

## **MASTER OF SCIENCE IN COMPUTER SCIENCE: M.SC-CS- SYLLABUS**

### **First Year:**

#### **MPCS-1: MATHEMATICAL STRUCTURES FOR COMPUTER SCIENCE**

##### **BLOCK –I**

Formal Logic: Statements, Symbolic Representation, and Tautologies, Propositional Logic, Quantifiers, Predicates, and Validity, Predicate Logic, Logic Programming, Proof of Correctness. Proofs, Recursion.

##### **BLOCK-II**

Sets, Combinatorics, Probability, and Number Theory: Sets, Counting, Principle of Inclusion and Exclusion; Pigeonhole Principle, Permutations and Combinations, Probability, Binomial Theorem, Number Theory.

##### **BLOCK-III**

Relations, Functions, and Matrices: Relations, Topological Sorting, Relations and Databases, Functions, The Mighty Mod Function, Matrices, Recursive Function-Recurrence relations.

##### **BLOCK-IV**

Graphs and Trees: Graphs and their Representations, Trees and their Representations, Decision Trees, Huffman Codes. Graph Algorithms: Directed Graphs and Binary Relations; Warshall's Algorithm, Euler Path and Hamiltonian Circuit, Shortest Path and Minimal Spanning Tree, Traversal Algorithms, Articulation Points and Computer Networks.

##### **BLOCK-V**

Boolean Algebra and Computer Logic: Boolean Algebra Structure, Logic Networks, Minimization, Modeling Arithmetic, Computation, and Languages: Algebraic Structures, Finite-State Machines, Turing Machines, Formal Languages.

##### **REFERENCE BOOKS:**

1. Judith L.Gersting,"Mathematical Structures for Computer Science", Sixth Edition, W.H.Freeman and Company,NY,2007.
2. Trembly J.P and Manohar R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw–Hill Pub. Co. Ltd, New Delhi, 2003.
3. Ralph. P. Grimaldi, "Discrete and Combinatorial Mathematics: An Applied Introduction", Fourth Edition, Pearson Education Asia, Delhi, 2002.
4. Bernard Kolman, Robert C. Busby, Sharan Cutler Ross, "Discrete Mathematical Structures", Fourth Indian reprint, Pearson Education Pvt Ltd., New Delhi, 2003.
5. Kenneth H.Rosen, "Discrete Mathematics and its Applications", Fifth Edition, Tata McGraw – Hill Pub. Co. Ltd., New Delhi, 2003.
6. Richard Johnsonbaugh, "Discrete Mathematics", Fifth Edition, Pearson Education Asia, New Delhi, 2002.

## **MPCS-2: DATA STRUCTURES**

### **BLOCK -1 : INTRODUCTION**

Definition of Algorithm and Data structure- Types of Data structure (linear and non- linear data structure) Linear data structure: Array, Stack ,Queue, Linked List-doubly linked list and circular list - Recursive and non recursive algorithm.

### **BLOCK – 2 : NON-LINEAR DATA STRUCTURE**

Binary Tree – notations, terminology, Representation, Binary tree Traversal and Application. Graph- Notations, Terminology-Representation, Traversal and Application. Performance analysis of an algorithm.-Tabular method.

### **Block-3 HEAP STRUCTURES**

Min/Max heaps – Deaps – Leftist Heaps – Binomial Heaps – Fibonacci Heaps – Skew Heaps – Lazy-Binomial Heaps.

### **Block 4 SEARCH STRUCTURES**

Binary Search Trees – AVL Trees – Red-Black trees – Multi-way Search Trees –B-Trees – Splay Trees – Tries.

### **Block 5 MULTIMEDIA STRUCTURES**

Segment Trees – k-d Trees – Point Quad Trees – MX-Quad Trees – R-Trees – TVTrees

## **REFERENCES**

1. E. Horowitz, S.Sahni and Dinesh Mehta, Fundamentals of Data structures in C++, University Press, 2007.
2. E. Horowitz, S. Sahni and S. Rajasekaran, Computer Algorithms/C++, Second Edition, University Press, 2007.
3. G. Brassard and P. Bratley, Algorithmics: Theory and Practice, Printice –Hall, 1988.
4. V.S. Subramanian, Principles of Multimedia Database systems, Morgan Kaufman, 1998.

## **MPCS-3: COMPUTER GRAPHICS**

### **BLOCK – I**

Introduction to Computer Graphics – Video display devices – Raster scan System – Random Scan Systems – Interactive input devices – Hard copy devices – Graphics software – Output primitives – Line drawing algorithms – DDA algorithm, Bresenham's Line drawing algorithm – Circle Generating algorithms – Bresenham's algorithm, Midpoint circle algorithm.

### **BLOCK – II**

Attributes of output primitives – line attributes – Color and Grayscale style – Area filling algorithms – Character attributes – Inquiry functions – Two dimensional transformation – Basic transformation – Composite transformation – Matrix representation – Other transformations.

### **BLOCK – III**

Two-dimensional viewing – Window to View Port co-ordinate transformation – Clipping algorithms – Interactive input methods – Physical input devices – Logical classification of input devices – Interactive picture construction methods.

### **BLOCK – IV**

Three-dimensional concepts–Three dimensional display methods – Parallel Projection – Perspective Projection – Depth Cueing – Visible Line and Surface Identification – Three dimensional transformation.

### **BLOCK – V**

Three dimensional viewing – Projection – Viewing transformation –hardware implementation – Visible surface detection algorithms – Backface detection –Depth buffer method.

### **REFERENCES:**

1. D. Hearn and M.P. Baker – Computer Graphics – Prentice Hall of India – 1997.
2. W.M. Newman and R.F. Sproull – Principles of Interactive Computer Graphics – McGraw Hill International Edition – 1979.

## **MPCS-4: OBJECT ORIENTED ANALYSIS AND DESIGN**

### **BLOCK-I**

Introduction to UML: Importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Architecture, Software Development Life Cycle.

### **BLOCK-II**

Basic Structural Modeling: Classes, Relationships, common Mechanisms, and diagrams. Advanced Structural Modeling: Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages.

### **BLOCK-III**

Class & Object Diagrams: Terms, concepts, modeling techniques for Class & Object Diagrams. Basic Behavioral Modeling-I: Interactions, Interaction diagrams. Basic Behavioral Modeling-II: Use cases, Use case Diagrams, Activity Diagrams.

### **BLOCK-IV**

Advanced Behavioral Modeling: Events and signals, state machines, processes and Threads, time and space, state chart diagrams.

### **BLOCK-V**

Architectural Modeling: Component, Deployment, Component diagrams and Deployment diagrams. Case Study: The Unified Library application. Mapping Object Model to Database Schema. Usability Principles- user interface design evaluating user interfaces . Testing and Quality – strategies, defects, test cases and test plan, inspections, quality assurance.

### **REFERENCES:**

1. Grady Booch, James Rumbaugh, Ivar Jacobson : The Unified Modeling Language User Guide, Pearson Education, second edition, 2005.
2. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: UML 2 Toolkit,
3. Ali Bahrami, “Object Oriented System Development”, McGraw Hill, 1999
4. Meilir Page-Jones: Fundamentals of Object Oriented Design in UML, Pearson Education.
5. Pascal Roques: Modeling Software Systems Using UML2, WILEY-Dreamtech India Pvt. Ltd.
6. Atul Kahate: Object Oriented Analysis & Design, The McGraw-Hill Companies
7. Mark Priestley: Practical Object-Oriented Design with UML,TATA McGrawHill
8. Applying UML and Patterns: An introduction to Object – Oriented Analysis and Design and Unified Process, Craig Larman, Pearson Education, 2001.

## **MPCS-5: ADVANCED DATABASES**

### **UNIT I PARALLEL AND DISTRIBUTED DATABASES**

Database System Architectures: Centralized and Client-Server Architectures – Server System Architectures – Parallel Systems- Distributed Systems – Parallel Databases: I/O Parallelism – Inter and Intra Query Parallelism – Inter and Intra operation Parallelism – Design of Parallel Systems- Distributed Database Concepts - Distributed Data Storage – Distributed Transactions – Commit Protocols – Concurrency Control – Distributed Query Processing – Case Studies

### **UNIT II OBJECT AND OBJECT RELATIONAL DATABASES**

Concepts for Object Databases: Object Identity – Object structure – Type Constructors – Encapsulation of Operations – Methods – Persistence – Type and Class Hierarchies – Inheritance – Complex Objects – Object Database Standards, Languages and Design: ODMG Model – ODL – OQL – Object Relational and Extended – Relational Systems: Object Relational features in SQL/Oracle.

### **UNIT III INTELLIGENT DATABASES**

Active Databases: Syntax and Semantics (Starburst, Oracle, DB2)- Taxonomy- Applications- Design Principles for Active Rules- Temporal Databases: Overview of Temporal Databases- TSQL2- Deductive Databases: Logic of Query Languages – Datalog- Recursive Rules- Syntax and Semantics of Datalog Languages- Implementation of Rules and Recursion- Recursive Queries in SQL- Spatial Databases- Spatial Data Types- Spatial Relationships- Spatial Data Structures- Spatial Access Methods- Spatial DB Implementation.

### **UNIT IV ADVANCED DATA MODELS**

Mobile Databases: Location and Handoff Management - Effect of Mobility on Data Management -Location Dependent Data Distribution - Mobile Transaction Models - Concurrency Control -Transaction Commit Protocols- Multimedia Databases- Information Retrieval- Data Warehousing-Data Mining- Text Mining.

### **UNIT V EMERGING TECHNOLOGIES**

XML Databases: XML-Related Technologies-XML Schema- XML Query Languages- Storing XML in Databases-XML and SQL- Native XML Databases- Web Databases- Geographic Information Systems- Biological Data Management- Cloud Based Databases: Data Storage Systems on the Cloud- Cloud Storage Architectures-Cloud Data Models- Query Languages- Introduction to Big Data-Storage-Analysis.

### **REFERENCES:**

1. R. Elmasri, S.B. Navathe, “Fundamentals of Database Systems”, Fifth Edition, Pearson Education/Addison Wesley, 2008.
2. Thomas Cannolly and Carolyn Begg, “Database Systems, A Practical Approach to Design, Implementation and Management”, Fourth Edition, Pearson Education, 2008.
3. Henry F Korth, Abraham Silberschatz, S. Sudharshan, “Database System Concepts”, Sixth Edition, McGraw Hill, 2011.
4. C.J.Date, A.Kannan, S.Swamynathan, “An Introduction to Database Systems”, Eighth Edition, Pearson Education, 2006.
5. Carlo Zaniolo, Stefano Ceri, Christos Faloutsos, Richard T.Snodgrass, V.S.Subrahmanian, Roberto Zicari, “Advanced Database Systems”, Morgan Kaufmann publishers,2006.
6. Vijay Kumar, “Mobile Database Systems”, John Wiley & Sons, 2006.
7. G.K.Gupta,”Database Management Systems”, Tata McGraw Hill, 2011.

## **MPCS-6: COMPUTER ARCHITECTURE**

### **Unit I**

Introduction to parallel processing – Trends towards parallel processing – parallelism in uniprocessor Systems – Parallel Computer structures – architectural classification schemes – Flynn' Classification – Feng's Classification – Handler's Classification – Parallel Processing Applications.

### **Unit II**

Solving problems in Parallel: Utilizing Temporal Parallelism – Utilizing Data Parallelism – Comparison of Temporal and Data Parallel Processing – Data parallel processing with specialized Processor – Inter – task Dependency. Instructional Level parallel processing – Pipelining of Processing Elements – Delays in Pipeline Execution – difficulties in Pipelining.

### **Unit III**

Principles Linear Pipelining – Classification of Pipeline processors – General Pipeline and Reservation tables – Arithmetic Pipeline – Design Examples – Data Buffering and Busing structure – Internal forwarding and Register Tagging – Hazard Detection and Resolution – Job sequencing and Collision prevention – Vector processing requirements – Characteristics – Pipelined Vector Processing methods.

### **Unit IV**

SIMD Array processors – Organization – Masking and Data routing – Inter PE communications – SIMD Interconnection Networks – Static Vs Dynamic – Mesh connected Illiac – Cube interconnection network – Shuffle – Exchange and Omega networks – Multiprocessor Architecture and programming Functional Structures – interconnection Networks.

### **Unit V**

**Parallel Algorithms:** Models of computation – Analysis of parallel Algorithms Prefix Computation – Sorting – Searching – Matrix Operations.

### **Reference Books:**

- 1 Kai Hwang, Faye A. Briggs, "Computer Architecture and Parallel Processing" Mc Graw – Hill Book Company, 1985 [ I, III UNITS]
- 2 V. Rajaraman, C. Siva Ram Murthy, "Parallel computers Architectures and Programming", PHI,2003 [II, IV UNITS]
- 3 Kai Hwang, "Advanced Computer Architecture – Parallelism, Scalability, Programmability", Mcgraw Hill, 1993.
- 4 Michael J. Quinn, 'parallel Computing Theory and Practice', TMCH, Second Edition, 2002.
- 5 Barry Wilkinson, Micheal Allen, "Parallel Programming : Techniques and Applications", Prentice Hall, 1999.

### **REFERENCES**

1. John L. Hennessey and David A. Patterson, " Computer Architecture – A quantitative approach", Morgan Kaufmann / Elsevier, 4th. edition, 2007.
2. David E. Culler, Jaswinder Pal Singh, "Parallel Computing Architecture : A hardware/ software approach", Morgan Kaufmann / Elsevier, 1997.
3. William Stallings, " Computer Organization and Architecture – Designing for Performance", Pearson Education, Seventh Edition, 2006.

## **MPCS-7: MOBILE COMPUTING**

**BLOCK-1** Mobile computing: Components of wireless environment- Challenges in Mobile environment- Mobile devices - Middleware and gateways - Wireless Internet - Smart clients - Three-tier Architecture- Design considerations for mobile computing— Mobility and Location based services – Active transactions - Device Technology – Device Connectivity – Voice technology – Personal digital assistant.

**BLOCK-2** Mobile computing through Internet- Mobile-enabled Applications - Developing Mobile GUIs – VUIs and Mobile Applications – Multichannel and Multi modal user interfaces – Synchronization and replication of Mobile Data - SMS architecture - Java card – GPRS – Mobile Computing through Telephony - Synchronization protocol - Context-aware applications.

**BLOCK-3** Mobile Communication: Wireless Transmission – Medium Access Control – Telecommunication Systems – Satellite Systems – Broadcast system – Wireless LAN – Mobile IP – Mobile TCP.

**BLOCK-4** ADHOC Wireless Network: Ad Hoc Wireless Network –MAC protocol – Routing protocols - Transport Layer Protocol - QOS – Energy Management.

**BLOCK-5** Wireless Sensor Network: Architecture and Design – Medium Access Control – Routing – Transport Layer – Energy model.

### **REFERENCE BOOKS:**

1. Jochen Schiller, Mobile Communications, Second Edition,2003.
2. William Stallings,"Wireless Communications & Networks", Pearson Education, 2005.
3. C.Siva Ram Murthy, B.S. Manoj, "Ad Hoc Wireless Networks – Architectures and Protocols", 2nd Edition, Pearson Education. 2004
4. Ashok K Talukder, Roopa R Yavagal, "Mobile Computing", Tata McGraw Hill, 2005.
5. Jochen Burkhardt Dr.Horst Henn, Klaus Rintdoff,Thomas Schack, "Pervasive Computing", Pearson, 2009.
6. Fei Hu , Xiaojun Cao, " Wireless Sensor Networks Principles and Practice " CRC Press, 2010.

## **MPCS-8: DATA WAREHOUSING AND DATA MINING**

### **BLOCK 1 DATA WAREHOUSE**

Data Warehousing - Operational Database Systems vs. Data Warehouses - Multidimensional Data Model - Schemas for Multidimensional Databases – OLAP Operations – Data Warehouse Architecture – Indexing – OLAP queries & Tools.

### **BLOCK 2 DATA MINING & DATA PREPROCESSING**

Introduction to KDD process – Knowledge Discovery from Databases - Need for Data Preprocessing – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation.

### **BLOCK 3 ASSOCIATION RULE MINING**

Introduction - Data Mining Functionalities - Association Rule Mining - Mining Frequent Itemsets with and without Candidate Generation - Mining Various Kinds of Association Rules - Constraint- Based Association Mining.

### **BLOCK 4 CLASSIFICATION & PREDICTION**

Classification vs. Prediction – Data preparation for Classification and Prediction – Classification by Decision Tree Introduction – Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction – Accuracy and Error Measures – Evaluating the Accuracy of a Classifier or Predictor – Ensemble Methods – Model Selection.

### **BLOCK 5 CLUSTERING**

Cluster Analysis: - Types of Data in Cluster Analysis – A Categorization of Major Clustering Methods – Partitioning Methods – Hierarchical methods – Density-Based Methods – Grid-Based Methods – Model-Based Clustering Methods – Clustering High- Dimensional Data – Constraint- Based Cluster Analysis – Outlier Analysis.

