201MCA: OPERATING SYSTEMS

UNIT 1: Introduction: Evolution of operating systems, Types of operating systems, Different views of the operating system, operating system Concepts and structure. Processes: The Process concept, systems programmer's view of processes, operating system services for process management. Scheduling algorithms. Performance evaluation.

UNIT 2: Memory Management: Memory management without swapping or paging, swapping, virtual memory, page replacement algorithms, modeling paging algorithms, design issues for paging systems, segmentation. Inter-process Communication and Synchronization: The need for inter-process synchronization, mutual exclusion, semaphores, hardware support for mutual exclusion, queuing implementation of semaphores, classical problems, in concurrent programming, critical region and conditional critical region, monitors, messages. Deadlocks: Deadlock Prevention, deadlock avoidance.


References:

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UNIT 1: Introduction: advantages of DBMS approach; various views of data, data independence, schema & sub-schema; primary concept of data models; database Languages; transaction management; database administrator & user; data dictionary; overall system architecture. ER model: basic concepts; design issues; mapping constraints; keys; ER diagram; weak & strong entity- set, specialization & generalization, aggregation, inheritance; design of ER schema; reduction of ER schema to tables. Domains, relation & keys: domains; relations; kind of relations; relational databases; various types of keys: candidate, primary, alternate & foreign keys.

UNIT 2: Relational algebra & SQL: The structure, relational algebra with extended operation; modification 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. Database Integrity: General idea; Integrity rules: domain rules; Attribute rules; Relation rules; Database rules; assertions; triggers; integrity & SQL.

UNIT 3: Functional dependencies & normalization: basic definitions; Trivial & nontrivial dependencies; closure set of dependences & of attributes; Irreducible set of dependencies; Introductions to normalization; Nonloss decomposition; FD diagram; First, Second and Third normal forms; Dependancy preservation; BCNF; multivalued dependencies and fourth normal form; Join dependencies and fifth normal form. Transaction, concurrency a Recovery: Basic Concept; ACID Properties; Transaction State; 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 & Atomicity- Log Based Recovery, Deferred Database Modification, Immediate Database Modification, Checkpoints.

UNIT 4: Distributed Databases: Basic Idea; distributed Data Storage; Data Replication; Data Fragmentation- Horizontal, Vertical & Mixed Fragmentation. Emerging Fields in DBMS: Object Oriented Databases- Basic Idea & the Model, Object Structure, Object Class, Inheritance, Multiple Inheritance, Object Identity; Data Ware Housing- Terminology, Definitions, Characteristics; Data Mining & Its Overview; Databases On WWW; Multimedia databases-difference with conventional DBMS, Issues, Similarity based Retrieval, Continues Media Data, Multimedia Data Formats, Video Servers.

UNIT 5: Storage Structure & File Organization: Overview of Physical Storage Media; Magnetic Disk 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 & B* Tree Organization. Network & Hierarchical Model: Basic Idea; Data Structure Diagram; DBTG Model; Implementation; Tree Structure Diagram; Implementation Techniques; Comparison of the Three Models.

References:
1. Date, C. J. "An Introduction to Database Systems" Narosa Publishing House, New Delhi
2. Desai B.C. "An Introduction to Database Concepts" Galgotia Publications New Delhi
203MCA : DATA STRUCTURE USING 'C' LANGUAGE

UNIT 1-Prerequisite: Array; Structure; Pointers; Pointer to Structures; Functions ; Parameter Passing; Recursion.Stack & Queue: Contiguous Implementation of Stack; Various Operation on Stack; Various Polish Notations-Prefix, Postfix, infix; Conversion From one to Another- Using Stack, Evaluation of Post & Prefix Expressions. Contiguous Implementation of Queue; Linear Queue, Its Drawback; Circular Queue; Various Operation on Queue; Linked Implementation of Stack & Queue- Operations. General List : List & its Contiguous Implementation, its Drawback; Singly Linked List- Operation on it; Doubly Linked List-Operation on it; Circular Linked List; Linked List Using Arrays.

UNIT 2-Trees: Definitions- Height, Depth, Order, Degree, Parent & Children Relationship etc.; Binary Trees- Various Theorem, Complete Binary Tree, Almost Complete Binary Tree; Tree Traversals- Pre, In & Post Order Traversals, Their Recursive And Non Recursive Implementations; Expression Tree-evaluation; Linked representation of Binary Tree- Operations. Threaded Binary Trees, Forest, Conversion of Forest into Tree. Heap-Definition.

UNIT 3-Searching, Hashing & Sorting: Requirement of Search Algorithm; Sequential search, Binary Search, Index Sequential Search, Interpolation Search; Hashing - Basics, Methods, Collisions, Resolution of Collisions, Chaining; Internal Sorting-Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort on linked and Contiguous List. Shell Sort, Heap Sort.

UNIT 4-Graphs: Related Definitions; Graph Representation- Adjacency Matrix, Adjacency List, Adjacency Multi List; Traversal Schemes- Depth First Search, Breadth First Search; Minimum Spanning Tree; Shortest Path Algorithm; Kruskal & Dijkstra Algorithms.

UNIT 5-Miscellaneous Features: Basic Idea of AVL Tree- Definition, Insertion, Deletion Operations; Basic Idea of B Tree-definition, Order, Degree, Insertion & Deletion Operations; B Tree- Definition, Comparison with B Tree; Basic Idea of String Processing.

References :
1. "Data structure and Program Design In C" Robert L. Kruse.
2. "Introduction to Data Structures " J.P. Trembley & Sorenson"
3. Algorithms + data Structures = Programs" N. whirl
4. "Fundamentals of Data Structures "E. Horwitz & S. Sahni

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204MCA: PROBABILITY AND COMBINATORICS


References:

205MCA: Software Engineering

System Development Life Cycle: Introduction to Various phases of system development of life cycle, data & fact gathering techniques (interviews, group communication, presentation and site visits), Feasibility Study and its Importance, Type of Feasibility reports, prototyping, cost-benefit analysis.

UNIT 2
Software engineering fundamentals: Definition of software engineering, difference with conventional method of software development, phases of software development life cycle, software project teams, software development process models: waterfall, prototype, spiral.
Software Requirement Analysis: Role of software requirement specification, Characteristics and components of software requirement specification, Specification languages, structure of SRS.

UNIT 3
Verification & validation: types of testing (black box and white box testing), unit testing, integration testing, system testing, acceptance testing.

UNIT 3
Software estimation and reliability: Issue in software cost estimation, standard component, function point method, COCOMO.
Concept of software reliability, software errors, faults. Reliability metrics.

UNIT 5
SCM & Software maintenance: Fundamental of software configuration management & software maintenance, major elements of SCM, types of software maintenance.
CASE Tools & Environment: Concept, Scope of CASE, Classification of CASE Tools, categories of CASE environments.

Books: