201 MCA: 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, queueing implementation of semaphores, classical problems, in concurrent programming: critical region and conditional critical region, monitors, messages.
Deadlocks: Deadlock Prevention, deadlock avoidance.
Input/Output: Principles of I/O Hardware: I/O devices, device controllers, direct memory access, Principles of I/O Software: BIOS, interrupt handlers, device drivers, device independent I/O software.
User space I/O Software.
UNIT 4: Disks: Disk hardware, scheduling algorithms, Error handling, track at a time caching, RAM Disks.
Caches: Cache hardware, memory mapped terminals, I/O software.
Processes and Processes in Distributed Systems:.
Threads, System modes, processor allocation, scheduling.
UNIT 5: Performance Measurement: Monitoring and evaluation: Introduction important issues affecting performance, issues why performance monitoring and evaluation are needed, performance measures, evaluation techniques, bottlenecks and saturation, feedback loops.
Case Studies: MS-DOS, MS WINDOWS, LINUX (UNIX) Operating System.

References:
202MCA: DATA BASE MANAGEMENT SYSTEMS

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: Relation 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 & non-trivial dependencies; closure set of dependencies & of attributes & irreducible set of dependencies; Introductions to normalization; Nonloss decomposition; FD diagram; First, Second and Third normal forms. Dependency preservation: BCNF; multi-valued dependencies and fourth normal form. Join dependencies and fifth normal form.


References:

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.


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. wirth
204MCA : PROBABILITY AND COMBINATORICS


References:

205MCA: Software Engineering


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
Software design & testing: Fundamental of design concept: abstraction, modularity; types of module. Coupling and cohesion: content, common, control, stamp, data coupling. Cohesion: coincidental, logical, temporal, procedural, communicational, sequential, functional. Design methodology: Object oriented approach, function approach Vs Object oriented approach, Software metrics: size oriented, function oriented, object oriented metrics. 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: