

**III Semester**  
**Course 8: Operating Systems**  
Credits -3

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**Course Objectives**

To gain knowledge about various functions of an operating system like memory management, process management, device management, etc.

**Course Outcomes:**

Upon successful completion of the course, a student will be able to:

1. Demonstrate knowledge and comprehension of operating system functions.
2. Analyze different process scheduling algorithms and apply them to manage processes and threads effectively
3. Create strategies to prevent, detect, and recover from deadlocks, and design solutions for inter-process communication and synchronization problems.
4. Compare and contrast different memory allocation strategies and evaluate their effectiveness
5. Evaluate disk scheduling algorithms while implementing OS security measures

**UNIT- I**

What is Operating System? History and Evolution of OS, Basic OS functions, Resource Abstraction, Types of Operating Systems– Multiprogramming Systems, Batch Systems, Time Sharing Systems; Operating Systems for Personal Computers, Workstations and Hand-held Devices, Process Control & Real time Systems.

**UNIT- II**

Processor and User Modes, Kernels, System Calls and System Programs, System View of the Process and Resources, Process Abstraction, Process Hierarchy, Threads, Threading Issues, Thread Libraries; Process Scheduling- Non-Preemptive and Preemptive Scheduling Algorithms.

**UNIT III**

**Process Management:** Deadlock, Deadlock Characterization, Necessary and Sufficient Conditions for Deadlock, Deadlock Handling Approaches: Deadlock Prevention, Deadlock Avoidance and Deadlock Detection and Recovery.

Concurrent and Dependent Processes, Critical Section, Semaphores, Methods for Inter process Communication; Process Synchronization, Classical Process Synchronization Problems: Producer-Consumer, Reader-Writer.

**UNIT IV**

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Memory Management: Physical and Virtual Address Space; Memory Allocation Strategies–Fixed and -Variable Partitions, Paging, Segmentation, Virtual Memory.

## UNIT V

**File and I/O Management, OS security:** Directory Structure, File Operations, File Allocation Methods, Device Management, Pipes, Buffer, Shared Memory, Disk Scheduling algorithms.

### Text Books:

1. Operating System Principles by Abraham Silberschatz, Peter Baer Galvin and Greg Gagne (7th Edition) Wiley India Edition.

### Reference Books

1. Operating Systems: Internals and Design Principles by Stallings (Pearson)
2. Operating Systems by J. Archer Harris (Author), Jyoti Singh (Author) (TMH)

### SUGGESTED CO-CURRICULAR ACTIVITIES & EVALUATION METHODS:

**Unit 1: Activity:** Case Study on a specific Operating System: highlighting its functions and key features.

**Evaluation Method:** Case study presentation, depth of understanding of operating system functions, and ability to articulate key concepts.

**Unit 2: Activity:** Comparison Poster on Scheduling Algorithms

**Evaluation Method:** Assessment of posters based on content accuracy, clarity of information, visual presentation, and ability to convey key insights.

**Unit 3: Activity:** Assignment on Dead Lock prevention techniques

**Evaluation Method:** Understanding, Completion and report.

**Unit 4: Activity:** Debate on various Memory allocation schemes

**Evaluation Method:** Debate arguments, ability to counter opposing viewpoints, logical reasoning, and presentation skills.

**Unit 5: Activity:** Comparative study of various disk scheduling algorithms using real world datasets

**Evaluation Method:** Analysis methodology, accuracy of results, and presentation of findings and conclusions.

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