

## CSE316:OPERATING SYSTEMS

L:3 T:0 P:0 Credits:3

**Course Outcomes:** Through this course students should be able to

- Recognize the basic structure of operating systems and classify roles and responsibilities of an operating System.
- Recognize the need and importance of fundamental concepts and principles of operating systems.
- Design the internal modules of an Operating System like memory management, process management, disk management and inter process communication etc.

### Unit I

**Introduction to Operating System :** Operating System Operations and Functions, Multiprogramming and Multiprocessing System

**Operating System Structure :** System Calls

**Process Management :** Process states, Process scheduling, Operations on processes, Process concept, Life cycle, Process control box

**Introduction to OS concepts :** Evolution of OS, Operating system (OS) modes, services and functions, OS structure - kernel and its types, shell

### Unit II

**CPU Scheduling :** CPU scheduler and dispatcher, Scheduling criteria, CPU scheduler - preemptive and non preemptive, Scheduling algorithms - process management in UNIX, First come first serve, Shortest job first, Round robin, Priority, Multi level feedback queue, multiprocessor scheduling, real time scheduling

### Unit III

**Threads :** Overview, Multithreading Models

**Process Synchronization :** Critical Section Problem, Dining Philosopher Problem, Reader-writer Problem etc, Semaphores, Monitors, Synchronization hardware, Critical section problem - Two process solution, Peterson's Solution

### Unit IV

**Deadlock :** Deadlock Characterization, Handling, Handling of deadlocks- Deadlock Prevention, Deadlock Avoidance & Detection, Deadlock Recovery, Starvation, Critical regions

**Information management :** Files and directories, Directory structure, Directory implementation - linear list and hash table

**File Management :** Allocation methods, Free-Space Management

### Unit V

**Memory Management :** Objectives and functions, Simple resident monitor program, Overlays - swapping, Schemes - Paging - simple and multi level, Fragmentation - internal and external, Virtual memory concept, Demand paging, Page interrupt fault, Page replacement algorithms, Segmentation - simple, multi-level and with paging

### Unit VI

**Protection and Security :** Need for Security, Different Security Environments, Application Security - Virus, Program Threats, Goals of protection, Principles of protection, Domain of protection, Access matrix, System and network threats, User authentication

**Device management :** Dedicated, shared and virtual devices, Serial access and direct access devices, Disk scheduling methods, Direct Access Storage Devices - Channels and Control Units

**Inter process communication :** Introduction to IPC (Inter process communication) Methods, Pipes - popen and pclose functions, Co-processes, Shared memory, Message queues, Passing File descriptors, Semaphores

### Text Books:

1. OPERATING SYSTEM CONCEPTS by ABRAHAM SILBERSCHATZ, GALVIN, WILEY

### References:

1. OPERATING SYSTEMS by D.M.DHARDHERE, MCGRAW HILL EDUCATION
2. DESIGN OF THE UNIX OPERATING SYSTEM by MAURICE J. BACH, Pearson Education India