Organizations, Sequential and Weak Consistency Models.

Unit IV: Pipelining and Superscalar Techniques:
Linear Pipeline Processors, Nonlinear Pipeline Processors, Instruction Pipeline Design, Arithmetic Pipeline Design, Superscalar and Super pipeline Design

Unit V: Multiprocessors and Multicomputers:
Multiprocessor System Interconnects, Cache Coherence and Synchronization Mechanisms, Three Generations of Multicomputers, Message-Passing Mechanisms.
Multivector and SIMD Computers: Vector Processing Principles, Multivector Multiprocessors, Compound Vector Processing, SIMD Computer Organizations: BSP and CM2 Architectures, The Connection Machine CM-5: CM5 Architecture and Inter process communication.

REFERENCE BOOKS:
1. Advanced computer Architecture,Parallelism, Scalability, Programmability. Kai Hwang, TMH
2. Computer Architecture,A quantitative approach, 4/e, John L. Hennessey , David A. Patterson, Morgan Kaufmann / Elsevier, 2007.
3. Parallel Computing Architecture, A hardware/ software approach , David E. Culler, Jaswinder Pal Singh, Morgan Kaufmann / Elsevier, 1997.
4. Computer Organization and Architecture, Designing for Performance, 7/e, William Stallings, Pearson, 2006.
5. Computer Organization and Design, 4/e, Patterson , Hennessy Elsevier India, 2008.
6. Computer Architecture & Parallel Processing, Kai Hwang, Faye A. Briggs, TMH.
7. Parallel programming, 2/e, Wikinson, Allen, Pea.

SECURED DATABASE APPLICATIONS DEVELOPMENT

Unit I: Security Architecture:
Introduction, Security, Information Systems, Database management systems, Information security, Information security Architecture, database security, Asset types and their value, Security methods.
Operating System Security Fundamentals:
Introduction, operating systems overview, security environment, components, Authentication methods, user administration, password policies, Vulnerabilities of operating systems, E-Mail security.

Unit II: Administration of Users :
Introduction, user authentication, operating system authentication, creating/removing/modifying users, default/remote users, Database links, Linked servers, remote servers.
 Profiles, Password Policies, Privileges, and Roles: Introduction, Defining and using profiles, Designing and implementing password policies, Granting and revoking user privileges, creating, Assigning and revoking user roles.

Unit III: Database Application Security Models :
Introduction, Types of users, security models, application types, application security models and Data encryption.

Unit IV: Virtual Private Databases (VPD):
Introduction, Overview, implementing a VPD using views and application context. Implementing oracle VPD, Viewing VPD policies and application context using: data dictionary, policy manager, implementing row and column level security with SQL server.

Unit V: Database Auditing Models, Application Data Auditing:
Database Auditing Models: Introduction, Auditing overview, environment, process, objectives, classification and types, benefits and side effects of auditing.
Application Data Auditing: Introduction, DML auction auditing architecture. Triggers, fine grained auditing, DML statement audit trail and auditing application errors with Oracle.

REFERENCE BOOKS:

1. Database Security and Auditing, Hassan Afyouni, Cengage Learning, 2007
2. Database Security, S. Castano, M. Fugini, G. Martella, P. Samarati, Addison-Wesley, 1994
3. Implementing Database Security and Auditing, RonBen Natan: Elsevier, Indian reprint, 2006
4. Principles of Distributed Database Systems, Prentice Hall,2/e, M.TamerÖzsu, Patrick Valdureiz
5. Database Security, Castano, Fugini, Addison Wesley
6. The security Audit and control of Databases, Clark, Holloway, List, UK:Ashgate.
7. Security and Audit of Database System, Douglas, Blackwell(UK)
8. Database security and Integrity, Fernandez, Summers, Wood, Addison Wesley

WIRELESS NETWORKS AND MOBILE COMPUTING

UNIT I : INTRODUCTION TO MOBILE AND WIRELESS LANDSCAPE: Definition of Mobile and Wireless, Components of Wireless Environment, Challenges, Overview of Wireless Networks, Categories of Wireless Networks, Wireless LAN : Infra red Vs radio transmission, Infrastructure and Ad-hoc Network, IEEE 802.11, HIPERLAN, Bluetooth.

UNIT   III: MOBILE NETWORK LAYER & TRANSPORT LAYER: MOBILE NETWORK LAYER: Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunnelling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP), Mobile Ad-hoc networks : Routing, destination Sequence Distance Vector, Dynamic Source Routing.
MOBILE TRANSPORT LAYER: Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission/time-out freezing, Selective retransmission, Transaction oriented TCP.

UNIT III: GSM: GLOBAL SYSTEM FOR MOBILE COMMUNICATIONS (GSM): GSM Architecture, GSM Entities, Call Routing in GSM, PLMN Interfaces, GSM Addresses and Identifiers, Network Aspects in GSM, GSM Frequency Allocation, Authentication and Security.

UNIT   IV : PROTOCOLS AND TOOLS: Wireless Application Protocol-WAP. (Introduction, protocol architecture, and treatment of protocols of all layers), Bluetooth (User scenarios, physical layer, MAC layer, networking, security, link management) and J2ME.

UNIT - V: WIRELESS LANGUAGE AND CONTENT – GENERATION TECHNOLOGIES: WIRELESS LANGUAGE AND CONTENT – GENERATION TECHNOLOGIES: Wireless Content Types, Markup Languages: HDML, WML, HTML, cHTML, XHTML, VoiceXML.
Content- Generation Technologies: CGI with Perl, Java Servlets, Java Server Pages, Active Server Pages, XML with XSL Stylesheets, XML Document, XSL Stylesheet
MOBILE AND WIRELESS SECURITY: Creating a Secure Environment, Security Threats, Security Technologies, Other Security Measures, WAP Security, Smart Client Security

REFERENCE BOOKS:
1. Mobile Communications, 2/e, Jochen Schiller, PEA, 2008.
2.   Mobile and Wireless Design Essentials, Martyn Mallick, Wiley, 2008.
3. Mobile Computing, Asoke K Talukder, et al,, MGH, 2008.
4. Mobile Computing,Raj Kamal,Oxford .
5.   Wireless Communications & Networks, 2/e, William Stallings, PEA, 2007.
6.   Fundamentals of Mobile and Pervasive Computing, Frank Adelstein et al, TMH, 2005.
7.   Wireless Networks first-step, Jim Geier, PEA, 2005.
8.   2.5G Mobile Networks: GPRS and EDGE, Sumit Kasera et al, TMH, 2008.
9.   802.11 Wireless Networks,2/e, Matthew S.Gast, O'Reilly, 2006.
10. Handbook of Wireless Networks and Mobile Computing, Ivan Stojmenovic , Wiley, 2007.