

DEPARTMENT OF COMPUTER SCIENCE
GOVT. HOLKAR AUTONOMOUS SCIENCE COLLEGE INDORE

M.Sc. (C. S.) II Semester
Core- 5 Computer Networks
2018-2020 and onwards

Unit I

Introduction: Computer Network, Goals and Applications, Reference models – OSI and TCP/IP. A Comparative study. Network hardware – LAN, MAN and WAN and topologies. LAN components – File server, Workstations, Network Adapter Cards. Connection Oriented and Connection less services, Switching Techniques – Circuit Switching, Packet Switching.

Unit II

Design Issues: Framing, Error Control, Flow Control, Error Detection and Correction, entry Data Link Protocols, Sliding window protocol, Data link layer in the Internet – SLIP and PPP.

Unit III

Multiple Access Protocols: Aloha, CSMA Protocols, Collision-Free Protocols, Ethernet: Cabling, Manchester Encoding, MAC Sublayer Protocol, Token bus : MAC Sublayer Protocol, Token Ring. MAC Sublayer Protocol, High speed LANs – Fast Ethernet, FDDI, Wireless LANs, Bridges.

Unit IV

Network Layer: Design issues, Routing Algorithms: Optimality Principle, Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcasting Routing, Multicast Routing, The Network Layer in the Internet: Internet Protocol, Internet addressing and Internet Control protocols.

Unit V

Transport Layer: Services, The Internet, Transport Protocols : TCP and UDP.

Application Layer: DNS Name Space, Name Servers, FTP, TELNET, WWW, SNMP, HTTP, SMTP, Network Security : Cryptography, Symmetric- key Algorithms, Public- key Algorithms, Digital Signatures, E-mail Security.

Required Text(s)

- A. Tanenbaum, Computer Networks, 5th Edition, Addison-Wesley, 2003.
- W. Stallings, Data and Computer Communications, Prentice-Hall, 5th Edition, 1997
- Michael A. Miller Data and Network Communication, Delmar Thomson Learning Inc.
- Introduction to Computer Networks: Douglas E. Comer, Prentice-Hall.
- James F. Kurore & Keith W. Rose, Computer Networking, 3rd Edition Pearson Education, 2005.
- Alberto Leon-Garcia and Indra Widjaja, Communication Networks : Fundamentals Concepts and Key Architecture, Tata McGraw-Hill Publishing Company Limited

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DEPARTMENT OF COMPUTER SCIENCE
GOVT. HOLKAR AUTONOMOUS SCIENCE COLLEGE INDORE

M.Sc. (C. S.) II Semester
Core-6 Data Structures using C++
2018-2020 and onwards

Unit I

Introduction to C++, Definition of data structures and abstract data types. Static and Dynamic implementations. Examples and real life applications, Data Structures: Arrays, Address calculation in a single and multi dimensional array. Sparse matrices.

Unit II

Definition, Array based implementation of stacks, Linked List based implementation of stacks, Examples. Infix, postfix, prefix representation .Applications: Mathematical expression Evaluation.
Definition: Queues & Lists: Array based implementation of Queues / Lists, Linked List implementation of Queues / Lists, Circular implementation of Queues and singly linked Lists, Straight / circular implementation of doubly linked Queues / Lists, Priority queues, Applications.

Unit III

Definition of trees and Binary trees, Properties of Binary trees and Implementation, Binary Traversal - preorder, post order, in order traversal, Binary Search Trees, Implementations. Threaded trees, balanced multi way search trees, AVL Trees, Implementations, Applications. Definition of Undirected and Directed Graphs and Networks, The Array based implementation of graphs, Adjacency matrix, path matrix implementation, The Linked List representation of graphs, Shortest path Algorithm, Graph Traversal – Breadth first Traversal, Depth first Traversal, Connectivity of graphs; Connected components of graphs, Weighted Graphs, Applications.

Unit IV

Definition: Hash function, Collision Resolution Techniques, Hashing Applications. Time Complexity, Big – Oh - notation, Running Times, Best Case, Worst Case, Average Case, Factors depends on running time, Introduction to Recursion, Divide and Conquer Algorithm, Evaluating time Complexity.

Unit V

Introduction, Sorting by exchange, selection, insertions, Bubble sort, Selection sort, Insertion sort, Pseudo code algorithm and their C++ implementation, Efficiency of above algorithms, Shell sort, Performance of shell sort, Merge sort, Merging of sorted arrays, merge sort Algorithms Quick sort Algorithm. Analysis of Quick sort, Picking a Pivot, A partitioning strategy, Heap sort, Heap Construction, Heap sort, bottom – up, Top – down Heap sort approach, Radix sort.

Straight Sequential Search, Array implementations, Linked List representations, Binary Search, non – recursive Algorithms, recursive Algorithms, Indexed Sequential Search.

