

ADIKAVI NANNAYA UNIVERSITY: RAJMAHENDRAVARAM Single Major B.Sc Computer Science (w.e.f:2023-24A.B)

III Semester Course 8: Operating Systems

Credits -3

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.

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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.

Text Books:

1. Operating System Principles by Abraham Silberschatz, Peter Baer Galvin and GregGagne (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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III Semester

Course 8: Operating Systems

Credits -1

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- 1. Illustrate the LINUX commands
 - a) pwd
 - b) mkdir
 - c) rmdir
 - d) grep
 - e) chmod
 - f) ls
 - g) rm
 - h) cp
- 2. Write a program to calculate average waiting time and turn around time of each process using the following CPU Scheduling algorithm for the given process schedules.
 - a) FCFS
 - b) SJF
 - c) Priority
 - d) Round Robin
- 3. Simulate MVT and MFT memory management techniques
- 4. Write a program for Bankers Algorithm for Dead Lock Avoidance
- 5. Implement Bankers Algorithm Dead Lock Prevention.
- 6. Write a program to simulate Producer-Consumer problem.
- 7. Simulate all Page replacement algorithms.
 - e) FIFO
 - f) LRU
 - g) LFU
 - h) Optimal
- 8. Simulate Paging Techniques of memory management
- 9. Simulate the following disk scheduling algorithms
 - a) FCFS
 - b) SSTF
 - c) SCAN
 - d) CSCAN