### **REFERENCES:**

1. Jiawei Han and Micheline Kamber, “Data Mining Concepts and Techniques” Second Edition, Elsevier, Reprinted 2008.
2. K.P. Soman, Shyam Diwakar and V. Ajay, “Insight into Data mining Theory and Practice”, Easter Economy Edition, Prentice Hall of India, 2006.
3. G. K. Gupta, “Introduction to Data Mining with Case Studies”, Easter Economy Edition, Prentice Hall of India, 2006.
4. A Pang-Ning Tan, Michael Steinbach and Vipin Kumar, “Introduction to Data Mining”, Pearson Education, 2007.

## **MPCS-9: ANALYSIS OF ALGORITHMS**

**Unit – I** Introduction: What is an Algorithm? – Algorithm Specification – Performance Analysis (Space Complexity, Time Complexity) – Randomized Algorithms. Analysis of Algorithms: Computational Complexity – Average-Case Analysis – Example: Analysis of Quick Sort.

**Unit - II** Divide and Conquer: General Method – Binary Search – Merge Sort – Quick Sort. Greedy Method: General Method – Knapsack Problem – Minimum Cost Spanning Tree – Single Source Shortest Path.

**Unit – III** Dynamic Programming: General Method – Multistage Graphs – All Pair Shortest Path – Optimal Binary Search Trees – 0/1 Knapsack - Traveling Salesman Problem – Flow Shop Scheduling.

**Unit - IV** Backtracking: General Method – 8-Queens Problem – Sum of Subsets – Graph Coloring – Hamiltonian Cycles – Knapsack Problem. Branch and Bound: The Method – 0/1 Knapsack Problem – Traveling Salesperson.

**Unit – V** Algebraic Problems: General Method – Evaluation and Interpolation - Modular Arithmetic – Even Faster Evaluation and Interpolation. NP-Hard and NP-Complex Problem: Basic Concepts – Traveling Salesperson Decision Problem – Scheduling Identical Processors – Implementing Parallel Assignment Instructions.

### **References:**

1. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, “Fundamentals of Computer Algorithms”, Second Edition, Universities Press, 2008
2. Robert Sedgewick, Phillipe Flajolet, “An Introduction to the Analysis of Algorithms”, Addison-Wesley Publishing Company, 1996.
3. Alfred V. Aho, John E. Hucroft, Jeffrey D. Ullman, “Data Structures and Algorithms”.
4. Wiley, Goodrich, “Data Structures and Algorithms in Java”, Third Edition.

## **MPCS10: ADVANCED SOFTWARE ENGINEERING**

### **BLOCK - I: Introduction to software engineering**

Introduction, Socio-technical Systems, Dependability, Software Processes, Software Requirements, RE Processes, Systems Models, Critical Systems Specification, Formal Specification

### **BLOCK - II: Design Engineering**

Architectural Design, Distributed Systems Architecture, Application Architectures  
Object-oriented Design, Real-time Systems, User Interface Design

### **BLOCK - III: Software Development Methodologies**

Iterative Software Development, Software Reuse, CBSE, Critical Systems Development  
Software Evolution

### **BLOCK - IV: Alternative Paradigms**

Extreme Programming, Agile Software Engineering, Clean Room Software Engineering,  
Introduction to Formal Methods, soft systems

### **BLOCK - V: Advanced Software Engineering Process**

Software Process Improvement, Software Economics, Software Quality, Software  
Metrics, Software Maintenance, Risk management, Requirement Engineering

### **REFERENCES:**

1. Software Engineering, Ian Sommerville, 8th Edition, Addison-Wesley, 2006, ISBN-10: 0321313798, ISBN-13: 9780321313799
2. Software Engineering: A Practitioner's Approach, 6/e, Roger S Pressman, McGraw Hill, 2005, ISBN: 0072853182
3. W. S. Jawadekar, "Software Engineering", Tata McGraw-Hill, 2004.
4. S. A. Kelkar, "Software Engineering", PHI, 2007.
5. S. Schach, "Software Engineering", 7<sup>th</sup> Edition, Tata McGraw-Hill, 2007.

