III/IV B. TECH. FIRST SEMESTER
OPERATING SYSTEMS(Required)

Course Code : CS 5T5   **Credits: 3**
Lecture: 3 periods/ week   **Internal assessment: 30 Marks**
Tutorial: 1period/week   **Semester end examination: 70 Marks**

Prerequisites: Data Structures

Course Outcomes:

At the end of this course student will:

CO1) Understand the structure and functionalities of Operating System

CO2) Apply CPU scheduling algorithms, deadlock prevention and detection algorithms

and different page replacement algorithms

CO3) Illustrate different problems and solutions related to process synchronization

CO4) Describe the concepts of paging and segmentation for memory management

CO5) Analyze the operating system support for virtual memory, disk management

Syllabus:
UNIT-I:
Computer System and Operating System Overview: Operating System Objectives & Functions, Computer System Organization & Architecture, Operating System Structure & Operations. System Structure: OS Services, System Calls, Types of system calls.

UNIT-II:
Process Management: Process Concept, Process scheduling, Operations on processes, Co-Operating Processes, Interprocess Communication.
Threads: Overview, Multithreading Models, user and kernel threads.
Process Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms (FCFS, SJF, Priority, RR).

UNIT-III:
Process Synchronization: Critical Section Problem, Peterson's Solution Synchronization Hardware, Semaphores, Classical problems of synchronization, Monitors.
Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance (including Banker's Algorithm), Deadlock Detection & Recovery

UNIT-IV:
Memory Management: Logical vs. physical address space, Swapping, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation.
Virtual Memory Management: Page fault, Demand Paging, Performance, Page Replacement & its Algorithms (FIFO, LRU Optimal, Clock), Allocation of frames, Thrashing

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

Learning Resource

Text Books
1 Operating System Concepts- Abraham Silberchatz, Peter B. Galvin, Greg Gagne,8thEdition, John Wiley.

References
1. Operating Systems' – Internal and Design Principles -- Stallings, Sixth Edition,Pearson education.
2. Operating System Design & Implementation -- Tanenbaum A.S. -- PHI
3. Operating Systems -- Stalling, William -- Maxwell McMillan International
    Editions.
4. An Introduction to Operating Systems -- Dietel H. N., -- Addison Wesley.
5.   Advanced programming in the UNIX environment -- W.Richard Stevens -- pearson Education

6. UNIX and Shell Programming -- **Behrouz A. Forouzan**, **Richard F. Gilberg.**