

**UNIT I**

**Introduction to Operating Systems:** Mainframe systems, desktop systems, multiprocessor systems, distributed systems, clustered systems, real-time systems, handheld systems. Feature migration and 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.

**UNIT II**

**Processes:** Process concept, process scheduling, operations on processes, cooperating processes, inter-process communication, communication in client-server systems.

**Threads:** Overview, multithreading models, threading issues.

**UNIT III**

**CPU Scheduling:** Basic Concepts, scheduling criteria, scheduling algorithms, multiple-processor scheduling, real-time scheduling, algorithm evaluation.

**Process Synchronization:** The critical section problem, synchronization hardware, semaphores, classical problems of synchronization, monitors.

**Deadlocks:** System model, deadlock characterization, methods for handling deadlocks, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock.

**UNIT IV**

**Storage and Memory Management:** Swapping, contiguous memory allocation, paging, segmentation, segmentation with paging.

**Virtual Memory:** Demand paging, process creation, 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, efficiency and performance.

**UNIT V**

**Protection:** Goals of protection, domain of protection, access matrix, implementation of access matrix, revocation of access rights.

**Security:** The security problem, user authentication, program threats, system threats, security systems and facilities, intrusion detection, cryptography.

**Recommended Books**

1. Operating System Concepts, Silberschatz G.G., John Wiley & Sons Inc.
2. Modern Operating Systems, Andrew S. Tanenbaum, Pearson Prentice Hall,
3. Advanced Concepts in Operating Systems Distributed, Database, and Multiprocessor Operating Systems, Mukesh Singhal and Niranjana G. Shivaratri, Tata McGraw-Hill
4. Operating Systems: A Concept-based Approach, Dhananjay M. Dhamdhere, Tata McGraw-Hill Education.
5. Distributed Systems: Concepts and Design, Coulouris et al, Addison Wesley.
6. Tanenbaum and Steen: Distributed Systems: Principles and Paradigms, Pearson Education