

COURSE CONTENT

Unit 1

Overview: Operating systems – structure, operations, components, types, services, user interfaces. System calls, system programs, system boot.

Process management: Processes – concept, scheduling, operations on processes, interprocess communications. IPC Methods, pipes, popen, pclose functions, Co-Processes, FIFOs, Message Queues, Shared Memory, Stream pipes, Threads – single and multi-threaded processes.

Unit 2

CPU scheduling – criteria, algorithms, multiple-processor scheduling.

Process synchronization – critical-section problem, semaphores, classic synchronization problems, monitors.

Unit 3

Deadlocks – characterization, deadlock prevention, deadlock avoidance, deadlock detection, prevention, avoidance, recovery from deadlock.

Memory management: Objective and functions, Simple monitor resident program, overlays- swapping, Main memory – memory allocation schemes, paging, segmentation. Virtual memory concept- demand paging, page interrupt fault, page replacement algorithms, segmentation – simple, multilevel, segmentation with paging, frame allocation, thrashing.

Unit 4

Storage management: File system – files and directories, structure and implementation of file systems, mounting and unmounting, storage allocation methods, free-space management. **Disk – structure, scheduling, management.**

Unit 5

I/o management: i/o hardware, i/o interface, kernel i/o subsystem.

Protection and security: Access matrix, security threats.

Case studies of latest operating systems.

Practical List

Implement these programs in C/C++ using Linux/Unix environment operating system. Maintain hard copy of the same for final assessment.

1. **Process creation and termination for operating system (fork, wait, signal, exit etc.).**
2. **Threads.**
3. **CPU scheduling algorithms: FCFS, SJF, Round Robin, Preemptive Priority Scheduling.**
4. **Inter process communication.**
5. **Critical Section problem.**
6. **Producer – Consumer problem using bounded and unbounded buffer.**
7. **Reader Writers problem, Dining Philosophers problem using semaphores.**
8. **Banker's algorithm.**
9. **Page replacement algorithms: LRU, LRU-Approximation, FIFO, Optimal.**
10. **File operation system calls (open, read, close, append etc.)**
11. **Disk scheduling algorithms: FCFS, SSTF, SCAN, CSCAN, LOOK, CLOOK.**