## **MPCS-P1:LAB1: DATA STRUCTURES USING C++**

1. Write C++ programs to implement the following using an array.
  - a) Stack ADT
  - b) Queue ADT
2. Write C++ programs to implement the following using a singly linked list.
  - a) Stack ADT
  - b) Queue ADT
3. Write C++ program to implement the deque (double ended queue) ADT using a doubly linked list.
4. Write a C++ program to perform the following operations:
  - Insert an element into a binary search tree.
  - Delete an element from a binary search tree.
  - Search for a key element in a binary search tree.
5. Write a C++ program to implement circular queue ADT using an array.
6. Write C++ programs that use non-recursive functions to traverse the given binary tree in
  - a) Preorder
  - b) inorder
  - c) postorder.
7. Write a C++ programs for the implementation of bfs and dfs for a given graph.
8. Write C++ programs for implementing the following sorting methods:
  - a) Quick sort
  - b) Merge sort
  - c) Heap sort
9. Write a C++ program to perform the following operations
  - a) Insertion into a B-tree
  - b) Deletion from a B-tree
10. Write a C++ program to perform the following operations
  - a) Insertion into an AVL-tree
  - b) Deletion from an AVL-tree

## **MPCS-P2: LAB2: DBMS**

1. Display all the employees in alphabetical order from employee table.
2. Change the basic salary Rs,3000 where basic salary less than 2500 from employee table.
3. Change the basic\_sal = 3000 where job in clerk from employee table.
4. Delete all records from Dept table.
5. Add a column “ Telephone\_No“ of data type ‘number’ and size = ‘10’ to the employee table.
6. Create an index for client \_no on client\_mast table.
7. Display the length of each employee name from employee table.
8. Find average salary per job in each department \_no.
9. Display only those jobs where max sal  $\geq 3000$ .
10. Find out the difference between highest and lowest salaries.
11. Display the sequence root of 81.
12. Display the total number of working days of each employee from employee table.
13. Count the number of products having price greater than equal to 1200.
14. Calculate the average price of all the products from product –mast table.
15. Find out the employees who earn the highest salary in each dept\_no
16. Display all clerks from emp table using cursor.
17. Update all Sal  $< 1000$  to Sal = 2000 using cursor.
18. Create a function for Simple Interest.
19. Create a recursive function for Fibonnaci series.
20. Create a package for checking the Even or Odd numbers.
21. Create a package for bank transactions for account debit and credit.

## **MPCS-11: Distributed System**

**Unit - I** Distributed Systems: Fully distributed processing systems – Networks and Interconnection structures – Designing a Distributed Processing System.

**Unit - II** Distributed Systems: Pros and Cons of Distributed processing – Distributed databases – the challenge of distributed data – loading factors – managing the distributed resources – division of responsibilities.

**Unit - III** Design Considerations: Communications line loading – Line loading Calculations – Partitioning and allocation – Data flow systems – dimension analysis – network database design considerations – ration analysis – database decision trees – synchronization of network databases.

**Unit - IV** Client/Server Network Model: Concept – file server – printer server – an e-mail server.

**Unit - V** Distributed Databases: An overview – Distributed Databases – Principles of Distributed Databases – levels of transparency – Distributed Database Design – The R\* Project Technique Problems of Heterogeneous Distributed Databases.

### **Reference Books:**

1. John A. Sharp, „An Introduction to Distributed and Parallel Processing“, Blackwell Scientific Publications, 1987.
2. Uyles D.Black, Data Communications & Distributed Networks“.
3. Joel M.Crichlow, „Introduction to Distributed & Parallel Computing“.
4. Stefans Ceri, Ginseppe Pelagatti, „Distributed Databases Principles and Systems“, McGraw Hill Book Co., New York, 1985

## **MPCS-12: ADVANCED WEB PROGRAMMING**

### **BLOCK - I : INTRODUCTION**

Introduction to applet –lifecycle of applet- servlet and its life cycle – HTML fundamentals-JSP fundamentals-variables-control structures, Applet to servlet communications. Servlets –deployment of simple servlets-web server (Java web server/Tomcat sever/Web logic)- HTTP GET and POST request-Session tracking-cookied-JDBC-Simple Web application-multi tier applications.

### **BLOCK - II : NETWORKING AND RMI**

Connecting to a Server - Implementing Servers - Advanced Socket Programming: InetAddress - URL Connections. Remote Method Invocations: Setting Up Remote Method Invocation -Parameter Passing in Remote Methods.

