

KONGU ENGINEERING COLLEGE, PERUNDURAI, ERODE – 638 052
 (Autonomous Institution affiliated to Anna University of Technology, Coimbatore)

M.E. DEGREE IN COMPUTER SCIENCE AND ENGINEERING (FULL TIME)

CURRICULUM

(For the candidates admitted from academic year 2011 – 12 onwards)

SEMESTER - I

Course Code	Course Title	Hours/Week			Credit	Maximum Marks		
		L	T	P		CA	ESE	Total
	THEORY							
11MS101	Theoretical Foundation of Computer Science	3	1	0	4	50	50	100
11MS102	Computer System Architecture	3	0	0	3	50	50	100
11MS103	Data Structures and Analysis of Algorithms	3	0	0	3	50	50	100
11MS104	Operating Systems Design	3	0	0	3	50	50	100
11MS105	Software Architecture	3	0	0	3	50	50	100
11MS106	Computer Networks and Management	3	0	0	3	50	50	100
	PRACTICAL							
11MS107	Data Structures and Operating System Laboratory	0	0	3	1	100	0	100
11MS108	Networks Laboratory	0	0	3	1	100	0	100
	Total				21			

CA - Continuous Assessment, ESE – End Semester Examination

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CURRICULUM

(For the candidates admitted from academic year 2011 – 12 onwards)

SEMESTER - II

Course Code	Course Title	Hours/Week			Credit	Maximum Marks		
		L	T	P		CA	ESE	Total
	THEORY							
11MS201	Database Technology	3	0	0	3	50	50	100
11MS202	Object Oriented System Design	3	0	0	3	50	50	100
11MS203	Web Technology	3	0	0	3	50	50	100
11MS204	Network Security	3	0	0	3	50	50	100
	Elective - I	3	0	0	3	50	50	100
	Elective - II	3	0	0	3	50	50	100
	PRACTICAL							
11MS205	CASE Tools Laboratory	0	0	3	1	100	0	100
11MS206	Web Technology Laboratory	0	0	3	1	100	0	100
Total					20			

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(For the candidates admitted from academic year 2011 – 12 onwards)

SEMESTER – III

Course Code	Course Title	Hours / Week			Credit	Maximum Marks		
		L	T	P		CA	ESE	Total
	THEORY							
	Elective – III	3	0	0	3	50	50	100
	Elective - IV	3	0	0	3	50	50	100
	Elective - V	3	0	0	3	50	50	100
	PRACTICAL							
11MS301	Project Work - Phase I	0	0	12	6	50	50	100
Total					15			

CA – Continuous Assessment, ESE – End Semester Examination

SEMESTER - IV

Course Code	Course Title	Hours / Week			Credit	Maximum Marks		
		L	T	P		CA	ESE	Total
	PRACTICAL							
11MS401	Project Work - Phase II	0	0	24	12	100	100	200
Total					12			

CA- Continuous Assessment, ESE – End Semester Examination

LIST OF ELECTIVES					
Course Code	Course Title	Hours/Week			Credit
		L	T	P	
11CN102	High Speed Networks	3	0	0	3
11MS011	Soft Computing	3	0	0	3
11MS012	Mobile and Pervasive Computing	3	0	0	3
11MS013	Multimedia Systems	3	0	0	3
11MS014	XML and Web Services	3	0	0	3
11MS015	Bio Informatics	3	0	0	3
11MS016	Grid and Cloud Computing	3	0	0	3
11MS017	Embedded Systems and RTOS	3	0	0	3
11MS018	Software Quality Assurance and Testing	3	0	0	3
11MS019	Ad hoc Networks	3	0	0	3
11MS020	Data Mining	3	0	0	3
11MS021	Agent Based Intelligent Systems	3	0	0	3
11MS022	Component Based Technology	3	0	0	3
11MS023	Natural Language Processing	3	0	0	3
11MS024	Special Elective	3	0	0	3
11MS025	Compiler Design	3	0	0	3
11MS026	RFID	3	0	0	3
11MS027	Business Intelligence	3	0	0	3
11MS028	Pattern Recognition	3	0	0	3
11VL025	Digital Image Processing	3	0	0	3

Objective:

On completion of the course the students are expected

- To understand the concepts of set theory.
- To know the basic concepts of probability.
- To know the basic concepts of logic and their applications.
- To understand the applications in the areas such as coding theory, analysis of algorithms.
- To know the concept of computability theory

MODULE – I**15**

Fundamental Structures: Set theory:- Relationships between sets - Operations on sets - Set identities - Minsets. Relations– Binary relations - Partial orderings - Equivalence relations. Functions:- Properties of functions - Composition of functions – Inverse functions - Permutation functions.

Discrete Probability: Finite probability - Conditional Probability – Independence - Bayes’ theorem - Mathematical expectation – Probability Distribution (Binomial, Poisson, Geometric and their Properties).

MODULE– II**15**

Logic: Propositional logic – Logical connectives – Truth tables – Normal forms (conjunctive and disjunctive) - Predicate logic - Universal and existential quantifiers - Proof techniques – direct and indirect – Proof by contradiction – Mathematical Induction

Combinatorics: Basics of counting – Counting arguments – Pigeonhole principle - Permutations and Combinations - Recursion and Recurrence relations – Generating functions

MODULE–III**15**

Modeling Computation and Languages: Finite state machines – Deterministic and Non-deterministic finite state machines – Turing Machines (Addition only) - Formal Languages – Classes of Grammars – Type 0 – Context Sensitive – Context Free – Regular Grammars – Ambiguity.

Lecture : 45, Tutorial : 15, TOTAL : 60**REFERENCE BOOKS**

1. Gersting, Judith L. “Mathematical Structures for Computer Science”, W.H. Freeman and Company, New York, 2006.
2. Veerarajan T. “Discrete Mathematics”, Tata McGraw-Hill, New Delhi, Reprint 2010.
3. Venkataraman, M.K, Sridharan, N and Chandrasekaran, N. “Discrete Mathematics”. The National Publishing Company, Chennai, 2007.

Objective:

- To understand the concepts of instruction level parallelism.
- To know the basic concepts of memory hierarchy
- To gain knowledge about the multiprocessor architectures and thread level parallelism

MODULE – I**15**

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

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

MODULE– II**15**

ILP with Software Approaches: Basic compiler techniques for exposing ILP- static branch prediction - static multiple issues: VLIW approach - Advanced compiler support for exposing and exploiting ILP – Hardware Support - Intel IA64 architecture.

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

MODULE–III**15**

Multiprocessors and Thread Level Parallelism: Symmetric shared memory architectures – performance of symmetric shared memory multiprocessors – Distributed shared memory architectures-synchronization- storage systems – types of storage devices- buses- reliability-availability and dependability - RAID – errors and failures in real systems- IO performance measures- Introduction to queuing theory.

TOTAL : 45**REFERENCE BOOKS**

1. John L. Hennessey and David A. Patterson, “Computer Architecture: A Quantitative Approach”, Morgan Kaufmann, 2006.
2. D. Sima, T. Fountain and P. Kacsuk, “Advanced Computer Architectures: A Design Space Approach”, Addison Wesley, 2000.
3. Kai Hwang “Advanced Computer Architecture: Parallelism, Scalability, Programmability”, Tata McGraw Hill, 2001.

11MS103 DATA STRUCTURES AND ANALYSIS OF ALGORITHMS
(Common to M.E. Computer Science and Engineering, Computer and Communication)

3 0 0 3

Objective:

- To know the basic data structures used in software development, along with algorithms for inserting, sorting and accessing data
- To create and use the data structures and learn the best situations for each, depending on the type of data to be stored and the running time (computational complexity) of algorithms for insertion, sorting and retrieval.
- To understand the advanced data structures

MODULE – I

15

Basic Data Structures: The Role of Algorithms in Computing- Growth of Function- Divide and Conquer - Probabilistic Analysis and Randomized Algorithms-Elementary Data Structure-Hash Tables- Binary Search Trees-Red-Black Trees-Augmenting Data Structure B-trees.

MODULE– II

15

Design and Analysis Technique, Graph, Heaps and Sets : Dynamic Programming- Greedy Algorithms- Amortized Analysis- Elementary Graph Algorithms- Minimum Spanning Trees- Single Source Shortest Paths- All-Pairs Shortest Paths-Maximum Flow- Binomial Heaps- Fibonacci Heaps- Data Structure and Disjoint Sets.

MODULE–III

15

Advanced Topics: Multi threaded Algorithms -Matrix Operations-Linear Programming- Polynomial and the FFT- Number Theoretic Algorithms-String Matching- Computational Geometry- NP-Completeness- Approximation Algorithms.

TOTAL : 45

REFERENCE BOOKS

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein "Introduction to Algorithms ", Third Edition, MIT Press, USA, 2009.
2. Levitin, A. "Introduction to The Design and Analysis of Algorithms", Second Edition, Addison Wesley, New York, 2007.
3. Weiss, Mark Allen. "Data Structures and Algorithm Analysis in C++", Third Edition, Pearson Education, New Delhi, 2007.
4. Aho, Alfred V. Hopcroft, John E and Ullman, Jeffrey D. "Data Structures and Algorithms", Pearson Education, New Delhi, 2002.

