

ANNA UNIVERSITY COIMBATORE

M.Tech (Information Technology)

CURRICULUM 2007 - FULL TIME MODE

SEMESTER – I

Code No.	Course Title	L	T	P	M
Theory					
	Optimisation Techniques	3	1	0	100
	Advanced Java Programming	3	0	0	100
	Data Structures and Algorithms	3	0	0	100
	Computer Communication Networks	3	0	0	100
	Information Security	3	1	0	100
	Advanced Database Technology	3	1	0	100
Practicals					
	Data Structures Lab using Java	0	0	3	100

SEMESTER – II

Code No.	Course Title	L	T	P	M
Theory					
	Software Engineering Methodologies	3	1	0	100
	Distributed Component Architecture	3	0	2	100
	Object Oriented Systems	3	0	0	100
	Advanced Operating Systems	3	0	0	100
	Web Technologies	3	0	0	100
	Elective – I	3	0	0	100
Practicals					
	Operating Systems Lab	0	0	3	100

SEMESTER – III

Code No.	Course Title	L	T	P	M
Theory					
	Elective - II	3	0	0	100
	Elective - III	3	0	0	100
	Elective - IV	3	0	0	100
	Technical Seminar	0	0	3	100
	Project Phase - I	3	0	0	100

SEMESTER IV

PROJECT PHASE 2

Possible Elective Subjects:

1. Software Project Management
2. Mobile Networking
3. Distributed Computing
4. Grid Computing
5. Pervasive Computing
6. Soft Computing
7. Bioinformatics
8. Data warehousing and Data mining
9. ERP
10. Management Information systems
11. Agent Based Intelligent Systems
12. Multimedia Communication systems

1. LINEAR PROGRAMMING (12)

Linear Programming: Graphical method, Simplex method, Revised simplex method, Duality in Linear Programming (LP), Sensitivity analysis, other algorithms for solving problems, Transportation, assignment and other applications.

2. NON LINEAR PROGRAMMING (12)

Non Linear Programming: Unconstrained optimization techniques, Direct search methods, Descent methods, constrained optimization.

3. INTEGER PROGRAMMING (12)

Formulation of Integer Programming problems, Gomory's cutting plane methods, Branch and Bound Techniques.

4. DYNAMIC PROGRAMMING (12)

Characteristics of Dynamic Programming, Bellman's principle of optimality, Concepts of dynamic programming, tabular method of solution, Calculus method of solution.

5. PERT/CPM (12)

Network Construction-computation of earliest start time, latest start time, Total, free and independent float time-Crashing-Computation of optimistic, most likely Pessimistic and expected time-Resource analysis in Network scheduling.

Total No. of Periods: 45

REFERNCES:

1. Taha, H.A., "Operations Research: An Introduction", Pearson Education, New Delhi, 2002.
2. S.S. Rao, "Engineering Optimization: Theory and practice", New Age International, New Delhi, 2000.
2. Trivedi K.S., "Probability and Statistics with Reliability , Queuing and Computer Applications", Prentice Hall, New Delhi, 2003.

Advanced Java Programming

3 0 0 100

1. Introduction to Java Programming

9

Features – Java development environment – exception handling – Applets – Design of XML documents – Generating an XML document – Parsing XML.

2. Swing

9

Swing mechanism – Frames – Panels and Borders – Layout manager – Label and buttons – Tabbed panes – Scrolling panes – Combo boxes – List boxes and spinners – Menus – Table – Trees – Constructing and XML editor

3. Java Servlets

9

Design – Servlet life cycle – Multithreaded Servlets – Handling exception – Session Management – filters

4. Java server pages

9

Basic JSP life cycle – JSP elements – Implicit objects – TOMCAT – JSTL

5. Enterprise Java Beans

9

Introduction – EJB container – classes – interfaces – Deployment description – Session Java bean – Entity Java bean – Message driven bean – JAR file

Total No. of Periods: 45

References:

1. Herbert Schildt, "Java Complete Reference", Tata McGraw Hill, 2005
2. Jim Keogh, "J2EE – Complete Reference", Tata McGraw Hill, 2003

1. INTRODUCTION**(8)**

Basic concepts of OOPs – Templates – Fundamentals of Analysis of Algorithm Efficiency – ADT - List (Singly, Doubly and Circular) Implementation - Array, Pointer

2. BASIC DATA STRUCTURES**(9)**

Stacks and Queues – ADT, Implementation and Applications - Trees – General, Binary, Binary Search, Expression Search, AVL, Splay, B-Trees – Implementations - Tree Traversals

3. ADVANCED DATA STRUCTURES**(10)**

Set – Implementation – Basic operations on set – Priority Queue – Implementation - Graphs – Directed Graphs – Shortest Path Problem - Undirected Graph - Spanning Trees – Graph Traversals

4. SEARCHING AND SORTING**(9)**

Searching Techniques, Sorting – Internal Sorting – Bubble Sort, Insertion Sort, Quick Sort, Heap Sort, Bin Sort, Radix Sort – External Sorting – Merge Sort, Multi-way Merge Sort, Polyphase Sorting

5. ALGORITHM DESIGN TECHNIQUES**(9)**

Design Techniques - Divide and Conquer - Dynamic Programming - Greedy Algorithm – Backtracking - Local Search Algorithms

Total No. of Periods: 45**REFERNCES:**

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Pearson Education, 2002.
2. A. Levitin, "Introduction to The Design and Analysis of Algorithms ", 2nd edition, Addison Wesley, 2007 (chapter 2)
3. Horowitz, Sahni, Rajasekaran, "Computer Algorithms", Galgotia, 2000
4. Tanenbaum A.S., Langram Y, Augestien M.J., "Data Structures using C & C++", Prentice Hall of India, 2002
5. Aho, Hopcroft, Ullman, "Data Structures and Algorithms", Pearson Education, 2002.

1. INTRODUCTION: (9)

Networking basics - LANs and WANs - Network hardware components, Server-based networks - Peer-to-peer networks - Server-based vs. peer-to-peer networks - Specialized servers - Combination networks - Network packets - Addressing packets - Multiplexing - Protocols - The OSI reference model - Internet Protocol Stack

2. DATA LINK CONTROL: (9)

Asynchronous and Synchronous transmission - MAC protocol; Controlled & contention-based - IEEE 802.11 LANs - IEEE 802.11a,802.11g - System architecture, protocol architecture- physical layer, Media Access Control - MAC management - Data Transmission Module wrap-up LAN architecture - Error Detection and Correction Techniques - CRC and Linear Block Codes - Transmission Protocols - Retransmission techniques -Token ring - FDDI

3. NETWORK PROTOCOLS: (9)

IP Layers and functions - Congestion control - X.25 - Internetworking concepts and X.25 architectural models - Naming addressing and routing using IP - Unreliable connectionless delivery - Datagram's - Routing IP datagram's - ICMP.

4. INTERNETWORKING: (9)

LAN Addresses and ARP - Bridges, and Switches - Hubs - Routers - Brouters - gateways and Repeaters - Choice for Implementation - File Transfer: FTP - Electronic Mail in the Internet - DNS - Socket Programming with UDP -Building a Simple Web Server

5. NETWORK MANAGEMENT: (9)

The dial-in end-user - the direct connection user - the Internet Service Provider - the global Internet - emerging technologies over the Internet: IPv6 and ATM for a multimedia network - desktop conferencing and collaboration - mobile Internet - high-quality audio - Push Technologies

Total No. of Periods: 45**References:**

1. Fitzgerald and Dennis, "Business Data Communications and Networking", John Wiley and Sons, New Delhi, 2004
2. William Stallings, "Data and Computer Communications", Prentice Hall, New Delhi, 2005

Information Security

3 1 0 100

1. CONVENTIONAL AND MODERN ENCRYPTION: (9)

Services – Attacks – Steganography - Classical Encryption Techniques – DES – Differential and Linear Cryptanalysis – Modes of operation – Encryption Algorithms – Triple DES – Blowfish – CAST128

2. PUBLIC KEY ENCRYPTION: (9)

Uniqueness – Number Theory concepts – Primality – Modular Arithmetic – Fermat & Euler Theorem – Euclid Algorithm – RSA Algorithm – Elliptic Curve Cryptography – Diffie Hellman Key Exchange

3. AUTHENTICATION AND SECURITY PRACTICE: (9)

Digests – Requirements – MAC – Hash function – Security of Hash and MAC – Birthday Attack – MD5 – SHA – RIPEMD – Digital Signature Standard – Authentication applications – Kerberos – Kerberos Encryption Techniques – PGP– IP Security Architecture– Web security – SSL – TLS – SET

4. PUBLIC- KEY INFRASTRUCTURE: (6)

Legislation - Regulation and Guidelines, Non-repudiation - Certification Policies and Practices- Public-Key Infrastructure Assessment and Accreditation

5. SYSTEM SECURITY: (6)

Intruders and Intrusion – Viruses and Worms – OS Security – Firewalls – Design Principles – Packet Filtering – Application gateways – Trusted systems – Counter Measures

6. STANDARDS: (6)

Blueprint for Security – Information Security Policy – Standards and Practices – ISO 17799/BS 7799 – NIST Models – VISA International Security Model – Design of Security Architecture – Planning for Continuity

L – 45 T – 15 Total – 60

References:

1. William Stallings, "Cryptography & Network Security", Pearson Education, New Delhi 2005
2. Charlie Kaufman, Radia Perlman, Mike Speciner, "Network Security, Private Communication in a Public World", PHI, New Delhi, 2002.
3. Bruce Schneier, Niels Ferguson, "Practical Cryptography", Wiley Dreamtech India Pvt Ltd, New Delhi, 2003.

1. INTRODUCTION**9**

Review of the formal relational data model - Database architecture, Components of database management system – DDL, DML. Database Security and Database recovery, Creating SQL Databases and Tables, Defining tables and views, Specifying integrity constraints, Selecting Data, Queries – stored procedures and functions - triggers and active databases

2. DATABASE DESIGN ISSUES:**9**

ER Model - Normalization - Security - Integrity - Consistency - Database Tuning - Optimization and Research Issues – Design of active databases - spatio-temporal databases - multi-media databases

3. TRANSACTION PROCESSING:**9**

Introduction – Properties of transaction – Serializability – Concurrency control – Locking mechanisms – two-phase commit protocol – dead locks – Database recovery

4. DISTRIBUTED DATABASES:**(9)**

Architecture- Design considerations-Interoperability Query processing - semi-joins - query optimization - Concurrency control – transactions and Heterogeneity issues – schema translation and schema integration

5. OBJECT ORIENTED DATABASES:**(9)**

Object-oriented data models - Object Identity and its implementation – Supporting object modeling in database systems--Database programming and querying in object-oriented databases - ODMG standard, including ODL, OQL – Comparing RDBMS with OODBMS

L – 45 T – 15 Total – 60**References:**

1. Raghuram Ramakrishnan, Johannes Gehrke, "Database Management Systems", Tata Mc- Graw Hill, New Delhi, 2004
2. Barry, Eaglestone and Mick, Ridley, "Object Databases: An Introduction", Tata Mc-Graw Hill, New Delhi., 1998.
3. Mario Piattini, Oscar Diaz, "Advanced database Technology and Design", Artech House Publishers, Massachusetts, 2000.
4. Ozsu M. T. & Valduriez P., "Principles of Distributed Database Systems". , Prentice Hall, New Delhi, 1999.

MIT107 DATA STRUCTURES LABORATORY

0 0 3 100

1. Implementation of List (Single, Double, Circular)
2. Implementation of Stack
3. Implementation of Queue.
4. Implementation of Searching Techniques (any Three)
5. Implementation of Sorting Techniques (any Three)
6. Implementation of Hash table
7. Implementation of Heaps
8. Implementation of AVL Rotations
9. Implementation of Prim's Algorithm.
10. Implementation of Breadth First Search Techniques.
11. Implementation of Depth First Search Techniques.
12. Implementation of Dijkstra's Algorithm.
13. Implementation of Kruskal's Algorithm.

MIT 201 SOFTWARE ENGINEERING METHODOLOGIES

3 1 0 100

1. PROCESS AND PROJECT MANAGEMENT

9

Software Process models – process iteration – process activities – rational unified process – computer aided software engineering. Management activities – project planning – project scheduling – risk management.

2. REQUIREMENT ANALYSIS

9

Functional and Non – functional requirements – user requirements - system requirements – interface specifications – software requirements document. Requirements engineering processes – feasibility studies – elicitation and analysis – validations – management - System Models – Context – Behavioural – Data – Object – Structured

3. SOFTWARE DESIGN

9

Architectural Design – Distributed Systems Architectures – Application Architectures – Object Oriented Design – Real-time Software Design.

4. SOFTWARE TESTING

9

Software testing fundamentals – Test Case Design – White Box - Basis Path Testing – Control Structure Testing – Block Box – Testing for Specialized environments, Architectures and Applications Software Testing Strategies – Approach – issues – testing – unit – integration – validation – system – art of debugging

5. SOFTWARE QUALITY ASSURANCE

9

Software Quality Concepts – Quality Assurance – Software Technical Reviews – Formal Approach To Software Quality Assurance - Reliability – Quality Standards – Software Quality Assurance Plan – Software Maintenance - Software Configuration Management – configuration item – process – objects in the software configuration – version control – change control – configuration audit – status reporting – SCM Standards – Case study : Martha Stockton Greengage (MSG) foundations.

L - 45 T-15 Total - 60

REFERENCES:

1. Roger S. Pressman, Software Engineering: A Practitioner's Approach", Sixth Edition, McGraw Hill, 2005. (chapter 8, 9, 17 ,18)
2. Sommerville, Software Engineering, V Edition: Addison Wesley, 1996. (Chapter 4, 5, 6,7,8, 11 – 15).

Distributed Component Architecture

3 1 0 100

1. INTRODUCTION:

(9)

Evolution of Distributed Systems – Distributed Objects – Issues in design of Distributed Object Systems – multi tier architectures – component concepts – Component based Software Development

2. CORBA TECHNOLOGIES:

(12)

OMA – CORBA architecture - Object Request Broker Structure - Interface Definition language — Portable Object Adapter – Object and invocation life cycles - Interceptors - CORBA services – Object location service – messaging service – security service – CORBA Component Model - steps in creating a CORBA application using SII and DII.

3. COM AND DCOM

(9)

From COM to Distributed COM – OLE - ActiveX – ATL – DCOM – COM IDL – COM Interfaces – COM threading models - COM services – Security - MTS – Clustering – MSMQ - steps in creating and deploying COM using ATL.

4. EJB

(7)

Introduction – EJB architecture – types of beans – life cycle of beans – steps in creating and deploying an EJB application.

5. OTHER DISTRIBUTED OBJECT MODELS

(8)

Java RMI - Java Beans – MDA - .NET - Comparison between different distributed models and their interoperability

L - 45 T-15 Total - 60

REFERENCES

1. Clemens Szyperski, “Component Software: Beyond Object-Oriented Programming”, Pearson Education, New Delhi, 2003
2. G Sudha Sadasivam, “ Distributed Component Architecture”, Wiley India Pvt. Ltd., New Delhi, 2007
3. Ed Roman, “Enterprise Java Beans”, Wiley, New York, 2004
4. Gerald Brose, Andreas Vogel, Keith Duddy, “Java Programming with CORBA”, John Wiley, New York, 2003,

1. INTRODUCTION**4**

Overview of System Analysis- Structured System Analysis vs. Object Oriented Analysis- Examples.

2. OBJECT MODELING**8**

Objects & Classes- Links and Associations- Object model- Evolution of object models- Applications- Object classifications – Generalization – Aggregation- Abstract Classes- Metadata-Candidate keys-Constraints.

3. FOUNDATION OF OBJECT ORIENTED COMPUTING**8**

Major foundations: Inheritance – Polymorphism – Overriding – Overloading Minor foundations: Typing - Concurrency – Persistence Object Oriented Language Vs. Object Based Language

4. UML & USE CASE MODELING**10**

Introduction to UML- Need for UML- Diagrams for Analysis & Design- Extended UML - Use Cases in UML: Describing - Testing – Realizing.

5. UML BEHAVIOR MODELING**10**

Static - Class diagram- Object diagram. Dynamic State Transition Diagrams- Interaction Diagrams- Module Diagrams- Process Diagrams.

6. CASE STUDY**4**

Cruise Control System - Automatic Teller Machine – Library Management System – Inventory Control System.

Total No. of Periods : 45 L + 30 P = 75**REFERENCES**

1. Rumbaugh J, Blaha M, Premerlani W, Eddy F and Lorenzen W., “Object Oriented Modeling and Design”, PHI/ Pearson Education, New Delhi, 2004.
2. Ali Bahrami, “ Object Oriented System Development”, Tata McGraw Hill, New Delhi, 1999.
3. Grady Booch, “ Object Oriented Analysis and Design with Applications”, Pearson Education, Singapore, 2000.

OPERATING SYSTEMS

3 0 0 100

1. INTRODUCTION (7)

Main frame Systems, Desktop Systems – Multiprocessor Systems – Distributed Systems – Clustered Systems – Real Time systems – Hand held Systems, Operating Systems Structures: System Components – Operating System Services - System calls - System Programs – System Design and Implementation - CPU scheduling: Basic Concepts – Scheduling Algorithms.

2. PROCESS MANAGEMENT (11)

Process Concepts - Process Scheduling - Operation on Process - Co-Operating process - Inter Process Communication - Threads: Multithreading Models - Process Synchronization: The Critical Section Problem – Synchronization Hardware - Semaphores – classical problem of Synchronization – Monitors - Deadlock: Deadlock Characterization - Methods for handling Deadlocks - Deadlock Prevention – Deadlock Avoidance - Deadlock Detection – Recovery from Deadlock.

3. MEMORY MANAGEMENT (9)

Background – Swapping - Contiguous Memory Allocation - Paging - Segmentation – Segmentation with paging - Virtual Memory: Demand paging - Page Replacement - Thrashing. Buddy Systems – Storage Compaction

4. FILE SYSTEMS (9)

File Concepts - Access methods - Directory Structure - File Protection - File System Implementation: File System Structure and Implementation – Directory Implementation – Allocation methods Free Space Management – Recovery - Disk Structure – Disk Scheduling.

5. DISTRIBUTED OPERATING SYSTEM (9)

Design issues in distributed operating system-Distributed file systems - Naming and Transparency-Remote File Access-Stateful versus Stateless service – Distributed Coordination- Event Ordering-Mutual Exclusion- Atomicity-Concurrency Control- Deadlock Handling-Election Algorithms-Case Study-Linux.

Total No. of Periods: 45

REFERENCES:

1. Silberschatz, Galvin, Gagne “ Operating System Concepts” Sixth Edition, 2003
2. Pradeep K.Sinha, “Distributed OS concepts and Design”, IEEE computer Society Press, PHI 1998.
3. Andrew S. Tanenbaum , “Modern Operating Systems”, PHI , 2nd Edition 2001
4. Achut S. Godbole and Kahate Atul , “Operating Systems & Systems Programming ”, Tata Mcgraw Hill, 2003.
5. Charles Crowley, “ Operating systems: A Design Oriented Approach”, Tata McGraw Hill, 1999.

1. XML TECHNOLOGIES: (9)

XML fundamentals – Document Type Definitions – XML Schema – Benefits - XML Schema Vocabulary - Converting DTDs to Schemas - Validating Documents against Schemas - Basics of Namespace - Declaring Namespaces - Xlink – Xpointer - Xpath – XSL – XSLT- XML as document format- XML on the Web. Document Object Model – concepts and API.

2. WEB SERVICES TECHNOLOGIES: (9)

Introduction to SOAP – Relation to XML RPC – Message Syntax – Envelope – Header – Body - SOAP Transport WSDL - Capabilities – Format – Semantics - Encoding - Endpoint UDDI - . The UDDI data structures - Publishing Services - The Publish API - Finding Services - The Inquiry API - Invoking a service. Introduction to .NET – web service architecture – RPC style web services – Message Style Web services

3. ebXML: (9)

Overview - Collaboration Protocol Profile and Agreement (CPP and CPA) - Core components - Business modeling – Registry - XML with JSP /Servlet – XML and Messaging services (JMS) - Transactions – XML and Databases

4. J2EE AND WEB SERVICES: (9)

Enterprise Web services (J2EE and Web services) - The back end service component - The Web application framework - The Web service front end - The Web service client - S2ML (Secure Services Markup Language) - XAML (Transaction Authority Markup Language)

5. XML AND CONTENT MANAGEMENT: (9)

Semantic Web – Role of Meta data in web content - Resource Description Framework – RDF schema – Architecture of semantic web – content management workflow – XLANG – WSFL

REFERENCES:

1. Harold and Means, “XML in a Nutshell”, O’Reilly Publishers, Orlando, 2004
2. Ron Schmelzer et al. “XML and Web Services”, Pearson Education, New Delhi, 2002
3. Sandeep Chatterjee and James Webber, “Developing Enterprise Web Services: An Architect’s Guide”, Prentice Hall, New Delhi, 2004.
4. Frank P.Coyle, “XML, Web Services and the Data Revolution”, Pearson Education, New Delhi, 2002

1. Implementation of the following CPU scheduling algorithms
 - i) FCFS
 - ii) Round Robin
 - iii) SJF
2. Implementation of the mutual exclusion problem using Dekker's Algorithm
3. Implementation of IPC Problem (Producer – consumer / Reader – writer problem) using semaphores.
4. Implementation of Best-fit, First-fit algorithms for memory management
5. Implementation of memory allocation with pages.
6. Implementation of FIFO page replacement algorithms
7. Implementation of LRU page replacement algorithms
8. Implementation of the creation of Shared Memory segment
9. Implementation of File Locking
10. Implementation of Banker's Algorithm

SOFTWARE PROCESS MANAGEMENT 3 0 0 100

1. SOFTWARE PROCESS	7
Process Maturity – Capability Maturity Model (CMM) – Variations in CMM - Productivity improvement process	
2. PEOPLE MANAGEMENT	6
Organization structure – Difficulties in people management - Effective team building – Role of Project manager - Team structures – Comparison of different team structures	
3. SOFTWARE METRICS	7
Role of metrics in software development - Project metrics – Process metrics – Data gathering - Analysis of Data for measuring correctness, integrity, reliability and maintainability of Software products	
4. PROJECT MANAGEMENT	7
Project initiation – Feasibility study - Planning – Estimation - Resource allocation	
5. RISK MANAGEMENT	6
Risk analysis and management – Types of Risk involved - RMM plan	
6. PROJECT SCHEDULING AND TRACKING	6
Scheduling - Critical path – Tracking - Timeline chart – Earned value chart	
7. SOFTWARE CONFIGURATION MANAGEMENT	6
Baselines-Software configuration items-The SCM process-Version control-Change control-Configuration audit-SCM standards.	

Total 45

REFERENCES

1. Roger S Pressman, “ Software Engineering, A Practitioner’s Approach” McGraw Hill Edition, Fifth Edition, New Delhi, 2001.
2. Watts Humphrey, “ Managing the Software Process “, Pearson Education, New Delhi, 2000.
3. Pankaj Jalote, “Software Project Management in practice”, Pearson Education, New Delhi, 2002.
4. Watts Humphrey, “Introduction to the Team Software Process”, Perason Education, NewDelhi, 2002.

MOBILE NETWORKING 3 0 0 100

1. ISSUES IN THE DESIGN OF A MOBILE COMMUNICATION SYSTEM 7

Analog cellular communication: Architecture-Network elements-Radio Transmission – Logical channels-Messages.

2. NETWORK OPERATIONS 6

Mobility management-authentication-Radio resources management -status.

3. CELLULAR CONCEPT 6

Frequency Reuse-Reuse distance-cluster size- channel assignment strategies-handoff strategies-co-channel interference-system capacity trunking and grade of service.

4. ADVERTISEMENT AND REGISTRATION 10

Agent Solicitation and Discovery mechanism-router discovery protocol-Agent Advertisement-Agent Operation-Agent Discovery-Registration Overview-Authentication Overview-Registration Request, Reply and Extensions-Mobile Node Registration Procedures-Foreign Agent Registration Actions-Home agent Processing-Security and Patent Issues.

5. DATAGRAMS AND ROUTE OPTIMIZATION 6

Tunneling Overview and terminology-Encapsulations-Routing Failures-Tunnel Management-Decapsulation -Unicast, Broadcast and Multicast Datagram Routing-Mobile Routers-Route Optimization-Message Format-Extensions-Mobile Key Requests.

6. IP VERSION 6 AND DHCP 10

Mobility Support in IP Version 6-Bindings-Movement Detection-home Agent Discovery-Smooth hand-off-Renumbering- DHCP-Client/Server Protocol-Option Handling-portability and Mobility-Dual Mode Operation-Home address–Multi homing-Administration and Security. WAP protocol.

TOTAL : 45

REFERENCES:

1. Charles E Perkins, "Mobile IP: Design Principles and Practices", Addison Wesley, 1998.
2. James D Solomon, "Mobile IP", Prentice Hall Inc., 1998.
3. David J. Goodman, "Wireless Personal Communication systems", Addison Wesley Wireless Communication Series, 1999.

DISTRIBUTED SYSTEMS

3 0 0 100

1. INTRODUCTION

5

Definition - System models- Design issues of distributed operating systems –
Distributed Computing environment

2. COMMUNICATION

9

Message Passing: Features and Issues –Synchronization-Buffering – Process
addressing – Failure handling- Remote Procedure Call: Model – Implementation
–Stub generation –RPC messages-Marshaling –Server management-Call
semantics

3. SYNCHRONIZATION

6

Clock synchronization -physical clocks- logical clocks- Election algorithms-
Mutual exclusion – Deadlocks

4. TRANSACTIONS

5

Transaction model- Classification – Implementation – Concurrency control.

5. PROCESS MANAGEMENT

5

Process migration: Features – Mechanism –Threads: Models, Issues,
Implementation.

6. RESOURCE MANAGEMENT

5

Features-Task assignment approach–Load Balancing approach–Load sharing
approach.

7. NAME SERVICES

5

Names, Identifiers and Addresses- Name resolution- Name space
implementation- Domain Name System- Name Caches-Security.

8. CASE STUDY: Amoeba- Mach.

5

Total 45

REFERENCES:

1. Pradeep K Sinha, "Distributed Operating Systems: Concepts and Design", PHI / Prentice Hall of India, New Delhi, 2005.
2. George Coulouris, Jean Dollimore, "Distributed Systems Concept and Design", Pearson Education, New Delhi, 2005.
3. Andrew S.Tanenbaum, Marteen van steen "Distributed Systems Principles and Paradigms", PHI / Pearson Education,New Delhi, 2005.
4. Nancy A Lynch, "Distributed Algorithms", Morgan Kaufmann Publishers, Indian Reprint, New Delhi, 2000.

GRID COMPUTING

3 0 0 100

1. INTRODUCTION 8

The Grid – History - The Evolution of the Grid – comparison with P2P, Cluster and Internet Computing – Grid Computing Model – Types of Grids – Grid Application Characteristics – Business value of Grid Computing

2. THE ANATOMY OF THE GRID 7

The concept of virtual organizations – Grid architecture – Grid architecture and relationship to other Distributed Technologies – computational and data Grids, semantic grids

3. THE OPEN GRID SERVICES ARCHITECTURE 10

Analogy for OGSA – Evolution of OGSA – OGSA overview – Building on the OGSA Platform – Implementing OGSA – based Grids

4. THE OPEN GRID SERVICES INFRASTRUCTURE 10

Technical details of OSGI specification, service data concepts, Naming and Change Management Recommendations – OGSA basic services

5. APPLICATION CASE STUDY 10

Study of Globus Toolkit Architecture – Services offered by Globus Toolkit – Deployment

Global Grid architecture - Grid Computing Adoption in Research and Industry – GlobeXplorer – NRC-CBR biogrid – White Rose Grid – Grids in life sciences Molecular Modeling for Drug Design, Resource management and scheduling, Setting up Grid, , and application execution

TOTAL 45

REFERENCES:

1. Ahmar Abbas, “Grid Computing: Practical Guide to Technology and Applications”, Delmar Thomson Learning, USA, 2004.
2. Ian Foster, Carl Kesselman, “The Grid2: Blueprint for a New Computing Infrastructure”. Morgan Kaufman, New Delhi, 2004
3. Joshy Joseph, Craig Fallenstein, “Grid Computing”, Pearson Education, New Delhi, 2004.
4. Fran Beramn, Geoffrey Fox, Anthony Hey J.G., “Grid Computing: Making the Global Infrastructure a Reality”, Wiley, USA, 2003.

PERVASIVE COMPUTING

3 0 0 100

1. PERVASIVE COMPUTING APPLICATION

9

Pervasive Computing devices and Interfaces – Device technology trends, Connecting issues and protocols, pervasive computing principles

2. PERVASIVE COMPUTING AND WEB BASED APPLICATIONS

9

XML and its role in Pervasive Computing - Wireless Application Protocol (WAP) Architecture and Security – Wireless Mark-Up language (WML)

3. MIDDLEWARE COMPONENTS

10

Programming consumer devices, Smart card programming, messaging components, Database components

4. PDA IN PERVASIVE COMPUTING

8

Introduction - PDA software Components, Standards, emerging trends - PDA Device characteristics - PDA Based Access Architecture

5. USER INTERFACE ISSUES IN PERVASIVE COMPUTING

9

Architecture - Smart Card- based Authentication Mechanisms - Wearable computing Architecture
(8)

TOTAL 45

REFERENCES:

1. Uwe Hansman, Lothar Merk, Martin S Nicklous, Thomas Stober, "Pervasive Computing - Handbook", Springer- Verlag, New Delhi, 2003
2. Uwe Hansman, Lothar Merk, Martin S Nicklous, Thomas Stober, "Principles of Mobile Computing", Springer- Verlag, New Delhi, 2003.
3. Jochen Burkhardt, Horst Henn, Stefan Hepper, Thomas Schaefer, Klaus Rindtorff, "Pervasive Computing Technology and Architecture of Mobile Internet Applications", Addison Wesley, New Delhi, 2002.

SOFT COMPUTING 3 0 0 100

1. FEED FORWARD NETWORKS AND SUPERVISED LEARNING 4

Fundamentals – Biological Neural Network – Artificial neuron – Activation function – Learning rules – Perceptron Networks – Adaline – Madaline – Back propagation Networks – Learning factors – Linear Separability.

2. SINGLE LAYER FEEDBACK NETWORKS 6

Hopfield Network - Discrete Hopfield networks – Associative memories – Recurrent auto association memory – Bi-directional Associative memory – Temporal associative memory – Boltzman machine.

3. UNSUPERVISED LEARNING NETWORKS 5

Hamming networks – Self-Organizing feature maps – Adaptive Resonance Theory network – Instar – Outstar model – Counter propagation network–Radial basis function networks.

4. FUZZY SETS AND RELATIONS 11

Crisp set – Vagueness – Uncertainty and Imprecision – Fuzziness Basic definitions – Basic set theoretic operations for fuzzy sets – Types – Operations – Properties – Crisp versus fuzzy relation – Fuzzy relation – Cardinality operations, Properties – Fuzzy Cartesian product and composition – Non interactive fuzzy sets – Tolerance and Equivalence Relations – Fuzzy ordering relations – Fuzzy Morphism – Composition of fuzzy relations.

5. FUZZY TO CRISP CONVERSION 5

Lambda cuts for fuzzy sets and relations – Definition – Methods.

6. APPLICATION OF NEURAL NETWORKS AND FUZZY LOGIC 5

Applications of neural Networks: Pattern Recognition – Image compression – Communication – control Systems – Fuzzy Pattern Recognition – Fuzzy Image Processing – Fuzzy Logic controllers.

7. GENETIC ALGORITHMS 6

Introduction – Terminologies – Genetic operators – Selection, Cross-over and mutation – fitness function – a simple genetic algorithm – Applications.

REFERENCES:

1. Simon Haykins, "Neural Networks: A Comprehensive Foundation" Pearson Education India / Prentice Hall of India, 2003.
2. Laurene V.Fausett, "Fundamentals of Neural Networks: Architectures, Algorithms and Applications" Pearson Education India, 2004.
3. Timothy J Ross, "Fuzzy Logic with Engineering Applications", McGraw Hill International Edition, 2003.
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BIO INFORMATICS

3 0 0 100

1. Introduction

7

The Central Dogma – Killer Application – Parallel Universes – Watson’s Definition – Top Down Vs Bottom Up Approach – Information Flow – Conversance – Communications.

2. Database and Networks

9

Definition – Data Management – Data Life Cycle – Database Technology – Interfaces – Implementation – Networks: Communication Models – Transmission Technology – Protocols – Bandwidth – Topology – Contents – Security – Ownership – Implementation.

3. Search Engines and data Visualization

10

Search Process – Technologies – Searching And Information Theory – Computational Methods – Knowledge Management – Sequence Visualizations – Structure Visualizations – User Interfaces – Animation Vs Simulation

4. Statistics, Data mining and pattern matching

11

Statistical Concepts – Micro Arrays – Imperfect Data – Basics – Quantifying – Randomness – Data Analysis – Tools Selection – Alignment – Clustering – Classification – Data Mining Methods – Technology – Infrastructure Pattern Recognition – Discovery – Machine Learning – Text Mining – Pattern Matching Fundamentals – Dot Matrix Analysis – Substitution Matrix – Dynamic Programming – Word Method – Bayesian Method – Multiple Sequence Alignment Tools.

5. Modeling simulation and collaboration

8

Drug Discovery Fundamentals – Protein Structure – System Biology Tools – Collaboration And Communication – Standards – Issues – Case Study.

Total No. Of Periods: 45

REFERENCES:

1. Bryan Bergeron, “Bio Informatics Computing”, Prentice Hall, 2003.
2. T.K. Affward, D.J. Parry Smith, “Introduction to Bio Informatics”, Pearson Education, 2001.
3. Pierre Baldi, Soren Brunak, “Bio Informatics – The Machine Learning Approach”, 2nd Edition, First East West Press, 2003

DATA WAREHOUSING AND DATA MINING 3 0 0 100

1. INTRODUCTION	5
Definition of Data Mining - Data Mining Vs Query Tools – Machine Learning – Taxonomy of Data Mining Tasks – Steps in Data Mining Process – Overview of Data Mining techniques.	
2. DATA WAREHOUSING	10
Definition – Multidimensional Data Model – Data Cube – Dimension Modeling – OLAP Operations – Warehouse Schema – Data Warehouse Architecture – Data Mart – Meta Data – Types of Meta Data – Data Warehouse Backend Process – Development Life Cycle	
3. DATA PRE-PROCESSING AND CHARACTERIZATION	10
Data Cleaning – Data Integration and Transformation – Data Reduction – Discretization and Concept Hierarchy Generation – Primitives – Data Mining Query Language – Generalization – Summarization – Analytical Characterization and Comparison - Association Rule Mining - Multi Dimensional data from Transactional Database	
4. CLASSIFICATION AND ASSOCIATION	10
Classification – Decision Tree Induction – Bayesian Classification – Prediction – Back Propagation – Cluster Analysis – Hierarchical Method – Density Based Method – Grid Based Method – Outlier Analysis - Basic Association Algorithms – Parallel and Distributed Algorithms – Advanced Association rule algorithms	
5. ADVANCED TOPICS	10
Web Mining – Web Content Mining – Structure and Usage Mining – Spatial Mining – Spatial Data Overview – Generalization and Specialization – Spatial Rules and Classification Algorithms – Spatial Clustering Algorithms – Temporal Mining	

TOTAL : 45

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1. Margaret Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education, New Delhi, 2005.
2. Jaiwei Han, Micheline Kamber, "Data Mining: Concepts and Techniques", Morgan Kaufman Amsterdam, 2004.
3. Paulraj Ponnaiah, "Data Warehousing Fundamentals", Wiley Publishers, Singapore, 2001.

1. INTRODUCTION: (9)

Business Processes - Concepts of ERP- brief history of ERP- major components and their functions in ERP system. Basic differences between manufacturing and services - Data Integration Issues

2. IMPLEMENTATION ISSUES (9)

Vendor/Package Selection- Rapid Implementation - People Issues - ERP and Business/Process Drivers - Office Integration – Software Selection – Project management – Feasibility Issues – Project Initiation – Risk Involved - User Education

3. ERP ARCHITECTURE: (9)

Basic architectural Concepts - The system control interfaces – Services - Presentation interface – Database Interface. ERP and Internet – ERP and E-Commerce

4. ERP INTERFACES: (9)

Description – Multi- client server solution - Open technology - User Interface - Application Integration - Data base requirement – methodology - interfaces with other systems and systems design and implementation aspects.

5. ERP MODULES: (9)

The Development of Enterprise Resource Planning Systems - Marketing Information Systems and the Sales Order Process - Production and Supply Chain Management Information Systems - Accounting in ERP Systems - Human Resources - Processes with ERP Process Modeling - Process Improvement

REFERENCES:

1. Sumner, Mary, “Enterprise Resource Planning”, Prentice Hall, New Jersey, 2005
2. Leon, “Enterprise Resource Planning”, Tata McGraw Hill, New Delhi.
3. O’Leary, Daniel, “Enterprise Resource Planning Systems: Systems, Life Cycle, Electronic Commerce, and Risk”, Cambridge University Press, Cambridge, 2000.
4. Ellen Monk, Bret Wagner,” Concepts in Enterprise Resource Planning”, Thomson Course Technology, USA, 2005

1. INFORMATION SYSTEM AND ORGANIZATION: 8

Matching the Information System Plan to the Organizational Strategic Plan – Identifying Key Organizational Objective and Processes and Developing an Information System Development – User role in Systems Development Process – Maintainability and Recoverability in System Design .

2. REPRESENTATION AND ANALYSIS OF SYSTEM STRUCTURE 8

Models for Representing Systems: Mathematical, Graphical and Hierarchical (Organization Chart, Tree Diagram) – Information Flow – Process Flow – Methods and Heuristics – Decomposition and Aggregation – Information Architecture - Application of System Representation to Case Studies

3. SYSTEMS, INFORMATION AND DECISION THEORY: 10

Information Theory – Information Content and Redundancy – Classification and Compression – Summarizing and Filtering – Inferences and Uncertainty – Identifying Information needed to Support Decision Making – Human Factors – Problem characteristics and Information System Capabilities in Decision Making

4. INFORMATION SYSTEM APPLICATION : 10

Transaction Processing Applications – Basic Accounting Application – Applications for Budgeting and Planning – Other use of Information Technology: Automation – Word Processing – Electronic Mail – Evaluation Remote Conferencing and Graphics – System and Selection – Cost Benefit – Centralized versus Decentralized Allocation Mechanism

5. DEVELOPMENT AND MAINTENANCE OF INFORMATION SYSTEMS: 9

Systems analysis and design – System development life cycle – Limitation – End User Development – Managing End Users – off-the Shelf Software Packages – Outsourcing – Comparison of Different Methodologies.

Total 45**REFERENCES:**

1. Laudon K C., Laudon J.P., Brabston M.E., “Management Information Systems: Managing the Digital Firm”, Pearson Education, New Delhi, 2005.
2. Henry C. Lucas Jr., “The Analysis, Design and Implementation of Information Systems”, Tata McGraw-Hill, New York, 2003
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4. Turban E.F., Potter R.E. “Introduction to Information Technology”, Wiley, New Delhi, 2004.
5. Jeffrey A. Hoffer, Joey F. George, Joseph S. Valachich, “Modern Systems Analysis and Design”, Addison-Wesley, New Delhi, 2002

AGENT BASED INTELLIGENT SYSTEMS

3 0 0 100

1. INTRODUCTION

8

Definitions – History – Intelligent Agents – Structure – Environment – Basic Problem Solving Agents – Formulating – Search Strategies – Intelligent search – Game playing as search.

2. KNOWLEDGE BASED AGENTS

7

Representation – Logic – First order logic – Reflex Agent – Building a knowledge Base – General Ontology – Inference – Logical Recovery.

3. PLANNING AGENTS

6

Situational Calculus – Representation of planning – partial order planning – practical planners – conditional planning – Replanning Agents.

4. AGENTS AND UNCERTAINTY

7

Acting under uncertainty – probability Bayes Rule and use- Belief Networks – Utility Theory – Decision Network – Value of information – Decision Theoretic Agent Design.

5. HIGHER LEVEL AGENTS

8

Learning agents – General model – Inductive Learning-Learning decision Trees – reinforcement Learning – Knowledge in learning – Communicative agents – Types of Communicating agents.

6. JAVA AGLETS

4

Anatomy – Messaging – Collaboration - Design

7. SOFT COMPUTING TECHNIQUES IN INTELLIGENT SYSTEMS

5

Neural Techniques- Fuzzy methods – Neuro-fuzzy techniques for Intelligent systems.

Total 45

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1. Stuart Russell and Peter Norvig, "Artificial Intelligence – A Modern Approach", Pearson Education India/ Prentice Hall of India, 2004.
2. Patrick Henry Winston, "Artificial Intelligence", Pearson Education India, 2003.
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1. INTRODUCTION TO MULTIMEDIA COMMUNICATIONS 7

Multimedia Communication Model – Elements of Multimedia Systems – User Requirements – Network Requirements – Packet Transfer Concept – Multimedia Requirements and ATM Networks – Multimedia Terminals

2. DISTRIBUTED MULTIMEDIA SYSTEMS (DMS): 13

Main Features of DMS. Resource Management of DMS – Networking – IP Networking – IP Multicast – Multicast Congestion Control Protocols – Resource. Reservation Protocol (RSVP) – Real-time Protocol (RTP) – Real-time Control Protocol (RTCP). Integrated Management Architecture for IP-based Networks – ATM – Integration of IP and ATM – Real-time Multimedia over ATM – Multimedia Operating Systems – Distributed Multimedia Applications: ITV – Telecooperation – Hypermedia Applications.

3. MULTIMEDIA COMMUNICATION STANDARDS: 13

MPEG approach – Coding of Moving Picture and Associated Audio (MPEG-1) – Generic coding of Moving Picture and Associated Audio (MPEG-2) - IPv6 – MPEG-4 Video Transport Across the Internet – Introduction to JPEG 2000 standard – Architecture of JPEG 2000.

4. MULTIMEDIA COMMUNICATIONS ACROSS NETWORKS 12

Packet Audio / Video in the Network Environment – Packet Voice – Packet Video – Video Transport across Generic Networks – Multimedia Transport across IP Networks – IP Multicast overlay using ATM – IP Multicast overlay using Routers – Multimedia Across Wireless – Mobile Networks – Digital Television infrastructure.

TOTAL 45**REFERENCES**

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