Required Text(s)

- Jr. Seymour Lipschetz, Schaum's outline of Theory & Problems of Data Structures, McGraw-Hill, 1986.
- Ellis Horowitz & Sartaj Sahni, Dinesh Mehta: Fundamentals of Data structures in C++, 2nd Edition, University Press, 2008.
- Sartaj Sahni, Data Structure: Algorithms and application in C++, International edition WCB/McGraw Hill, 2000.

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DEPARTMENT OF COMPUTER SCIENCE
GOVT. HOLKAR AUTONOMOUS SCIENCE COLLEGE INDORE

M.Sc. (C. S.) II Semester
Core-7 Computer Oriented Numerical and Statistical Method
2018-2020 and onwards

Unit 1

Solution of non-linear & transcendental equations

Computer Arithmetic: Floating-point representation of numbers, arithmetic operations with normalized floating-point numbers and their consequences, significant figures. Error in number representation-inherent error, truncation, absolute, relative, percentage and round-off error. Iterative Methods: Bisection method, method of false position, newtonrapson method, secant method, method of successive approximation, concept oriented theoretical consideration of above methods.

Unit 2

Solution of linear equations Meaning, conditions for solutions, solution of equation by direct methods - (Gaussian elimination, Gaussian jordan), iterative methods - (Jacobi method, gaussian seidel), ill-conditional equations and solution.

Unit 3

Interpolation and approximation Introduction, finite differences, Newton's formulae, Central difference formulae, interpolation with unevenly spaced points, divided difference and their properties, inverse interpolation and double interpolation.

Unit 4

Numerical integration & solution of ordinary differential equations Concept of numerical integration with geometrical representation, trapezoidal method, simpson - 1/3 rule, simpson - 3/8 rule, veddle's rule, understanding and solution of Ordinary Differential Equation and theoretical consideration, euler method, modified euler's method, R-K 2nd order & 4th order method, predictor corrector methods.

Unit 5

Statistics Graphical representation, Frequency distributions, Measures of central tendency, Measures of dispersions, Correlation, Regression.

TEXT BOOK:

V. Rajaraman, Computer Oriented Numerical Methods, Prentice Hall, India.

REFERENCE BOOKS

1. S. S. Sastry, Introductory Methods of Numerical Analysis.
2. M. K. Jain, S.R.K. Iyengar & R. K. Jain, Numerical Methods for Scientific and Engineering Computation.
3. H. C. Saxena, Finite Differences and Numerical Analysis.
4. Modes A., Numerical Analysis for Computer Science.

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DEPARTMENT OF COMPUTER SCIENCE
GOVT. HOLKAR AUTONOMOUS SCIENCE COLLEGE INDORE

M.Sc. (C. S.) II Semester
Core-8 Database Management Systems
2018-2020 and onwards

Unit I

Introduction: Purpose of DBMS, view of data, data independence, data model, data base languages, traditional/flat files versus database approach, merits and demerits of both approaches. Profile of people working in DB environment, database administration, and overall system structure.

Entity-relationship model: Basic concepts of entities and relationships, design issues, mapping constraints, keys, super key, entity-relationship (E-R) diagram, weak entity sets, extended E-R features, design of E-R database schema and reduction of E-R schema to tables.

Unit II

Relational –model: Structure of relational database, relational algebra, tuple relational calculus, and extended relational algebra operators.

Integrity Constraints: Domain constraints, referential integrity, foreign key.

Structure Query Language(SQL): Basic structure ,set operations, aggregate functions, Null values nested and correlated sub queries ,derived relations,views,Data Definition Language(DDL) Embedded SQL,and other SQL features, introduction to(other relational query languages),Query –By-Example(QBE) and QUery Language(QUEL), assertions, triggers and stored procedures.

Unit III

Design theory of relational databases: Functional Dependencies, Design issues problem faced in designing an application, decomposition, Normalization using multivalued dependencies, Normalization using join dependencies, Domain key normal form and alternative approaches to database design.

Unit IV

Concurrent operation on database: Locked based protocols, Time-stamp based protocols, multiple granularity, multiversion schemes, deadlock handling, Insert and delete operation, Thomas Writing Rule and concurrency in index structures.

Unit V

Crash recovery systems: Failure classification, storage structure, recovery and Atomicity, Log Based Recovery mechanisms, Shadow paging, Recovery with concurrent transactions, and advanced recovery techniques.

Introduction to distributed and Object Oriented Databases.

Case study : Oracle

Required Text(s):

- Henry F. Kourth, Abraham Silverschatz, S. Sudarshan "Database System Concepts", 5th Edition TataMcGraw Hills Publishing Co., 2005
- Ramez Elmasri, shamkant B. Navathe, Fundamentals of Database System, 5th edition, addition Wesley, 2006.
- An Introduction to Database system- Bipin C. Desai.
- SQL, PL/SQL the Programming Language of Oracle- Ivan Bayross.
- An Introduction to Database system- C.J. Date.

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