Objective:

- To become familiar with the fundamental concepts of operating systems
- To become competent in recognizing operating systems features and issues
- To provide sufficient understanding of operating system design and how it impacts application systems design and performance.

MODULE – I**15**

Introduction: Operating System concepts –Processes- Address Spaces – Files - Input/Output – Protection -The Shell - System Calls -System Calls for Process Management - System Calls for File Management - System Calls for Directory Management - Operating System Structure -Monolithic Systems - Layered Systems - Microkernels - Client-Server Model - Virtual Machines

Process and Threads: Processes -The Process Model - Process Creation - Process Termination - Process Hierarchies -Process States - Implementation of Processes –Threads-The Classical Thread Model-Implementing Threads in User Space - Implementing Threads in the Kernel - Hybrid Implementations- Inter Process Communication -Race Conditions - Critical Regions - Mutual Exclusion with Busy Waiting - Sleep and Wakeup – Semaphores – Mutexes .

MODULE– II**15**

Scheduling: Introduction to Scheduling - Scheduling in Batch Systems - Interactive Systems - Real-Time Systems - Classical IPC Problems - The Dining Philosophers Problem -The Readers and Writers Problem.

Memory Management: A Memory Abstraction: Address Spaces -The Notion of an Address Space – Swapping - Managing Free Memory - Virtual Memory – Paging - Page Tables - Speeding Up Paging -Page Tables for Large Memories -Page replacement Algorithms –Not Recently used – The Clock Page - The Working Set Page Replacement Algorithm - The WSClock Page Replacement Algorithm – Implementation Issues - Operating System Involvement with Paging - Page Fault Handling - Instruction Backup - Locking Pages in Memory - Backing Store - Separation of Policy and Mechanism –Segmentation - Implementation of Pure Segmentation

MODULE–III**15**

Deadlocks : Resources -Introduction To Deadlocks - The Ostrich Algorithm - Deadlock Avoidance – Resource Trajectories – Safe and Unsafe state – The Banker’s Algorithm for a Single Resource and Multiple Resources

File Systems : Files-Directories-File System Implementation-Security-Protection Mechanisms -Mass-Storage Structure-Disk scheduling –Disk management – Design issues in distributed operating system-Distributed file systems - Naming and Transparency-Remote File Access - Stateful versus Stateless service – Event Ordering-Mutual Exclusion- Atomicity- Concurrency Control- Election Algorithms-Case Study-Linux.

TOTAL: 45**REFERENCE BOOKS**

1. Tanenbaum, Andrew S.,” Modern Operating Systems”, Third Edition , Prentice Hall , 2008
2. Tanenbaum Andrew S,Albert S Woodhull, “Operating Systems Design and Implementation”, Third Edition, Prentice Hall, 2006.
3. Sinha, Pradeep K. “Distributed Operating System: Concepts and Design”, IEEE Computer Society Press, PHI, 2004.
4. Tanenbaum, Andrew S., “Modern Operating Systems”, Second Edition, Pearson Education, New Delhi, 2004.

Objective:

- To get familiarized with the concepts of software architecture
- To understand the history of how software architecture has evolved over time.
- To provide an introductory concept about the tools used in architectural design.

MODULE - I**15**

Introduction and Shared Information Systems: Software Architecture – Engineering Discipline for Software – Status of Software Architecture. Architectural Styles – Pipes and Filters – Data Abstraction and Object Oriented Organization – Event Based Implicit Invocation – Layered Systems – Repositories – Interpreters – Process Control – Other Architectures – Hetero Generous Architecture - Case Studies.

Shared Information Systems – Database Integration – Integration in Software Development Environments – Integration in the Design of Buildings – Architectural Structures for Shared Information Systems – Conclusions.

MODULE - II**15**

Design Guidance and Formal Models : Architectural Design Guidance – Guidance for User-Interface Architectures – Design spaces and rules – Design space and rules for User-Interface architectures – Applying the design space – Validation Experiment - Design Space preparation– The Quantified Design Space-Overview-Background

Formal Model and Specification – The Value of Architectural Formalism – Formalizing the Architecture of a Specific System – Formalizing an Architectural Style – Formalizing and Architectural Design Space

MODULE-III**15**

Theory of Software Architecture and Tools : Theory – Notation Linguistic Issues – Requirement for Architecture – Description Languages – First Class Connectors – Adding Implicit Invocation to Traditional Programming Languages.

Tools for Architectural Design – Unicon: A Universal Connector Language – Exploiting Style in Architectural Design Environments – Beyond Definition / Use: Architectural interconnection.

TOTAL: 45**REFERENCE BOOKS**

1. Shaw. Mary and Garlan. David., “Software Architecture: Perspectives on an Emerging Discipline”, Prentice Hall of India Pvt. Ltd, New Delhi: 2007.
2. Len. Bass, Paul. Clements and Kazman. Rick., “Software Architecture in Practice”, Second Edition, Addison-Wesley Professional, New York, 2003.
3. Bosch. J, “Design and Use of Software Architectures: Adopting and Evolving a Product-Line Approach”, Addison-Wesley, New York, 2000.
4. Clements, P., Kazman, R., and Klein M , “Evaluating Software Architecture: Methods and Case Studies”, Addison-Wesley, New York, 2002.

Objective:

- To get familiarized with the concepts of computer networks
- To understand the various layers and their functionality of network models
- To provide an introductory concept about the multimedia networks and network management

MODULE – I**15**

Introduction to Internet, Application and Transport Layers: Internet- protocol - network edge - network core - access networks & physical media -delay & loss in packet-switched networks - protocol layers & their service models -internet backbones, NAPs & ISPs - a brief history of computer networking and the internet. Application layer protocol - world wide web- HTTP Transport layer services and principles - multiplexing & demultiplexing applications -connectionless transport: UDP - principles of reliable data transfer - connection-oriented transport: TCP - principles of congestion control - TCP congestion control- TCP Standards – Reno, New Reno and Vegas, Performance comparison of TCP Flavors.

MODULE– II**15**

Network Layer , Data Link Layer and LAN: Introduction & network service models - routing principles - hierarchical routing -internet protocols – Overview of IPv6 – Ipv6 Transition, Terminologies, IPv6 Addresses, IPv6 Header Format, Auto configuration, Configuration via DHCPv6, ICMPv6 Messages, Neighbor Discovery, IPv6 Security issues and Security Protocol elements. Data link layer - error detection and correction techniques - multiple access protocols- LAN- LAN Addresses and ARP – Ethernet – Hubs, Bridges and Switches – IEEE802.11 LANs.

MODULE–III**15**

Multimedia Networks and Management: Multimedia network - streaming stored audio and video- best-effort service: an internet phone example - RTP - beyond best -effort - scheduling and policing mechanisms -integrated services - RSVP - differentiated services - network management - infrastructure network management - ASN.1 - firewalls.

TOTAL : 45**REFERENCE BOOKS**

1. Kurose, K.F and Ross, K.W, "Computer Networking: A Top - Down Approach Featuring the Internet", 3rd Edition, Pearson Education, New Delhi, 2006.
2. Hassan M. and Jain R.. "High Performance TCP/IP Networking: Concepts, Issues and Solutions", Pearson Education, 2009.
3. Sidnie Feit, "TCP/IP: Architecture, Protocols and Implementation with IPv6 and IP Security", 2nd Edition, Tata McGraw Hill, 2009.
4. Appropriate most recent IEEE/Elsevier/ACM Journal Publications

Objective:

- To implement the various data structures concepts
- To implement and simulate operating system concepts

LIST OF EXPERIMENTS

1. Represent a polynomial as a linked list and write functions for polynomial Addition
2. Implement stack and use it to evaluate the arithmetic expression
3. Implement an expression tree. Produce its pre-order, in-order, and post-order traversals.
4. Implement Prim's algorithm using priority queues to find MST of an undirected graph
5. Implement insertion and deletion in AVL trees
6. Implement the Quick Sort and Heap Sort
7. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for FCFS and SJF. For each of the scheduling policies, compute and print the average waiting time and average turnaround time
8. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for Priority and Round robin. For each of the scheduling policies, compute and print the average waiting time and average turnaround time
9. Implement the Producer – Consumer problem using semaphores
10. Implement Banker's Algorithm
11. Implement Best-fit, First-fit algorithms for memory management
12. Implement FIFO and LRU page replacement algorithms

11MS108 NETWORKS LABORATORY

0 0 3 1

Objective:

- To introduce Network Simulators and to implement the various topologies, protocols and routing Algorithms
- To study the performance of TCP and UDP Protocols

LIST OF EXPERIMENTS

1. Study of Network simulators (NS2 & GloMoSim)
2. Implementation of Various Topologies.
3. Implementation of Sliding Window Protocol.
4. Implementation of Routing Algorithms (Shortest path, Link state).
5. Simulation of Congestion control Algorithms.
6. Performance analysis of TCP
7. Performance analysis of UDP
8. Implementation of ZRP Protocol.
9. Implementation of ARP and RARP Protocol.
10. Design of Local Area Network.