### **BLOCK - III : ADVANCED SWING AND AWT**

Lists – Trees – Tables - Styled Text Components - Component Organizers – Shapes - Images.

### **BLOCK - IV : DATABASE CONNECTIVITY and Servlet**

The Design of JDBC - Basic Concepts - Executing Queries - Result Sets – Metadata - Transactions, Servlets.

### **BLOCK - V : JAVABEANS**

The Bean-Writing Process - Using Beans to Build an Application - Bean Property Types - Customizers.

### **REFERENCE BOOK :**

1. Cay S. Horstmann, Gary Cornell, *Core Java™ 2: Volume II–Advanced Features*, Prentice Hall, 2008.
1. Patrick Naughton & Herbert Schildt, *The Complete Reference: Java 2*, Tata McGraw Hill, 8 th Edition 2011.

## **MPCS-13: Operating System**

**Unit - I** Introduction: What is an Operating System? – Main frame Systems – Desktop Systems – Multiprocessor Systems – Distributed Systems – Clustered Systems – Real-Time Systems – Handheld Systems – Feature Migration – Computing Environments. Computer System Structures: Computer-System Operation - I/O Structure - Storage Structure - Storage Hierarchy - Hardware Protection - Network Structure. Operating System Structures: System Components – Operating System Services - System Calls - System Programs - System Structure - Virtual Machines - System Design and Implementation - System Generation.

**Unit - II** Process Management: Process Concept - Process Scheduling - Operations on Processes - Cooperating Processes – Inter Process Communication – Communication in Client-Server Systems. CPU Scheduling: Scheduling Concepts Scheduling Criteria - Scheduling Algorithms - Algorithm Evaluation – Multiple-Processor Scheduling – Real-Time

**Unit - III** Memory Management: Background – Swapping - Contiguous Memory Allocation - Paging – Segmentation - Segmentation with Paging. Virtual Memory: Demand Paging - Page Replacement – Allocation of Frames - Thrashing. File System Interface: File Concept - Access Methods - Directory Structure - File System Mounting - File Sharing - Protection. File System Implementation: File-System Structure - File-System Implementation - Directory Implementation - Allocation Methods - Free-Space Management - Recovery.

**Unit - IV** I/O systems: I/O Hardware - Kernel I/O Subsystem. Mass-Storage Structure : Disk Structure - Disk Scheduling - disk management - swap-space Management, RAID structure, disk attachment, stable-storage implementation, tertiary-storage structure.

**Unit - V** Comparative study - DOS, UNIX/LINUX, Windows 9x, Windows NT.

### **References:**

1. Silberschatz, Galvin, Gagne, „Operating Systems Concepts“, John Wiley & Sons, Inc., Sixth Edition.
2. Andrew S. Tanenbaum, „Modern Operating Systems“, Prentice Hall of India, Second Edition.
3. H. M. Deitel, „Operating Systems“, Pearson Education, Second Edition.

## **MPCS-14: Artificial Intelligence**

### **UNIT I INTRODUCTION**

Introduction to Artificial Intelligence – Intelligent Agents – Agents and Environments - Good behavior – The Nature of Environments – Structure of Agents - Problem Solving - Problem Solving Agents – Agent Architectures and Hierarchical Control - Agents - Agent Systems – Hierarchical Control - Embedded and Simulated Agents - Acting with Reasoning.

### **UNIT II SEARCHING TECHNIQUES**

Searching For Solutions – Uniformed Search Strategies - Avoiding Repeated States – Searching with Partial Information - Informed Search and Exploration – 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 CSPs – Structure of Problems - Adversarial Search – Games – Optimal Decisions in Games – Alpha-Beta Pruning – Imperfect Real-Time Decisions – Games that include an element of chance.

### **UNIT III KNOWLEDGE AND REASONING**

Proposition Logic - First Order Predicate Logic – Unification – Forward Chaining -Backward Chaining - Resolution – Knowledge Representation - Ontological Engineering - Categories and Objects – Events - Mental Events and Mental Objects - Reasoning Systems for Categories - Reasoning with Default Information - Prolog Programming.

