

MCPC2002 OPERATING SYSTEM (3-0-0)

Course Objectives

- To understand the fundamental concepts and role of Operating System.
- To learn the Process Management and Scheduling Algorithms
- To provide a detailed discussion of the various memory management techniques
- To gain insight on I/O and File management techniques
- Understand various problems related to concurrent operations and their solutions.

MODULE-1

Operating Systems: Definition, Generations of Operating systems, Types of Operating System, Functions of operating System, Abstract view of OS, System Structures, System Calls.

Processes: Definition, Process Relationship, Process states, Process State transitions, Process Control Block, Context switching, Threads, Concept of multithreads, Benefits of threads, Types of threads.

MODULE-2

Process Scheduling: Definition, Scheduling objectives, Types of Schedulers. Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time, Scheduling algorithms: Preemptive and Non-preemptive, FCFS, SJF, RR, Priority Scheduling, Multiple Queue Scheduling, Multilevel Feedback Queue Scheduling.

Deadlocks: Definition, Deadlock characteristics, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.

MODULE-3

Inter-process Communication: Race Conditions, Critical Section, Mutual Exclusion, Peterson's Solution, The Producer Consumer Problem, Semaphores, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dining Philosopher Problem etc.

Memory Management: Main Memory, Swapping, Memory allocation Methods, Internal and External fragmentation and Compaction, Paging, Structure of Page Table, Segmentation, Virtual Memory: Demand Paging, Page Replacement Algorithms, Allocation of Frames, Thrashing.

MODULE-4

Disk management: Disk Structure, Disk Scheduling, RAID Structure. **I/O Management:** I/O devices, direct memory access. **File Management:** File concept, access methods, File types, File operation, Directory structure, Allocation methods (contiguous, linked, indexed). **Security & Protection:** Security Environment, Design Principles of Security, User Authentication.

Course Outcomes

- CO 1. Understand the structure and functions of Operating System and how of the working principle of various types of operating systems
- CO 2. Ability to comprehend the techniques used to implement the process manager
- CO 3. Compare the performance of Scheduling Algorithms and Analyze resource management techniques
- CO 4. Ability to comprehend virtual memory abstractions in operating systems

Text Book:

1. Operating System Concepts (9th Edition) by Silberschatz, Peter B. Galvin and Greg Gagne, Wiley Indian Edition.

Reference Books:

1. Modern Operating Systems (Fourth Edition) by Andrew S Tanenbaum, Prentice Hall India.
2. William Stallings, "Operating Systems Internals and Design Principles", Pearson, 2018, 9th Edition.