Objective:

- To learn the fundamentals of parallel and distributed databases
- To make a study of Information retrieval and object based databases
- To understand the concepts of distributed databases, concurrency control and parallel databases.
- To know the current trends in databases.

MODULE – I**15**

Parallel and Distributed Databases: Centralized versus distributed databases – Database System Architectures: Centralized and Client-Server Architectures- Server System Architectures – Parallel and Distributed Systems – Parallel Databases : I/O Parallelism – Query Parallelism – Operation Parallelism – Query Optimization – Parallel Systems Design – Parallelism on Multi-core Processors – Distributed Databases : Homogeneous and Heterogeneous database – Distributed data Storage and Transactions – Commit Protocols – Concurrency Control – Query Processing – Cloud-Based Databases – Directory Systems.

MODULE - II**15**

Information Retrieval and Object-Based Databases: Information retrieval – Relevance Ranking using Terms - Relevance using Hyperlinks – Synonyms, Homonyms and Ontologies – Indexing of Documents – Measuring Retrieval Effectiveness – Crawling and Indexing the Web – Beyond Ranking of Pages – Directories and Categories – Object – Based Databases: Complex Data Types – Structured types and inheritance in SQL – Table Inheritance – Array and Multiset Types in SQL– Object-identity and Reference Types in SQL – Implementing O-R Features – Persistent Programming Languages – Object –Relational Mapping – Object oriented versus Object relational database

MODULE - III**15**

Advanced Databases and Current Trends: XML Structure - XML document schema - querying and transformation - API to XML - XML data storage – applications - Enhanced data models for advanced applications - Active database concepts and triggers - Temporal database concepts - Deductive databases - Mobile Database - Multimedia Database - Geographic Information Systems - Genome Data Management - Data Analysis and OLAP - Data mining - Data warehousing.

TOTAL : 45**REFERENCE BOOKS**

1. Silberschatz, Abraham., Korth, Henry F. and Sudarshan, S., “Database System Concepts”, Sixth Edition, McGraw-Hill, New York, 2011.
2. Elmasri, Ramez and Navathe, Shamkant B., “Fundamentals of Database Systems”, Fifth Edition, Pearson Education, New Delhi, 2007
3. Buyens, Jim., “Web Database Development – Step by Step -.NET edition”, Prentice Hall of India, New Delhi, 2005.
4. Date, C J., Kannan A, Swamynathan S, “An Introduction to Database Systems”, Eighth Edition, Pearson Education, New Delhi, 2006.
5. Ceri, Stefano and Pelagatti, Giuseppe., “Distributed Databases: Principles and Systems”, McGraw-Hill, New York, 2008.

11MS202 OBJECT ORIENTED SYSTEM DESIGN

3 0 0 3

Objective:

- To understand the object oriented life cycle.
- To know how to identify objects, relationships, services and attributes through UML.
- To understand the use-case diagrams.
- To know the Object Oriented Design process.

MODULE – I

15

Object Oriented Design and Methodologies : The Object Model - Classes And Objects - Complexity Of Software - Classification -Notation - Process - Pragmatics - Binary And Entity Relationship - Object Types -Object State - OOSD Life Cycle - Object Oriented Methodology: Rumbaugh, Booch, Jacobson, Shaler/Mellor, Coad/Yardon.

MODULE - II

15

UML and Object Oriented Analysis: Patterns - Frame Works - The Unified Approach - UML.- Identify Use Cases - Use Case Model - Documentation - Classification - Identifying Classes - Noun Phrases Approach - Common Class Pattern Approach - Use Case Driven Approach - Identifying Object Relationship, Attributes And Models.

MODULE - III

15

Object Oriented Design and Maintenance: Design Process - Design Axioms - Designing Classes - Access Layer Design - View Layer Design.-Managing Analysis And Design - Evaluation Testing - Coding - Maintenance - Metrics - Case Study: Foundation Class Library - Client/Server Computing.

TOTAL : 45

REFERENCE BOOKS

1. Bahrami, Ali., "Object Oriented System Development", McGraw-Hill, New York,2008.
2. Larman, Craig., "Applying UML and Patterns: An Introduction to Object Oriented Analysis and Design", Second Edition, Pearson Education, 2005.
3. Bruegge, Bernd, and Dutoit, Allen H., "Object Oriented Software Engineering using UML, Patterns and Java", Second Edition, Pearson Education, 2004.

11MS203 WEB TECHNOLOGY

(Common to M.E. Computer Science and Engineering, Computer and Communication)

3 0 0 3

Objective:

- To understand the basic concepts of networks and web
- To provide the knowledge for developing dynamic web pages.
- To understand the fundamentals of java used in web applications.
- To acquire skills to develop server side programs.

MODULE – I

15

Networking Concepts and Scripting: Introduction – Network concepts – Web concepts – Internet addresses - Retrieving Data with URL – HTML – DHTML with Java Script - Cascading Style Sheets - XML vs. HTML – XML Terminology – DTD – SCHEMA – XSLT – Basics of parsing: SAX, DOM and JAXP - AJAX

MODULE - II

15

Java and Server Side Programming: Java fundamentals - Java Servlets - Servlet container–Session Tracking–Using Servlet context– Servlet Chaining – Apache Struts – Java Server Faces (JSF) – Enterprise Java Beans (EJB) – Java Applets and Life Cycle - Active server pages – Java server pages

MODULE - III

15

Web Services and Middleware: Introduction – application communication incompatibilities – Middleware concepts – Java RMI, CORBA and DCOM – Web Services – Wireless Internet - Web Servers(IIS and Apache) – Database: SQL, MySQL, ADO.NET 2.0 – PHP – ASP.NET 2.0 and ASP.NET Ajax

TOTAL : 45

REFERENCE BOOKS

1. Deitel H.M. and Deitel P.J., “Internet and World Wide Web: How to Program”, Fourth Edition, Pearson Education Asia, New Delhi, 2007.
2. Norton, D and Schildt, H., “Java 2: The complete Reference”, Seventh Edition, Tata McGraw-Hill, New Delhi, 2008
3. Herold, Elliotte Rusty., “Java Network Programming”, Third Edition, Shroff Publishers and Distributors, Mumbai, August 2008
4. Ladd, Eric and O’Donnell, Jim, “Using HTML 4, XML, and JAVA1.2”, Prentice Hall of India, New Delhi, 2003.
5. Godbole. A.S. and Kahate. A., “Web Technologies”, Second Edition, Tata McGraw-Hill, New Delhi, First Reprint, 2008.

11MS204 NETWORK SECURITY

(Common to Computer Science and Engineering, Communication Systems)

3 0 0 3

Objective:

- To know the methods of conventional encryption.
- To understand the concepts of public key encryption, number theory, authentication and Hash functions.
- To know the network security tools and applications.
- To understand the system level security used.

MODULE – I

15

Public Key Cryptography : OSI Security Architecture - Classical Encryption techniques – Cipher Principles – Data Encryption Standard – Block Cipher Design Principles and Modes of Operation - Evaluation criteria for AES – AES Cipher – Triple DES – Placement of Encryption Function – Traffic Confidentiality

Key Management - Diffie-Hellman key Exchange – Elliptic Curve Architecture and Cryptography - Introduction to Number Theory – Confidentiality using Symmetric Encryption – Public Key Cryptography and RSA.

MODULE - II

15

Authentication and Network Security: Authentication requirements – Authentication functions – Message Authentication Codes – Hash Functions – Security of Hash Functions and MACs – MD5 message Digest algorithm - Secure Hash Algorithm – RIPEMD – HMAC Digital Signatures – Authentication Protocols – Digital Signature Standard - Authentication Applications: Kerberos – X.509 Authentication Service.

MODULE- III

15

Web Security and System Level Security: Electronic Mail Security – PGP – S/MIME - IP Security – Web Security - Intrusion detection – password management – Viruses and related Threats – Virus Counter measures – Firewall Design Principles – Trusted Systems.

TOTAL : 45

REFERENCE BOOKS

1. Stallings, William., “Cryptography And Network Security: Principles and Practices”, Fourth Edition, Prentice Hall of India, New Delhi, 2005.
2. Forouzan, Behrouz A., “Cryptography and Network Security”, Tata McGraw Hill, New Delhi, 2007.
3. Kahate, Atul., “Cryptography and Network Security”, Second Edition, Tata McGraw-Hill, New Delhi, 2003.
4. Schneier, Bruce, “Applied Cryptography”, Second Edition, John Wiley & Sons Inc, New York, 2001.

11MS205 CASE TOOLS LABORATORY

0 0 3 1

Objective:

To study about how to use Rational Rose for designing a software system using UML Modeling Techniques for an Object Oriented System

LIST OF EXPERIMENTS /EXERCISES

Prepare the following documents for two or three of the experiments listed below and develop the software engineering methodology

1. Program Analysis and Project Planning.
2. Thorough study of the problem – Identify project scope, Objectives, infrastructure.
3. Software requirement Analysis
4. Describe the individual Phases / Modules of the project, Identify deliverables.
5. Data Modeling
6. Use work products – Data dictionary, Use diagrams and activity diagrams, build and test class diagrams, Sequence diagrams and add interface to class diagrams.
7. Software Development and Debugging
8. Software Testing
9. Prepare test plan, perform validation testing, Coverage analysis, memory leaks, develop test case hierarchy, Site check and Site monitor.
 - i. Student Marks Analyzing System
 - ii. Quiz System
 - iii. Online Ticket Reservation System
 - iv. Payroll System
 - v. Course Registration System
 - vi. Expert Systems
 - vii. ATM Systems
 - viii. Stock Maintenance
 - ix. Real-Time Scheduler
 - x. Remote Procedure Call Implementation

REFERENCES / MANUALS/SOFTWARE

1. Rational Rose Suite.
2. JDK1.6 / Visual Studio 2000.
3. <http://www-01.ibm.com/software/awdtools/developer/rose>.
4. www.ibm.com/software/rational/uml/

Objective:

To study about how to develop dynamic web pages and server side programs.

LIST OF EXPERIMENTS /EXERCISES

1. a) Creation of web page using frameset, table and nested lists.
b) Creation of web page using all types of style sheets.
2. a) Creation of web page which shows all the related information when the hot spots of an image are clicked.
b) Design an Interactive web site for a sales company using DHTML.
3. a) Write a java script to perform the client side form validation.
b) Design an Interactive photo album using Applets.
4. a) Write a VB Script to process the employee salary details using form elements.
5. a) Creation of java program for getting time and date information from the server using TCP/UDP.
b) Write a java program to implement packages and interfaces.
6. a) Write a java program to implement multithreading.
b) Write a java program to implement exception handling.
7. a) Creating JSP program for order processing.
b) Write a program to include a java bean in a JSP page.
c) Write a JSP program to invoke a Servlet.
8. a) Creation of servlet program to implement on-line examination using JDBC.
b) Write a Servlet program that counts and displays the number of times it has been accessed.
9. a) Write a program to call a procedure using JavaScript in ASP.
b) Write a program to call a JavaScript procedure and a VBScript procedure using VBScript in ASP.
10. a) Display a different image or content each time a user visits a page in ASP.
b) Interact with a user in a form that uses the "get" or "post" method in ASP.
11. Develop a java program to implement servlet chaining.
12. Write a Servlet to implement session tracking techniques using cookies.

REFERENCES / MANUALS/SOFTWARE:

JDK, JSDK, JWS, Tomcat Server, Internet Explorer 6.0

11CN102 HIGH SPEED NETWORKS

(Common to M.E. Computer Science and Engineering, Computer and Communication)

3 0 0 3

Objective:

- To understand the architecture of ATM protocol and high speed LANs.
- To provide basic concepts of congestion control and traffic management in high speed network.
- To introduce the protocols for QoS support.

MODULE – I

15

Introduction to ATM, Congestion and Traffic Management: Frame Relay Networks – Asynchronous transfer mode – ATM Protocol Architecture, ATM logical Connection, ATM Cell – ATM Service Categories – AAL- High Speed LAN's: Fast Ethernet, Gigabit Ethernet, Fibre Channel – Wireless LAN's: applications, requirements – Architecture of 802.11- Queuing Analysis- Queuing Models – Single Server Queues – Multi server queues-Effects of Congestion – Congestion Control – Traffic Management – Congestion Control in Packet Switching Networks – Frame Relay Congestion Control.

MODULE - II

15

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

MODULE - III

15

Integrated and Differentiated Services, Protocols for QoS Support: Integrated Services Architecture – Approach, Components, Services- Queuing Discipline, FQ, PS, BRFQ, GPS, WFQ – Random Early Detection, Differentiated Services- RSVP – Goals and Characteristics, Data Flow, RSVP operations, Protocol Mechanisms – Multiprotocol Label Switching – Operations, Label Stacking, Protocol details – RTP – Protocol Architecture, Data Transfer Protocol, RTCP

TOTAL : 45

REFERENCE BOOKS

1. Stallings William., "High Speed Networks and Internet", Second Edition, Pearson Education, New Delhi, 2002.
2. Walrand and Pravin Varaiya, "High Performance Communication Networks", Second Edition, Jean Harcourt Asia Pvt. Ltd., 2001.
3. Pepelnjak Irvan, Guichard Jim and Apcar Jeff, "MPLS and VPN Architecture", Cisco Press, Volume 1 and 2, 2003
4. <http://pages.cpsc.ucalgary.ca/~carey/CPSC641/archive/Sept2005/>

Objective:

- To understand the Soft Computing paradigm
- To learn the basics of Artificial Neural Networks
- To know about Fuzzy logic and Genetic Algorithms
- To acquire skills to design Hybrid System with ANN, Fuzzy logic and GA

MODULE – I**12**

Neural Networks: Fundamentals Basic Concepts – Back-propagation Network: Architecture, Learning, Illustration, Applications, Effects of tuning parameter, Selection of parameters Variations of Standard Back-propagation Algorithm -Research Directions – Associative Memory: Autocorrelators - Heterocorrelators: Kosko's Discrete BAM - Wang et al.'s Multiple Training Encoding Strategy - Exponential BAM - Associative Memory for Real-coded Pattern Pairs - Applications – Recent Trends – Adaptive Resonance Theory - Introduction – ART 1 and 2- Application – Sensitiveness of ordering data

MODULE - II**15**

Fuzzy Set Theory: Fuzzy versus Crisp - Crisp sets - Fuzzy Sets - Crisp Relations – Fuzzy Relations – Fuzzy Systems - Crisp Logic - Predicate Logic - Fuzzy Logic - Fuzzy Rule based System - Defuzzification Methods Applications

Genetic Algorithms: History - Basic Concepts - Creation of Offspring - Working Principle - Encoding -Fitness Function -Reproduction – Genetic Modeling: Inheritance Operators –Cross Over - Inversion and Deletion - Mutation Operator - Bit-wise Operators - Applications – Multilevel Optimization - Real Life Problem - Differences and Similarities between GA and Other Traditional Methods Advances in GA

MODULE- III**18**

Hybrid Systems: Neural Networks, Fuzzy Logic and Genetic Algorithms Hybrids -Preview of the Hybrid Systems to be Discussed – GA Based BPN - GA Based Weight Determination - Applications – Fuzzy - LR-type Fuzzy Architecture - Learning -Inference -Applications – Simplified Fuzzy ARTMAP - Introduction -Working – Application- Recent Trends

FAM: Introduction - Single Association FAM - Fuzzy Hebb FAMs -FAM Involving a Rule Base - FAM Rules with Multiple Antecedents/Consequents -Applications – Fuzzy Logic Controlled GA - Soft Computing Tools - Problem Description of Optimum Design –Fuzzy Constraints - Illustrations - GA in Fuzzy Logic Controller Design

TOTAL : 45**REFERENCE BOOKS**

1. Rajasekaran S. and Pai G.A.V., "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, 2004.
2. J.S.R.Jang, C.T.Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", PHI, Pearson Education 2004.
3. Timothy J.Ross, "Fuzzy Logic with Engineering Application", McGraw Hill, 2000
4. Davis E.Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning" Addison Wesley, N.Y., 2003.
5. R.Eberhart, P.Simpson and R.Dobbins, "Computational Intelligence" PC Tools", AP Professional, Boston 1996.

11MS012 MOBILE AND PERVASIVE COMPUTING

(Common to M.E. Computer Science and Engineering, Computer and Communication)

3 0 0 3

Objective:

- To learn the basics of wireless and data communication technologies.
- To explore mobile computing and its current trends
- To combine open standard-based applications with everyday activities

MODULE – I

15

Introduction to Wireless Environment: Introduction to wireless communication-Wireless transmission- Medium Access Control- Wireless MAC protocols -Wireless LANs - WAP- Current trends in wireless network-2G,3G, looking ahead 4G concepts - Wireless IEEE standards.

MODULE - II

15

Mobile Communication: GSM - DECT system - Tetra and UMTS - Bluetooth - Mobile network layer-Mobile transport layer - Mobile Ad Hoc Networks - Reactive, proactive and hybrid routing protocols - Cellular networks - Mobility management - Mobile transaction and commerce-protocols for mobile commerce - File system support for mobility support- Mobile execution environments and applications.

MODULE - III

15

Pervasive Communication: Characteristics of pervasive computing environments -Vision and challenges of pervasive computing - Pervasive computing applications and case study - Pervasive computing and web based applications- Voice enabling pervasive computing- PDA in pervasive computing- User interface issues in pervasive computing, Architecture - Smart Card-based Authentication mechanisms - Wearable computing architecture

TOTAL : 45

REFERENCE BOOKS

1. Schiller, Jochen., "Mobile Communications", Pearson education, New Delhi, 2003.
2. Burkhardt Jochen, Henn Horst and Hepper Stefan, Schaec Thomas and Rindtorff Klaus., "Pervasive Computing Technology and Architecture of Mobile Internet Applications", Addison Wesley Reading, 2002.
3. Stallings, William., "Wireless Communications and Networks", Pearson education, New Delhi, 2002.
4. Toh, C. K. "Ad Hoc Mobile Wireless Networks: Protocols and Systems," Prentice Hall, New Delhi, 2002.