### **UNIT IV LEARNING**

Probability basics - Bayes Rule and its Applications - Bayesian Networks – Exact and Approximate Inference in Bayesian Networks - Hidden Markov Models - Forms of Learning – Supervised Learning - Learning Decision Trees – Regression and Classification with Linear Models – Artificial Neural Networks – Nonparametric Models - Support Vector Machines - Statistical Learning - Learning with Complete Data - Learning with Hidden Variables- The EM Algorithm – Reinforcement Learning

### **UNIT V AI PLANNING AND APPLICATIONS**

AI Planning – Planning with State - Space Search – Partial-Order Planning – Planning Graphs – Planning with Propositional Logic- Hierarchical Task Network Planning – Conditional Planning - All applications – Language Models - Information Retrieval – Information Extraction – Machine Translation – Machine Learning - Symbol-Based – Machine Learning: Connectionist – Machine Learning - Social and Emergent -Robots

### **REFERENCES:**

1. Stuart Russell, Peter Norvig, “Artificial Intelligence: A Modern Approach”, Third Edition, Pearson Education / Prentice Hall of India, 2010.
2. Elaine Rich and Kevin Knight, “Artificial Intelligence”, Third Edition, Tata McGraw-Hill, 2010.
3. Bratko I, “Prolog Programming for Artificial Intelligence”, Addison-Wesley Educational Publishers Inc; Fourth Edition, 2011.
4. David L. Poole, Alan K. Mackworth, “Artificial Intelligence: Foundations of Computational Agents”, Cambridge University Press, 2010.

5. Ethem Alpaydin, "Introduction to Machine Learning (Adaptive Computation and Machine Learning series)", The MIT Press; Second edition, 2009.
6. Patrick H. Winston. "Artificial Intelligence", Third edition, Pearson Edition, 2006.
7. Dan W.Patterson, "Introduction to Artificial Intelligence and Expert Systems", PHI, 2006.
8. Nils J. Nilsson, "Artificial Intelligence: A new Synthesis", Harcourt Asia Pvt. Ltd., 2000.

## **MPCS-15: Network Security**

### **Block I**

#### **Introduction:**

Security Trends, The OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, A Model for Internetwork Security, Internet Standards and the Internet Society.

### **Block II**

**Symmetric Encryption and Message Confidentiality:** Symmetric Encryption Principles, Symmetric Block Encryption Algorithms, Stream Ciphers and RC4 , Cipher Block Modes of Operation, Location of Encryption Devices, Key Distribution. **Public-key Cryptography and Message Authentication:** Approaches to Message Authentication, Secure Hash Functions and HMAC, Public-Key Cryptography Principles, Public-Key Cryptography Algorithms, Digital Signatures, Key Management.

### **Block III**

**Authentication Applications:** Kerberos, x.509 Authentication Service, Public-Key Infrastructure. **Electronic Mail Security:** Pretty Good Privacy (PGP), S/MIME.

### **Block IV**

**IP Security:** IP Security Over view, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations. **Web Security:** Web Security Considerations, Secure Socket Layer(SSL) and Transport Layer Security(TLS), Secure Electronic Transaction(SET). **Network Management Security:** Basic Concepts of SNMP, SNMPv1 Community Facility, SNMPv3.

### **Block V**

**Intruders:** Intruders, Intrusion Detection, Password Management. **Malicious Software:** Virus and Related Threats, Virus Countermeasures, Distributed Denial of Service Attacks. **Firewalls:** Firewall Design Principles, Trusted Systems, Common Criteria for Information Technology Security Evaluation.

### **References:**

1. William Stallings, “Network Security Essentials Applications and Standards”Third Edition, Pearson Education, 2008.

### **MPCS-P3: LAB - 3: ADVANCED WEB PROGRAMMING LAB**

1. HTML to Servlet Applications
2. Applet to Servlet Communication
3. Designing online applications with JSP
4. Creating JSP program using JavaBeans
5. Working with Enterprise JavaBeans
6. Working with Java Database Connectivity.
7. Creating Web services with RMI.
8. To Implement RMI program to perform arithmetic functions.
9. Develop a simple application to insert and retrieve data from database.
10. Design a color bean.

### **MPCS-P4: PROJECT WORK**

Each student will develop and implement individually a Project work which is an application (software or hardware or both) based on any emerging latest technologies. The Project work is to be carried out either in an R & D section of any Industry or Research Institute or University or in the Institute itself (i.e., in which the candidate is studying) within the duration of second year. The Project work report shall be submitted through the Guides / Supervisors to the Head of the Department