

Name of the course: OPERATING SYSTEMS	
Course code: UGCMSMC06	
Total Class Hours: 60	Credit: 4+2 (Theory & Lab)

COURSE OBJECTIVES: 1.To explain main components of OS and their working 2. To familiarize the operations performed by OS as a resource Manager 3. To impart various scheduling policies of OS 4. To teach the different memory management techniques.

COURSE OUTCOMES: At the end of the course students will be able to: 1. Outline various concepts and features of Operating systems. 2. Compare various operating systems with respect to characteristics and features 3. Implement algorithm of CPU Scheduling, Memory Scheduling and disk scheduling. 4. Make changes in the OS configurations as per need

SYLLABUS

A. Theory (60 Hours)

UNIT - I (10L)

OPERATING SYSTEMS OVERVIEW: Introduction, Booting sequences and types, operating system operations, process management, memory management, storage management, protection and security, distributed systems.

OPERATING SYSTEMS STRUCTURES: Operating system services and systems calls, system programs, operating system structure, operating systems generations.

UNIT - II (15L)

PROCESS MANAGEMENT: Process concepts, process state, process control block, scheduling queues, process scheduling, multithreaded programming, threads in UNIX, comparison of UNIX and windows. **CONCURRENCY AND SYNCHRONIZATION:** Process synchronization, critical section problem, Peterson's solution, synchronization hardware, semaphores, classic problems of synchronization, readers and writers problem, dining philosophers problem, monitors, synchronization examples(Solaris), atomic transactions. Comparison of UNIX and windows.

UNIT - III (15L)

DEADLOCKS: System model, deadlock characterization, deadlock prevention, detection and avoidance, recovery from deadlock banker's algorithm. **MEMORY MANAGEMENT:** Swapping, contiguous memory allocation, paging, structure of the page table, segmentation, virtual memory, demand paging, page-replacement algorithms, allocation of frames, thrashing, case study - UNIX.

UNIT IV (10L)

FILE SYSTEM:

Concept of a file, 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, comparison of UNIX and windows.

UNIT - V (10L)

I/O SYSTEM:

Mass storage structure - overview of mass storage structure, disk structure, disk attachment, disk scheduling algorithms, swap space management, stable storage implementation, tertiary storage structure. I/O: Hardware, application I/O interface, kernel I/O subsystem, transforming I/O requests to hardware operations, streams, performance.

B Practical (30 Hours)

List of Experiments:

1. Write C programs to simulate the following CPU Scheduling algorithms a) FCFS b) SJF c) Round Robin d) priority
2. Write programs using the I/O system calls of UNIX/LINUX operating system (open, read, write, close, fcntl, seek, stat, opendir, readdir)
3. Write a C program to simulate Bankers Algorithm for Deadlock Avoidance and Prevention.
4. Write a C program to implement the Producer – Consumer problem using semaphores using UNIX/LINUX system calls.
5. Write C programs to illustrate the following IPC mechanisms a) Pipes b) FIFOs c) Message Queues d) Shared Memory
6. Write C programs to simulate the following memory management techniques a) Paging b) Segmentation

TEXT BOOKS:

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne (2006), Operating System Principles, 7th edition, Wiley India Private Limited, New Delhi.

REFERENCE BOOKS:

1. Stallings (2006), Operating Systems, Internals and Design Principles, 5th edition, Pearson Education, India.
2. Andrew S. Tanenbaum (2007), Modern Operating Systems, 2nd edition, Prentice Hall of India, India.
3. Deitel & Deitel (2008), Operating systems, 3rd edition, Pearson Education, India.
4. UNIX Programming Environment, Kernighan and Pike, PHI/Pearson Education.
5. UNIX Internals: The New Frontiers, U. Vahalia, Pearson Education.