Objective:

- To introduce the basic concepts of multimedia architecture and documents.
- To provide the skills and knowledge for processing multimedia data.
- To know the different forms of virtual reality

MODULE – I**15**

Compression and CD-Technology: Introduction-CODEC-types of compression-types of redundancies-lossless/statistical compression techniques-GIF image coding standard-Lossy/perceptual compression techniques-JPEG image coding standard-MPEG standards overview-MPEG-1 Audio-MPEG-1 video-MPEG2 audio-MPEG video-MPEG-4-MPEG-7- Compact disc-CD formats-Magneto-optical discs-CD interface-Laserdisc-Error handling-DVD-DVD formats

MODULE - II**15**

Multimedia Architecture and Documents: Introduction-User interfaces-windows multimedia support-Hardware support-distributed multimedia applications-Real time protocols-playback architectures-streaming technologies-temporal relationships-synchronization-multimedia database systems-similarity metrics-indexing mechanisms-characteristics and bench marking of multimedia databases –Document and document architecture-designing multimedia interchange format-SGML-ODA-MHEG- HyTime-OMF-Digital copy rights

MODULE - III**15**

Multimedia Application development and Virtual reality: Introduction-Software life cycle overview-ADDIE model-conceptualization-content collection and processing-story-flowline-script-storyboard-authoring metaphors-Testing and feedback-final delivery-Report writing /documentation-introduction to virtual reality –Forms of virtual reality-VR applications-Software requirements-peripheral devices-Virtual Reality Modeling language (VRML)

TOTAL : 45**REFERENCE BOOKS**

1. Ranjan Parekh., “Principles of Multimedia ”, Tata McGraw-Hill, New Delhi, 2006.
2. Tay Vaughan, “Multimedia making it work”, Tata McGraw-Hill, 2008
3. Li and Drew, “Fundamentals of Multimedia”, Pearson Education, 2009.
4. Chitreshh Banerjee and Ajeet Singh Poonia, “Multimedia Systems” Genius publications, India, 2009

11MS014 XML AND WEB SERVICES

3 0 0 3

Objective:

- To understand the basics of XML, XML syntax, namespaces, grammars and document presentation
- To provide web service specifications for XML, XML Schema, SOAP, WSDL and UDDI
- To know the concept of web services

MODULE – I

15

XML, DTD, XPATH: Introducing XML- XML Fundamentals-Document Type Definitions-Namespaces -Internationalization - XML as a Document Format -XML on the web - XSL Transformations(XSLT) - XPATH - XLinks -XPointers- XInclude

MODULE - II

15

XSL, CSS and Schema: Cascading Style Sheets (CSS) - XSL Formatting Objects (XSL-FO) - Resource Directory Description Language (RDDDL) -XML as a Data Format - XML Schemas - Programming Models - Document Object Model (DOM) - Simple API for XML (SAX), JDOM, JAXB, SAX Vs DOM, Working with SAX.

MODULE - III

15

Web Services: Architecture of web services, business motivations- Technical motivations, Services Oriented Architecture – Architecting Web Services, SOAP, basic SOAP syntax, SOAP messages, implementations, Overview of WSDL and UDDI.

TOTAL : 45

REFERENCE BOOKS

1. Elliotte Rusty Harold, W. Scott Means, “XML in a Nutshell”, Third Edition, O'Reilly Media, Inc., 2004
2. Schmelzer, Ron and Vandersypen, Travis, “XML and Web Services Unleashed”, Pearson education, New Delhi, 2002
3. Ramesh Nagappan, Robert Skoczylas and Rima Patel Sriganesh, "Developing Java Web Services", Wiley Publishing Inc., 2004.
4. Sandeep Chatterjee, and James Webber, "Developing Enterprise Web Services", Pearson Education, New Delhi, 2004.
5. McGovern, et al., "Java Web Services Architecture", Morgan Kaufmann Publishers, 2005.

11MS015 BIO INFORMATICS

3 0 0 3

Objective:

- To understand the concepts of computer science that relate to problems in biological sciences.
- To know commercial and academic perspectives on bioinformatics.
- To know the impact of bioinformatics on the methodologies used in biological science.
- To understand the influence of biological science on computing science.

MODULE – I

15

Introduction, Database and Networks: The Central Dogma – Killer Application – Parallel Universes – Watson’s Definition – Top Down Vs Bottom Up Approach – Information Flow – Conversance – Communications. Definition – Data Management – Data Life Cycle – Database Technology – Interfaces – Implementation – Networks: Communication Models – Transmission Technology – Protocols – Bandwidth – Topology – Contents – Security – Ownership – Implementation.

MODULE - II

15

Search Engines, Data Visualization, Mining: Search Process – Technologies – Searching And Information Theory – Computational Methods – Knowledge Management – Sequence Visualizations – Structure Visualizations – User Interfaces – Animation Vs Simulation. 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.

MODULE - III

15

Pattern Matching, Modeling Simulation and Collaboration: Pattern Matching Fundamentals – Dot Matrix Analysis – Substitution Matrix – Dynamic Programming – Word Method – Bayesian Method – Multiple Sequence Alignment Tools. Drug Discovery Fundamentals – Protein Structure – System Biology Tools – Collaboration And Communication – Standards – Issues – Case Study.

TOTAL : 45

REFERENCE BOOKS

1. Bryan Bergeron, “Bio-Informatics Computing”, Prentice Hall of India, New Delhi, 2003.
2. Affward T.K, Parry Smith D.J, “Introduction to Bio Informatics”, Pearson Education, New Delhi, 2001.
3. Baldi, Pierre, and Brunak, Soren., “Bioinformatics: The Machine Learning Approach”, Second Edition, East West Press, New Delhi, 2003.

11MS016 GRID AND CLOUD COMPUTING

3 0 0 3

Objective:

- To explore cloud computing concepts and technologies
- To introduce various possibilities of cloud services
- To introduce infrastructure, platforms and standards needed for the cloud
- To enable the cloud to mobile devices and platforms

MODULE – I

15

Grid Computing- Anatomy and Physiology of Grid-Review of Web Services-OGSA-WSRF. Grid Monitoring Architecture (GMA) - An Overview of Grid Monitoring Systems- Grid Security-A Brief Security Primer-PKI-X509 Certificates-Grid Security

MODULE - II

15

Grid Scheduling and Resource Management-Scheduling Paradigms- Working principles of Scheduling -A Review of Condor, SGE, PBS and LSF-Grid Scheduling with QoS Grid Portals-First-Generation Grid Portals-Second-Generation Grid Portals. List of globally available grid Middlewares - Case Studies-Current version of Globus Toolkit and gLite - Architecture, Components and Features.

MODULE - III

15

Cloud and Services: Introduction – Evolution of cloud computing – Hardware evolution – Internet software evolution – Server virtualization – Web services overview –Communication as a Service-Information as a Service – Monitoring as a Service – Platform as a Service –Software as a Service-Cloud Networks- Hardware and infrastructure – Clients – Security – Network – Services - Accessing the cloud – Platforms – Web applications – Web APIs- Web browsers

TOTAL : 45

REFERENCE BOOKS

1. Maozhen Li, Mark Baker, The Grid: Core Technologies, John Wiley & Sons, 2005.
2. Rittinghouse, John, and Ransome, James., “Cloud Computing: Implementation, Management, and Security”, CRC Press, 2010.
3. Ian Foster and Carl Kesselman, “The Grid 2 – Blueprint for a New Computing Infrastructure” , Morgan Kaufman – 2004
4. Joshy Joseph and Craig Fellenstein, “Grid Computing”, Pearson Education , 2004
5. Fran Berman, Geoffrey Fox, Anthony J.G.Hey, “Grid Computing: Making the Global Infrastructure a Reality”, John Wiley and Sons, 2003
6. Toby Velte., Anthony Velte and Elsenpeter, Robert,, “Cloud Computing - A Practical Approach”, Tata McGraw Hill, 2010.

11MS017 EMBEDDED SYSTEMS AND RTOS

(Common to M.E. Computer Science and Engineering, Computer and Communication)

3 0 0 3

Objective:

- To introduce the concept of embedded systems, its hardware and software.
- To understand devices and buses used for embedded networking.
- To explore programming concepts and embedded programming in C and C++.
- To know real time operating systems, inter-task communication and an exemplary case of MUCOS – II RTOS

MODULE – I

15

Introduction to Embedded Systems: Overview of Processors and hardware units in an embedded system – Software embedded into the system – Exemplary Embedded Systems – Embedded Systems on a Chip (SoC) and the use of VLSI designed circuits.

Devices and Buses for Devices Network: I/O Devices - Device I/O Types and Examples – Synchronous - Iso-synchronous and Asynchronous Communications from Serial Devices - Examples of Internal Serial-Communication Devices - UART and HDLC - Parallel Port Devices - Sophisticated interfacing features in Devices/Ports- Timer and Counting Devices - ‘12C’, ‘USB’, ‘CAN’ and advanced I/O Serial high speed buses- ISA, PCI, PCI-X, cPCI and advanced buses.

