

3/4 B.Tech. FIFTH SEMESTER

EM5T4

OPERATING SYSTEMS

Credits: 4

Lecture: 4 periods/week

Internal assessment: 30 marks

Tutorial: 1 period /week

Semester end examination: 70 marks

Course Objectives:

- To explain the basic objectives ,functions and architecture of the operating systems.
- To discuss the services provided by operating systems and understand the structure of O.S.
- To discuss about process concept and understand various process scheduling algorithms.
- To explain critical section problem and its solutions.
- To discuss about the concept of deadlock.
- To discuss in detail about memory management.
- To Explain different concepts in virtual memory.
- To discuss about various concepts in File system and Disk management.

Learning Outcomes:

After the completion of the course the student will be able to:

- Understand the basic operating system structure and functions as well as objectives of the operating system.
- Distinguish between different types of operating systems.
- Understand different structures of operating systems.
- Understand the concept of process along with different operations performed on process.
- Identify the difference between various scheduling algorithms.
- Understand the concept of semaphores and monitors along with various problems of synchronization
- Understand in detail about deadlock such as their characterization, prevention,avoidance,detection and recovery.
- Uderstand the logical and physical memory and also regarding different memory management techniques like paging and segmentati
- Uderstand virtual memory technique and different page replacement algorithms.
- Understand file access methods , directory structures, allocation methods.
- Understand structure of mass storage devices and disk scheduling algorithms.

UNIT-I

Computer System and Operating System Overview: Operating System Objectives & Functions, Computer System Organization & Architecture, Operating System Structure & Operations, Evaluation of O.S(Serial Processing, Simple Batch, Multi-programmed, Time-sharing, distributed, Special purpose Systems).

UNIT-II

System Structure: Operating System Services, System Calls, Operating System Structure (simple, layered, Microkernel, Modules).

Process Management: Process Concept, Process scheduling, Operations on processes, Co-Operating Processes, Interprocess Communication.

UNIT-III

Threads: Overview, Multithreading Models, user and kernel threads.

Process Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms (FCFS, SJF, Priority, RR).

UNIT-IV

Process Synchronization: Critical Section Problem, Peterson's Solution Synchronization Hardware, Semaphores, Classical problems of synchronization, Monitors.

UNIT-V

Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance (including Banker's Algorithm), Deadlock Detection & Recovery.

UNIT-VI

Memory Management: Logical vs. physical address space, Swapping, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation.

UNIT-VII:

Virtual Memory Management: Page fault, Demand Paging, Performance, Page Replacement & its Algorithms (FIFO, LRU Optimal, Clock), Allocation of frames, Thrashing.

UNIT-VIII

Storage Management

File System: File Concept, Access Methods, Directory & Disk Structure, File System Structure, Directory Implementation (linear list, hash table), Allocation methods (contiguous, linked, and indexed). **Disk Management:** Overview of Mass Storage Structure, Disk Scheduling (FCFS, SSTF, SCAN, C-SCAN).

Learning resources

TEXT BOOKS:

1. Operating System Concepts- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 8th Edition, John Wiley.

REFERENCES:

1. Operating Systems' – Internal and Design Principles Stallings, Sixth Edition–2005, Pearson education.
2. Tanenbaum A.S., "Operating System Design & Implementation", Practice Hall NJ.
3. Silbersehatz A. and Peterson J. L., "Operating System Concepts", Wiley.
4. Dhamdhare: Operating System TMH
5. Stalling, William, "Operating Systems", Maxwell McMillan International Editions.
6. Dietel H. N., "An Introduction to Operating Systems", Addison Wesley.