

2/4 B.Tech SECOND SEMESTER

IT4T2

**OPERATING SYSTEMS
(Common to CSE/IT/ECM)**

Credits: 4

Lecture: 4 Periods/week

Internal assessment: 30 marks

Tutorial: 1 Period /week

Semester end examination: 70 marks

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.

Outcomes:

Students 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.
- Know 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.
- Understand the logical and physical memory and also regarding different memory management techniques like paging and segmentation.
- Understand virtual memory technique and different page replacement algorithms.
- Understand file access methods, directory structures, allocation methods.
- Know the structure of mass storage devices and disk scheduling algorithms.

Syllabus:

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).

Text books:

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

References books:

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.