MODULE - II

15

Programming Concepts and Embedded Programming in C, C++ : Programming in assembly language (ALP) vs. High Level Language - C Program Elements, Macros and functions -Use of Pointers - NULL Pointers - Use of Function Calls – Multiple function calls in a Cyclic Order in the Main Function Pointers – Function Queues and Interrupt Service Routines Queues Pointers – Concepts of EMBEDDED PROGRAMMING in C++ - Objected Oriented Programming – Embedded Programming in C++, ‘C’ Program compilers – Cross compiler – Optimization of memory codes.

Real Time Operating Systems- Introduction: Definitions of process, tasks and threads – Clear cut distinction between functions – ISRs and tasks by their characteristics – Operating System Services- Goals – Structures- Kernel - Process Management – Memory Management – Device Management – File System Organisation and Implementation – I/O Subsystems – Interrupt Routines Handling in RTOS

MODULE - III

15

Real Time Operating Systems -Scheduling: RTOS Task scheduling models - Handling of task scheduling and latency and deadlines as performance metrics – Co-operative Round Robin Scheduling – Cyclic Scheduling with Time Slicing (Rate Monotonics Co-operative Scheduling) – Preemptive Scheduling Model strategy by a Scheduler – Critical Section Service by a Preemptive Scheduler – Fixed (Static) Real time scheduling of tasks - Inter Process Communication and Synchronization – Shared data problem – Use of Semaphore(s) – Priority Inversion Problem and Deadlock Situations – Inter Process Communications using Signals – Semaphore Flag or mutex as Resource key – Message Queues – Mailboxes – Pipes – Virtual (Logical) Sockets – Remote Procedure Calls (RPCs).

Study of Micro C/OS-II: RTOS System Level Functions – Task Service Functions – Time Delay Functions – Memory Allocation Related Functions – Semaphore Related Functions – Mailbox Related Functions – Queue Related Functions – Case Studies of Programming with RTOS – Understanding Case Definition – Multiple Tasks and their functions – Creating a list of tasks – Functions and IPCs – Exemplary Coding Steps.

TOTAL : 45

REFERENCE BOOKS

1. Raj Kamal. “Embedded Systems: Architecture, Programming and Design”, Second Edition, Tata Mcgraw Hill Education,2008

2. Heath Steve, "Embedded Systems Design", Second Edition, Newnes, 2003
3. Simon, David E., "An Embedded Software Primer", Pearson Education Asia, 2000.
4. Wolf, Wayne, "Computers as Components; Principles of Embedded Computing System Design", Harcourt India, Morgan Kaufman Publishers, 2001.
5. Vahid Frank and Givargis Tony, "Embedded Systems Design: A unified Hardware /Software Introduction", John Wiley, New York, 2002.

11MS018 SOFTWARE QUALITY ASSURANCE AND TESTING
(Common to M.E. Computer Science and Engineering, Computer and Communication)

3 0 0 3

Objective:

- To understand the quality tools in software development.
- To know the various Metrics and Models used in quality assurance.
- To provide the step-by-step guidelines, checklists, and templates for each testing activity.
- To know the guidelines for testing specialized systems.

MODULE – I

15

Software Quality Assurance Framework, Standards and Metrics: Software Quality Assurance-Components of Software Quality Assurance - Software Quality Assurance Plan: Steps to develop and implement a Software Quality Assurance Plan – Quality Standards: ISO 9000 and Companion ISO Standards-CMM-CMMI-PCMM- Malcom Balridge - 3 Sigma- 6 Sigma - Software Quality Metrics: Product Quality metrics - In-Process Quality Metrics - Metrics for Software Maintenance - Software Quality metrics methodology: Establish quality requirements - Identify Software quality metrics - Implement the software quality metrics - analyze software metrics results - validate the software quality metrics - Software quality indicators - Fundamentals in Measurement theory.

MODULE - II

15

Software Testing Techniques: The Three-Step Process to Becoming a World-Class Testing Organization - Building a Software Testing Environment: Creating an Environment Supportive of Software Testing -Building the Software Testing Process: Software Testing Guidelines - The Seven-Step Testing Process: Overview of the Software Testing Process - Organizing for Testing - Developing the Test Plan - Verification Testing-Validation Testing-Analyzing and Reporting Test Results.

MODULE - III

15

Software Testing Tools and Applications: Taxonomy of Testing tools, Methodology to evaluate automated testing tools, Load Runner, Win runner and Rational Testing Tools, Java Testing Tools, Testing Client/Server – Web applications, Testing off the Shelf Components, Testing Security, Testing a Data Warehouse.

TOTAL : 45

REFERENCE BOOKS

1. Perry William, "Effective Methods for Software Testing", Third Edition, Wiley – India, Reprint 2009.
2. Mordechai BenMenachem and Garry S. Marliss, "Software Quality", Cengage Learning publication 2008.
3. Kan. Stephen H., "Metrics and Models in Software Quality Engineering", Second Edition, Pearson Education, 2009.
4. Jenkins, Nick., "A Software Testing Primer", Online book.
<http://www.nickjenkins.net/prose/testing>.
5. Daniel Galin, "Software Quality Assurance: from Theory to Implementation", Pearson Education, 2009.

11MS019 ADHOC NETWORKS

(Common to M.E. Computer Science and Engineering, Computer and Communication)

3 0 0 3

Objective:

- To introduce the concepts of Wireless and Adhoc Networks.
- To introduce MAC, Routing, Multicast Routing and Transport Layer Services.
- To learn about the Security requirements and QoS.

MODULE – I

15

Wireless LAN, PAN, WAN AND MAN: Characteristics of wireless channel, Fundamentals of WLANs, IEEE 802.11 standard, HIPERLAN Standard, Cellular Architecture, WLL, Wireless ATM, IEEE 802.16 standard, HIPERACCESS.

Ad hoc Wireless Networks: Introduction, Issues, Ad hoc wireless Internet.

Medium Access Control: MAC Protocols: Design issues, goals and classification, Contention Based Protocols: MACAW, FAMA, BTMA-Contention based protocols with reservation mechanism: DPRMA, FPRP, RTMAC - Contention based protocols with scheduling mechanisms: DPS, DWOP, DLPS, Protocols using directional antennas: MAC protocols using directional antennas, DBTMA, DMAC.

MODULE - II

15

Routing and Multicast Routing Protocols Routing Protocols: Design issues and classification, Table-driven Routing protocols: DSDV, WRP, CGSR- On-demand routing protocols: DSR, AODV, TORA, LAR, ABR- Hybrid routing protocols: CEDAR, ZRP- Routing protocols with efficient flooding mechanisms: OLSR- Hierarchical: FSR- power-aware routing protocols.

Multicast Routing Protocols: Design issues and operation, Architecture reference model, classification, Tree-based: BEMRP, MZRP, MAODV - Mesh-based protocols: ODMRP, DCMP, FGMP Energy-efficient multicasting.

MODULE - III

15

Transport Layer: Transport layer Protocol: Design issues, goals and classification, TCP over AdHoc wireless Networks.

Security, Security Requirements: Issues and challenges in security provisioning, Network security attacks, Secure routing.

Quality of Service: Issues and challenges in providing QoS, Classification of QoS solutions, MAC layer solutions: Cluster TDMA, IEEE 802.11e - Network layer solutions : QoS Routing Protocols, Ticket based QoS routing protocol, PLBQR- QoS frameworks: QoS models, INSIGNIA.

TOTAL : 45

REFERENCE BOOKS

1. Siva Ram Murthy C., “AdHoc Wireless Networks Architectures and Protocols”, Pearson Education, 2004.
2. Toh C.K., “AdHoc Mobile Wireless Networks: Protocols and Systems”, Prentice Hall PTR, 2001.
3. Perkins Charles E., “AdHoc Networking”, Addison – Wesley, 2000
4. Stefano Basagni, Marco Conti, Silvia Giordano and Ivan Stojmenovic, “Mobile AdHoc Networking”, Wiley – IEEE press, 2004.

Objective:

- To understand about different data mining methods that can be used for the databases.
- To get familiarized with data preprocessing and data mining techniques
- To develop in-depth knowledge about the concepts of data mining.
- To provide an introductory concept about the applications of data mining in different areas.

MODULE – I**15**

Introduction: Data Mining on different kind of data - Data Mining Functionalities-Steps in Data Mining Process-Architecture of a Typical Data Mining System- Classification of Data Mining Systems - Data Mining Task Primitives- Integration of a data mining system with a Database or Data warehouse System - Major issues- Data Preprocessing-Descriptive data summarization - Data Cleaning, Integration, Transformation, Reduction, Discretization and Concept Hierarchy Generation- Attribute Oriented Induction.

MODULE - II**15**

Association and Classification: Mining frequent patterns, Associations and Correlations - Classification and Prediction: Issues Regarding Classification and Prediction-Classification by Decision Tree Induction-Bayesian Classification-Rule based classification-Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners - Other Classification Methods-Prediction – Accuracy and Error Measures – Classifier and Predictor accuracy evaluation – Ensemble methods – Model Selection.

MODULE - III**15**

Clustering and Applications: Clusters Analysis - Types of Data In Cluster Analysis - Categorization of Major Clustering Methods: Partitioning Methods – Hierarchical Methods - Applications of Data Mining - Social Impacts of Data Mining - Ubiquitous and invisible data mining – Data mining, privacy and security – Tools - An Introduction to OLE DB for data mining- Model creation, Training – Prediction and browsing - Case Studies-Mining WWW- Text Mining -Mining Spatial Databases.

