

# MCC 302: OPERATING SYSTEMS

## Module-1 (16 hours)

**Introduction** — Evolution of Operating Systems, Types of operating systems, Operating System Structures, Hardware and software structures needed for an operating system.

**Process Management:** Processes—States & Life cycle of process, Schedulers, Context Switching, Process scheduling policies—Preemptive vs. Non-preemptive, CPU scheduling algorithms, Threads—States & Life cycle of thread, thread scheduling, Types of threads & Examples. Inter-process Communication (IPC) Mechanisms—Concurrent processes, Process synchronization, Critical Section, Peterson's Solution, Classic IPC Problems, Semaphores, Concurrent programming, Monitors.

## Module-2 (14hours)

**Deadlock**—Basic cause of deadlock, Conditions for deadlock, resource allocation graph, Wait for graph, Strategies for handling deadlocks, Starvation, Havender's linear ordering principle, deadlock avoidance & detection, Safe state, Dijkstra's Banker's Algorithm.

**Memory Management:** Main Memory, Static & Dynamic Partition schemes, multiple partitions schemes, Fragmentation, Compaction, Buddy Systems, Partition selection algorithms, de-allocation strategy, Swapping, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation, Virtual Memory: Demand Paging, Copy-on-Write, Page Replacement Policies, Belady's Anomaly, Thrashing, Working set model.

## Module-3 (10hrs)

**Storage (File and Device) Management:** File-System Interface, File-System Implementation, Mass-Storage Structure, Disk Scheduling, RAID Structure, I/O Systems.

Outline of : Multiprocessor Management, Protection & Security, Real-Time Operating Systems, and Multimedia Operating Systems, Case Studies: Windows XP/ Vista, Linux.

### Text books:

1. Abraham **Silberschatz**, Peter Baer **Galvin**, Greg **Gagne**, "Operating System Concepts", Eighth Edition, 2009, Wiley India Pvt. Ltd., New Delhi.  
Reading Chapters: 1-15 & 19-22 (excluding chapters: 16, 17, 18, and 23).
2. Harvey M. **Deitel**, Paul J. **Deitel**, David R. **Choffnes**, "Operating Systems", Third Edition, 2004, Pearson Education Inc., New Delhi.

### Reference Books:

1. Andrew S. **Tanenbaum**, "Modern Operating Systems", Third Edition, 2008, PHI Learning Pvt. Ltd., / Pearson Education Inc., New Delhi.
2. Ramez **Elmasri**, A. G. **Carrick**, David **Levine**, "Operating Systems: A Spiral Approach", First Edition, 2009, McGraw-Hill Education (India), New Delhi.
3. Ann **McIver Hoes** and Ida M. **Flynn**, "Understanding Operating Systems", Fifth Edition, 2009, CENGAGE Learning India Pvt. Ltd., New Delhi.
4. Gary **Nutt**, "Operating Systems", 3<sup>rd</sup> Edition, 2004, Pearson Education Inc., New Delhi.
5. William **Stallings**, "Operating Systems: Internals and Design Principles", Sixth Edition, 2009, PHI Learning Pvt. Ltd., / Pearson Education Inc., New Delhi.