ST. JOSEPH’S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

III SEMESTER   **COMPUTER SCIENCE** TIME:3HRS/WEEK

CS-Ma4-3601(3) **OPERATING SYSTEM** MARKS:100

w.e.f 2024-2025 (23AK Batch) **SYLLABUS**

**COURSE OBJECTIVES:**

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

**COURSE OUTCOMES:** Students after successful completion of the course will be ableto:

1. Demonstrate the structure and design of operating systems. [L2]

2. Compare various algorithms for process scheduling. [L4]

3. Apply various deadlock handling strategies to solve resource allocation problems.

[L3]

4. Evaluate the performance of different memory management techniques and page replacement algorithms [L5].

5. Describe file concepts and analyze various disk scheduling strategies. [L4]

**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: 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.

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**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.