TOTAL : 45**REFERENCE BOOKS**

1. Han Jiawei, and Kamber Micheline, "Data Mining: Concepts and Techniques", Second Edition, Morgan Kaufmann Publishers, 2006.
2. Berson Alex, and Smith Stephen J., "Data Warehousing, Data Mining and OLAP", Tata Mcgraw- Hill, New Delhi, 2004.
3. Gupta G.K., "Introduction to Data Mining with Case Studies", Prentice Hall India, New Delhi, 2006.
4. Dunham, Margaret H., "Data Mining: Introductory and Advanced Topics", Pearson Education 2004.

Objective:

- To understand the agent's development frameworks and language development tools.
- To examine basic methodologies for problem solving.
- To provide an in-depth understanding of major techniques used to simulate intelligence.
- To apply agent based intelligence systems techniques in various environments.

MODULE – I**15**

Intelligent systems and Searching Techniques: Intelligent Agents – Agents and environments - The nature of environments – structure of agents - Problem Solving - problem solving agents – searching for solutions – uniformed search strategies -Informed search strategies – heuristic function – local search algorithms and optimistic problems – local search in continuous spaces – online search agents and unknown environments - Constraint satisfaction problems (CSP) – Backtracking search and Local search for CSP – Structure of problems - Adversarial Search – Games – Optimal decisions in games – Alpha – Beta Pruning – imperfect real-time decision – games that include an element of chance.

MODULE - II**15**

Knowledge Representation and Learning: First order logic – Syntax and semantics for first order logic –prepositional versus first order logic – unification and lifting – forward chaining – backward chaining - Resolution - Knowledge representation - Ontological Engineering - Ontology languages – RDF - Constructing an ontology – Software tools for ontology – Communicating - Cooperative distributed problem solving- Task sharing and result sharing - Handling inconsistency – Coordination – Multi-agent planning and synchronization – Agent oriented analysis and design- Pitfalls of agent development.

MODULE - III**15**

Security and Applications: Mobile agents – Applications - Agents for information retrieval, electronic commerce -Human computer interfaces – Agent development frameworks and languages development tools applications of agents. Agent oriented methodologies, agent oriented analysis and design, Gaia methodology, MASE, OPEN process framework, tropos, agent UML - Agent security issues - Mobile agents security – Protecting agents against malicious hosts - Un trusted agent -Black box security - Authentication for agents - Security issues for aglets.

TOTAL : 45**REFERENCE BOOKS**

1. Russell Stuart, and Norvig Peter, “Artificial Intelligence: A Modern Approach”, Third Edition, Pearson Education / Prentice Hall of India, New Delhi, 2009.
2. Wooldridge, Michael., “An Introduction to Multi-agent Systems”, Second Edition, John Wiley & Sons, 2009.
3. Rich Elaine and Knight Kevin, “Artificial Intelligence”, Third Edition, Tata McGraw-Hill, New Delhi, 2009.
4. Luger George F., “Artificial Intelligence: Structures and Strategies for Complex Problem Solving”, Sixth edition, Pearson Education / Prentice Hall of India, New Delhi, 2009.

11MS022 COMPONENT BASED TECHNOLOGY

3 0 0 3

Objective:

- To introduce in depth JAVA, Corba and .Net Components
- To deal with Fundamental Properties of Components, Technology Architecture and middleware.
- To know the Component Frameworks and Development in depth.

MODULE – I

15

Software Components – objects – fundamental properties of Component technology – modules – interfaces – callbacks – directory services – component architecture – components and middleware, Threads – Java Beans – Events and connections – properties – introspection – JAR files – reflection – object serialization- Enterprise Java Beans.

MODULE - II

15

Distributed Object models – RMI and RMI-IIOP- Java and CORBA – Interface Definition language – Object Request Broker – system object model – portable object adapter – CORBA services – CORBA component model – containers – application server – model driven architecture - COM – Distributed COM – object reuse – interfaces and versioning.

MODULE - III

15

Dispatch interfaces – connectable objects – OLE containers and servers – Active X controls – .NET components - assemblies – appdomains – contexts – reflection – remoting - Connectors – contexts – EJB containers – CLR contexts and channels – Black Box component framework – directory objects – cross-development environment – component-oriented programming – Component design and implementation tools – testing tools - assembly tools.

TOTAL : 45

REFERENCE BOOKS

1. Szyperski Clemens, “Component Software: Beyond Object-Oriented Programming”, Pearson Education publishers, New Delhi, 2003.
2. Roman Ed, “Mastering Enterprise Java Beans”, John Wiley & Sons Inc., New York, 1999.
3. Mowbray, “Inside CORBA”, Pearson Education, New Delhi, 2003.
4. Freeze, “Visual Basic Development Guide for COM & COM+”, BPB Publication, New Delhi, 2001.
5. Hortsamann, Cornell, “Core JAVA”, Volume. II, Sun Press, 2002.

Objective:

- To introduce the application of state automata for language processing
- To provide the fundamentals of syntax including a basic parse
- To know advanced feature like feature structures and realistic parsing methodologies
- To provide details about a typical natural language processing application

MODULE – I**15**

Introduction: Knowledge in speech and language processing – Ambiguity – Models and Algorithms – Language, Thought and Understanding. Regular Expressions and automata: Regular expressions – Finite-State automata. Morphology and Finite-State Transducers: Survey of English morphology – Finite-State Morphological parsing – Combining FST lexicon and rules – Lexicon-Free FSTs: The porter stammer – Human morphological processing- Word classes and part-of-speech tagging: English word classes – Tagsets for English – Part-of-speech tagging – Rule-based part-of-speech tagging – Stochastic part-of-speech tagging – Transformation-based tagging – Other issues. Context-Free Grammars for English: Constituency – Context-Free rules and trees – Sentence-level constructions – The noun phrase – Coordination – Agreement – The verb phrase and sub categorization – Auxiliaries – Spoken language syntax – Grammars equivalence and normal form – Finite-State and Context-Free grammars – Grammars and human processing. Parsing with Context-Free Grammars: Parsing as search – A Basic Top-Down parser – Problems with the basic Top-Down parser – The early algorithm – Finite-State parsing methods.

MODULE - II**15**

Features and Unification: Feature structures – Unification of feature structures – Features structures in the grammar – Implementing unification – Parsing with unification constraints – Types and Inheritance. Lexicalized and Probabilistic Parsing: Probabilistic context-free grammar – problems with PCFGs – Probabilistic lexicalized CFGs – Dependency Grammars – Human parsing- Representing Meaning: Computational desiderata for representations – Meaning structure of language – First order predicate calculus – Some linguistically relevant concepts – Related representational approaches – Alternative approaches to meaning. Semantic Analysis: Syntax-Driven semantic analysis – Attachments for a fragment of English

MODULE - III**15**

Integrating Semantic Analysis into the Early Parser: Idioms and compositionality – Robust semantic analysis. Lexical semantics: relational among lexemes and their senses – WordNet: A database of lexical relations – The Internal structure of words – Creativity and the lexicon- Word Sense Disambiguation and Information Retrieval: Selectional restriction-based disambiguation – Robust word sense disambiguation – Information retrieval – other information retrieval tasks. Natural Language Generation: Introduction to language generation – Architecture for generation – Surface realization – Discourse planning – Other issues. Machine Translation: Language similarities and differences – The transfer metaphor – The interlingua idea: Using meaning – Direct translation – Using statistical techniques – Usability and system development.

TOTAL : 45**REFERENCE BOOKS**

1. Jurafsky Daniel and Martin James H., “Speech and Language Processing”, Pearson Education Singapore, 2002.
2. Allen, James, “Natural Language Understanding”, Pearson Education, New Delhi, 2003.

11MS025 COMPILER DESIGN

(Common to M.E. Computer Science and Engineering, Computer and Communication)

3 0 0 3

Objective:

- To know the concepts related to design and implementation of a lexical analyzer.
- To provide knowledge about design and implementation of a parser.
- To know the various code generation schemes.
- To understand optimization of codes and runtime environment

MODULE – I

15

The phases of Compiler- Compiler construction tools - Lexical Analysis-Expressing tokens by Regular Expression - Finite Automata-Converting regular expression to NFA –Syntax Analysis - Top Down parsing-Recursive Parsing- Problems- Recursive Descent parser- Predictive Parser –Bottom up parsers- shift reduce parser-operator precedence parsers- LR parser -YACC- Design of a syntax analyzer for a sample language

MODULE - II

15

Syntax-directed definitions-Construction of syntax trees-Bottom-up evaluation, L-attributed definitions-Top down translation- Recursive Evaluator Method- Comparison of Translation Method-Syntax directed translation for declaration statements- Assignment statements-Boolean expression-Control flow statements-Procedure calls-Runtime Environment: Source language issues-Storage organization-Storage allocation strategies-Storage allocation in C-Parameter passing.

