

## MCA-201 Operating System

### UNIT-I

**Introduction:** Evolution of operating systems (History of evolution of OS with the generations of computers), Types of operating systems, Multitasking, Timesharing, Multithreading, Multiprogramming and, Real time operating systems, Different views of the operating system, System Programmer's view, User's view, Operating system concepts and structure, Layered Operating Systems, Monolithic Systems.

**Processes:** The Process concept, The process control block, Systems programmer's view of processes, Operating system services for process management, Scheduling algorithms, First come first serve, Round Robin, Shortest run time next, Highest response ratio next, Multilevel Feedback Queues, Performance evaluation of scheduling algorithms stated above

### UNIT-II

**Memory Management :** Memory management without swapping or paging, Concepts of swapping and paging, Page replacement algorithms namely, Least recently used, Optimal page replacement, Most recently used, Clock page replacement, First in First out (This includes discussion of Belady's anomaly and the category of Stack algorithms), Modeling paging algorithms, Design issues for paging system, Segmentation, Segmented Paging, Paged Segmentation

### UNIT-III

**Inter-process Communication and Synchronization:** The need for inter-process synchronization, Concept of mutual exclusion, binary and counting semaphores, hardware support for mutual exclusion, queuing implementation of semaphores, Classical problems in concurrent programming, Dining Philosopher's problem, Bounded Buffer Problem, Sleeping Barber Problem, Readers and Writers problem, Critical section, critical region and conditional critical region, Monitors and messages.

**Deadlocks:** Concepts of deadlock detection, deadlock prevention, deadlock avoidance. Banker's Algorithm

### UNIT-IV

**File System:** File systems, directories, file system implementation, security protection mechanisms.

**Input/output:** Principles of I/O Hardware: I/O devices, device controllers, direct memory access.

**Principles of I/O software:** Goals interrupt handlers, device drivers, and device independent I/O software. User space I/O Software.

**Disks:** Disk hardware, Disk scheduling algorithms (namely First come first serve, shortest seek time first, SCAN, C-SCAN, LOOK and C-LOOK algorithms) Error handling, track-at-a-time caching, RAM Disks.

**Clocks:** Clock hardware, memory-mapped terminals, I/O software.

### UNIT-V

**Processes and Processors in Distributed Systems:** Threads, System models, processor allocation, scheduling. Distributed File Systems: Design, Implementation, and trends. .Performance Measurement, monitoring and evaluation Introduction, important trends affecting performance issues, why performance monitoring and evaluation are needed, performance measures, evaluation techniques, bottlenecks and saturation, feedback loops.

**Case Studies:** WINDOWS and LINUX /UNIX Operating System.

### BOOKS

1. Deitel, H.M. "An Introduction to Operating Systems". Addison Wesley Publishing Company 1984.
2. Milenkovic, M., "Operating Systems - concepts and Design" McGraw Hill International Edition- Computer Science series 1992.
3. Galvin P., J.L. Abraham Silberschatz. "Operating System Concepts". John Wiley & Sons Company, 1989.
4. Tanenbaum, A.S. "Modern Operating System", Prentice Hall of India Pvt. Ltd.1995.
5. William Stallings "Operating Systems", Prentice Hall of India Pvt. Ltd.
6. Joshi R.C. "Operating System" Wiley India.

Note : Paper is to be set unit wise with internal choice.

## MCA-202 Data Base Management System

### UNIT-I

**Introduction:** Advantage of DBMS approach, various view of data, data independence, schema and sub-schema, primary concepts of data models, Database languages, transaction management, Database administrator and users, data dictionary, overall system architecture.

**ER model:** basic concepts, design issues, mapping constraint, keys, ER diagram, weak and strong entity sets, specialization and generalization, aggregation, inheritance, design of ER schema, reduction of ER schema to tables.

### UNIT-II

**Domains, Relations and Keys:** domains, relations, kind of relations, relational database, various types of keys, candidate, primary, alternate and foreign keys.

**Relational Algebra & SQL:** The structure, relational algebra with extended operations, modifications of Database, idea of relational calculus, basic structure of SQL, set operations, aggregate functions, null values, nested sub queries, derived relations, views, modification of Database, join relations, DDL in SQL.

### UNIT-III

**Functional Dependencies and Normalization:** basic definitions, trivial and non trivial dependencies, closure set of dependencies and of attributes, irreducible set of dependencies, introduction to normalization, non loss decomposition, FD diagram, first, second, third Normal forms, dependency preservation, BCNF, multivalued dependencies and fourth normal form, Join dependency and fifth normal form.

### UNIT-IV

**Database Integrity:** general idea. Integrity rules, domain rules, attribute rules, relation rules, Database rules, assertions, triggers, integrity and SQL.

**Transaction, concurrency and Recovery:** basic concepts, ACID properties, Transaction states, implementation of atomicity and durability, concurrent executions, basic idea of serializability, basic idea of concurrency control, basic idea of deadlock, failure classification, storage structure types, stable storage implementation, data access, recovery and atomicity- log based recovery, deferred Database modification, immediate Database modification, checkpoints.

**Distributed Database:** basic idea, distributed data storage, data replication, data fragmentation-horizontal, vertical and mixed fragmentation

### UNIT-V

**Emerging Fields in DBMS:** object oriented Databases-basic idea and the model, object structure, object class, inheritance, multiple inheritance, object identity, data warehousing- terminology, definitions, characteristics, data mining and its overview, Database on www, multimedia Databases-difference with conventional DBMS, issues, similarity based retrieval, continuous media data, multimedia data formats, video servers.

**Storage structure and file organizations:** overview of physical storage media, magnetic disks-performance and optimization, basic idea of RAID, file organization, organization of records in files, basic concepts of indexing, ordered indices, basic idea of B-tree and B+-tree organization

**Network and hierarchical models:** basic idea, data structure diagrams, DBTG model, implementations, tree structure diagram, implementation techniques, comparison of the three models.

### BOOKS

1. A Silberschatz, H.F Korth, Sudersan "Database System Concepts" -, MGH Publication.
2. C.J Date "An introduction to Database Systems" -6<sup>th</sup> ed.
3. Elmasri & Navathe "Fundamentals of Database systems" - III ed.
4. B.C. Desai. "An introduction to Database systems" BPB
5. Raghurama Krishnan "Database Systems" TMH

Note : Paper is to be set unit wise with internal choice.

## MCA-203 Data Structure

**Prerequisites:** Array, Structure, pointers, pointer to structure, functions, parameter passing, recursion.

### **UNIT-I**

**Stack and Queue:** contiguous implementations of stack, various operations on stack, various polish notations-infix, prefix, postfix, conversion from one to another-using stack; evaluation of post and prefix expressions. Contiguous implementation of queue: Linear queue, its drawback; circular queue; various operations on queue; linked implementation of stack and queue- operations

### **UNIT-II**

**General List:** list and it's contiguous implementation, it's drawback; singly linked list-operations on it; doubly linked list-operations on it; circular linked list; linked list using arrays.

### **UNIT-III**

**Trees:** definitions-height, depth, order, degree, parent and child relationship etc;  
Binary Trees- various theorems, complete binary tree, almost complete binary tree;  
Tree traversals-preorder, in order and post order traversals, their recursive and non recursive implementations; expression tree- evaluation; linked representation of binary tree-operations. Threaded binary trees; forests, conversion of forest into tree. Heap-definition.

### **UNIT-IV**

**Searching, Hashing and Sorting:** requirements of a search algorithm; sequential search, binary search, indexed sequential search, interpolation search; hashing-basics, methods, collision, resolution of collision, chaining; Internal sorting- Bubble sort, selection sort, insertion sort, quick sort, merge sort on linked and contiguous list, shell sort, heap sort, tree sort.

### **UNIT-V**

**Graphs:** related definitions: graph representations- adjacency matrix, adjacency lists, adjacency multilist; traversal schemes- depth first search, breadth first search; Minimum spanning tree; shortest path algorithm; kruskals & dijkstras algorithm.

Miscellaneous features Basic idea of AVL tree- definition, insertion & deletion operations; basic idea of B-tree- definition, order, degree, insertion & deletion operations;  
B+-Tree- definitions, comparison with B-tree; basic idea of string processing.

### **BOOKS**

1. Kruse R.L. Data Structures and Program Design in C; PHI
2. Aho "Data Structure & Algorithms".
3. Trembly "Introduction to Data Structure with Applications".
4. Tennenbaum A.M. & others: Data Structures using C & C++; PHI
5. Horowitz & Sahney: Fundamentals of Data Structures, Galgotia Publishers.
6. Yashwant Kanetkar, Understanding Pointers in C, BPB.

Note : Paper is to be set unit wise with internal choice.

## MCA-204 Computer Oriented Numerical & Statistical Methods

### UNIT – I

Numerical approximation, Representation of integers and real numbers in computers, fixed and floating point arithmetic, normalized floating point numbers, Round off and truncation errors, relative and absolute errors. Iterative methods: Zeros of single transcendental equations and zeros of polynomials using bisections, false position, Newton Raphson methods. Convergence of solutions.

### Unit – II

Interpolation : Forward, Backward, central (Striplings) and divided difference formulas, Lagrange's interpolation, Inverse interpolation for equal and unequal intervals.

Numerical Integration : Newton Cote's formula, Simpson's  $1/3^{\text{rd}}$  and  $3/8^{\text{th}}$  rule. Gauss Legendre (two and three points) integration formula.

### Unit – III

Simultaneous linear equations: Solutions of simultaneous linear equations – Gauss elimination method and pivoting, ill conditioned equations and refinement of solutions, Gauss-seidal iterative methods.

Solution of differential equation: Runge-Kutta fourth order method. Euler's method, Picard's, Taylor's series.

### Unit - IV

Distributions : Binomial distribution, Poisson distribution and normal distribution,  $\chi^2$  distribution, Rectangular distribution, hypergeometric distribution.

### Unit -V

Hypothesis testing for sampling: Small samples, t, z and f tests. Chi-square test.

Large samples : Comparison of large samples, testing the significance of the difference between the means of two large samples.

### BOOKS

1. E. Balaguruswamy "Numerical Methods", TMH, ISBN – 07-463311-2, 1999.
2. B.S. Grewal "Numerical Methods in Engineering & Science".
3. Miller "Mathematical Statistics with applications" 7 ed, Pearson.
4. Gupta & Kapoor, Introduction to Statistics, Chand & Co.
5. V. Rajaraman "Computer Oriented Numerical Methods".
6. M.Ray and Har Swarup Sharma " Mathematical Statistics".

### REFERENCE BOOKS

1. Iyengyr M.K. Jain & R.K. Jain "Numerical Methods for scientific and engineering computation", Wiley Eastern (New Age), 1995
2. E.V. Krishnamurthy & S.K. Sen "Computer Based Numerical Algorithms".
3. Miller & Freund's "Probability and Statistics for Engineers".

Note : Paper is to be set unit wise with internal choice & emphasis is to be given on computerized implementation.

## **MCA-205 Accounting & Management Control**

### **UNIT-I**

Meaning and objects of accounting, accounting concepts and conventions, accounting equations, rules of Journalizing; Cash-book, Ledger posting, preparation of trial balance,

### **UNIT-II**

Trading and profit and loss account and balance sheet with adjustments relating to closing stock , outstanding expenses, prepaid expenses , accrued income depreciation, bad debts, provision for bad debts, provision for discount on debtors and creditors .

### **UNIT-III**

Inventory pricing , FIFO and LIFO methods; Simple problems of funds flow statement, cost volume, profit analysis.

### **UNIT-IV**

Standard costing, computation of material and labour variances, budgetary control, preparation of cash budget and flexible budget.

### **UNIT-V**

Management control and its characteristics, goals and strategies, structure and control.

Responsibility centers and control centers: concepts of Responsibility centers, revenue centers, profit centers and investment centers, transfer pricing, Responsibility reporting.

### **BOOKS**

1. Bhattacharya S.K. and Deardan John "Accounting for Management" PHI
2. Chadwick "The essence of financial accounting" PHI
3. Chadwick "The essence of Management accounting" PHI
4. Grewal "Introduction to Book – keeping"
5. Subhash Sharma "Management control systems" TMH

Note : Paper is to be set unit wise with internal choice.