MODULE - III

15

Code Generation-Issues in the design of a code generator-Basic blocks and flow graph-A simple code generator-Register allocation and Assignment-DAG representation of basic blocks-Generating code form dags-Code Optimisation: Principal sources of Optimization –Optimisation of basic blocks-Global data flow analysis-Code-improving transformations-Data flow analysis of structured flow graph-Efficient data flow algorithms- Symbolic debugging of optimised code-Approaches to compiler development-The C compilers.

TOTAL : 45

REFERENCE BOOKS

1. Aho Alfred V, Ravi Sethi and Ullman Jeffrey D, "Compilers: Principles, Techniques and Tools", Pearson Education, New Delhi, 2007.
2. Louden, Kenneth C., "Compiler Construction Principles and Practice", Vikas Publishing House, New Delhi, 2004.
3. Dick Grone, Henri E Bal, Cerial J H Jacobs and Koen G Langendoen, "Modern Compiler Design", John Wiley & Sons, USA, 2000.
4. Holub, Allen I., "Compiler Design in C", Prentice Hall of India, New Delhi, 2001.

11MS026 RFID

3 0 0 3

Objective:

- To understand the concept of RFID and different types of RFID
- To familiarize them with the different applications possible with RFID and the benefits
- To give exposure to students on various types of tags and vendors for the same
- To expose the various standards which govern use of RFID

MODULE – I

15

General RFID Information and Technology: Automatic identification – What is RFID?- different types of uses of RFID- Applications of RFID- Benefits of RFID - System of working – Low , high and ultra high frequency – Right frequency for an application – use with sensors.

MODULE - II

15

RFID Tags and readers: Information stored in tag – read only and read write tags – passive and active tags-read range of a tag – tag collision – energy harvesting – chipless RFID tag- leading RFID vendors – MEMS – Agile reader – intelligent and dumb readers – reader collision- dense reader mode – leading RFID reader vendors.

MODULE - III

15

RFID Standards: EPCIS standard – standards for RFID – EPC standard – EPC Gen 2 standard- foundation protocol – difference between ISO and EPC – ISO 18000-6 – EPCglobal e-pedigree standard.

TOTAL : 45

REFERENCE BOOKS

1. RFID Journal
2. www.rfidjournal.com
3. Simson Garfinkel and Beth Rosenberg., “RFID Applications, Security and Privacy”, Addison Wesley Professional, 2005. 608 page ISBN: 0321290968

11MS027 BUSINESS INTELLIGENCE

(Common to M.E. Computer Science and Engineering, Computer and Communications)

3 0 0 3

Objective:

- To understand various basic concepts of Data Warehousing, Business Intelligence.
- To know how to build Business Intelligence application using SSIS, SSAS, SSRS.
- To understand the relation between Data Warehousing, Data Mining and Reporting.

MODULE - I

15

Data Warehousing : Data Warehouse Architecture – System Process – Process Architecture – Database Design – Aggregations – Metadata – OLTP - OLAP

Introduction to Business Intelligence : Business Intelligence from the Business Side – Components of Business Intelligence Architecture – Business Intelligence Front-End – Measures of Success – LOFT Effect – Applications of BI

MODULE - II

15

Success of Business Intelligence: Executive Support – Data and Data Quality – The Business-IT Partnership – Relevance – Agile Development – Organizing for Success – Other Secrets to Success – The Future of Business Intelligence – Case Study

SSIS: Introduction to ETL using SSIS – Integration services – Package structure – Package Items – Control flow - Data flow components – Sources, Transformations and Destinations

MODULE - III

15

SSAS : Introduction to Dimensional Modeling using SSAS - Creating Cube - Measures – Dimensions – Managing dimensions – Relating Dimensions to Measure Group – Types of Dimensions – Slowly Changing Dimensions

Enterprise Reporting : Introduction to Reporting Using SSRS – Reporting Service – Report Structure – Report Delivery – Report Serving Architecture – Report Server – Creating Report using Tablix Data Region with Table Template

TOTAL: 45

REFERENCE BOOKS

1. Sam Anahory, Dennis Murray, “Data warehousing in the Real World: A Practical Guide for Building Decision Support Systems”, Pearson Education Limited, New Delhi, 2007
2. Cindi Howson, “Successful Business Intelligence: Secrets to Making BI a Killer App”, Tata McGraw-Hill, New Delhi, 2008
3. Brian Larson, “Delivering Business Intelligence with Microsoft SQL Server 2008”, McGraw-Hill, 2009
4. David Loshin, “Business Intelligence”, Morgan Kaufmann Publishers, San Francisco, Fifth edition, 2007
5. Mike Biere, “Business Intelligence for the Enterprise”, Pearson Education, Tenth edition, 2008
6. Larissa Terpeluk Moss, Shaku Atre, “Business Intelligence Roadmap”, Pearson Education, 2007

11MS028 PATTERN RECOGNITION

(Common to M.E. Computer Science and Engineering, Computer and Communications)

3 0 0 3

Objective:

- To understand various basic concepts of pattern recognition.
- To know the different methods of parameter estimation
- To understand the different statistical methods for classification and clustering

MODULE - I

15

Basics of Pattern Recognition: Machine perception – Pattern recognition system – Design cycle – learning and adaptation - Bayesian decision theory - Classifiers, Discriminant functions, Decision surfaces - Normal density and discriminant functions – Error Probabilities and Integrals – Error bounds –Discrete features – Missing and noisy features – Bayesian Belief Networks.

MODULE - II

15

Parameter Estimation: Parameter estimation methods Maximum-Likelihood estimation - Gaussian mixture models - Expectation-maximization method - Bayesian estimation - Hidden Markov models for sequential pattern classification - Discrete hidden Markov models - Continuous density hidden Markov models - Dimension reduction methods - Fisher discriminant analysis - Principal component analysis - Non-parametric techniques for density estimation - Parzen-window method - K-Nearest Neighbor method

MODULE - III

15

Classification and Clustering

Linear discriminant function based classifiers - Perceptron - Support vector machines - Non-metric methods for pattern classification - Non-numeric data or nominal data - Decision trees - Unsupervised learning and clustering - Criterion functions for clustering - Algorithms for clustering: K-means, Hierarchical and other methods- Cluster validation.

TOTAL: 45

REFERENCE BOOKS

1. Richard O Duda, Peter E Hart and David G Stork, Pattern Classification, Second Edition, John Wiley, 2001
2. S. Theodoridis and K. Koutroumbas, Pattern Recognition, 4th Ed., Academic Press, 2009
3. C. M. Bishop, Pattern Recognition and Machine Learning, Springer, 2006

11VL025 DIGITAL IMAGE PROCESSING

(Common to M.E. Mechatronics, Applied Electronics and Computer Science and Engg.)

3 0 0 3

PREREQUISITE

Digital Signal Processing

Objectives:

- To introduce the fundamentals and techniques of digital image processing.
- To understand the various 2D image transformations.
- To study the concepts of image processing techniques like image enhancement and restoration.
- To study the various techniques in image segmentation and representation.
- To understand the various techniques of Image compression and its standards.

MODULE– I

15

Introduction: Elements of Digital Image processing – Elements of visual perception: light - luminance – brightness, contrast, hue, saturation – Mach band effect – simultaneous contrast. Color image fundamentals – RGB model and HIS model – converting colors from HIS to RGB. Two dimensional sampling theory – practical limits in sampling and reconstruction.

Image Transforms: Two dimensional systems - Block matrices and Kronecker products. Two dimensional orthogonal and unitary transforms – DFT, cosine, sine, Walsh, problems

MODULE– II

15

2D Transforms: Hadamad, Haar and KL transforms, Radon transforms, problems

Image Enhancement and Restoration: Image enhancement - Point operations - contrast stretching - clipping and thresholding - digital negative intensity level slicing - bit extraction. Histogram processing - histogram equalisation -modification. Spatial operations – smoothing spatial filters, sharpening spatial filters. Transform operations. Color image enhancement. Image Restoration – degradation model, Noise models, Unconstrained and Constrained restoration, Inverse filtering – removal of blur caused by uniform linear motion, Wiener filtering.

Image Segmentation: Point, line and edge detection –Image segmentation based on thresholding– Region based segmentation – region growing – region splitting and merging.

MODULE– III

15

Image Representation: Representation: chain codes – polynomial approximations – signatures – boundary descriptors – Regional descriptors: Texture regional descriptor.

Image Compression: Image Compression – Need for data compression – Run length encoding – Huffman coding – Arithmetic coding – predictive coding- transform based compression, Image compression standards – JPEG 2000, MPEG 4. - vector quantization – block truncation coding, Wavelet based image compression.

TOTAL: 45

REFERENCE BOOKS

1. Gonzalez, Rafel C. and Woods, Richard E., "Digital Image Processing", Second Edition, Prentice Hall, New York, 2006.
2. Jain, Anil K., "Fundamentals of Digital Image Processing", Prentice Hall of India, New Delhi, 2003.
3. Rosenfield, Azriel and Kak, Avinash C., "Digital Picture Processing", Academic Press Inc, New York, 1982.
4. Jayaraman. S, Esakkirajan. S, and Veerakumar. T, "Digital Image Processing" 1st ed, Tata McGraw-Hill, New Delhi 2009