



MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AN AUTONOMOUS INSTITUTION)

(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)

Accredited by NAAC with 'A' Grade & Recognized Under Section 2(f) & 12(B) of the UGC act, 1956

COURSE CONTENT

OPERATING SYSTEMS								
IV Semester: CSD / CSE / CSM								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P		CIA	SEE	Total
2540510	CORE	3	0	0	3	40	60	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes: 45			
Prerequisites: Programming for Problem Solving, Computer Organization and Architecture								

Course Overview:

This course provides a comprehensive understanding of Operating Systems, covering key concepts such as process management, memory management, synchronization, and deadlock handling. It explores OS structure, process scheduling, multithreading, and system calls. Additionally, the course delves into file systems, virtual memory, and the challenges of managing resources in a multi-process environment. Practical knowledge is gained through studying algorithms and techniques for efficient OS functioning.

Course Objectives:

1. Introduce operating system concepts (i.e., processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection)
2. Introduce the issues to be considered in the design and development of operating system
3. Introduce basic Unix commands, system call interface for process management, interprocess communication and I/O in Unix

Course Outcomes: After Completion of the Course, Students should be able to

1. Understand operating system concepts, system structures, services, system calls, and process management fundamentals.
2. Analyze CPU scheduling algorithms, multiprocessor scheduling issues, and deadlock handling strategies within operating systems.
3. Apply process synchronization techniques, interprocess communication mechanisms, semaphores, monitors, and concurrency control concepts.
4. Examine memory management strategies including paging, segmentation, virtual memory, demand paging, and page replacement algorithms.
5. Evaluate file system interfaces, directory structures, allocation methods, protection mechanisms, and file-related system calls.

UNIT - I

Operating System - Introduction, Structures - Simple Batch, Multiprogrammed. Time-shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating System services, System Calls

Process - Process concepts and scheduling, Operations on processes, Cooperating Processes, Threads

UNIT - II

CPU Scheduling - Scheduling Criteria, Scheduling Algorithms, Multiple -Processor Scheduling. System call interface for process management-fork, exit, wait, waitpid, exec

Deadlocks - System Model, Deadlocks Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock

UNIT - III

Process Management and Synchronization - The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors **Interprocess Communication Mechanisms:** IPC between processes on a single computer system, IPC between processes on different systems, using pipes, FIFOs, message queues, shared memory.

UNIT - IV

Memory Management and Virtual Memory - Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging, Demand Paging, Page Replacement, Page Replacement Algorithms.

UNIT - V

File System Interface and Operations -Access methods, Directory Structure, Protection, File System Structure, Allocation methods, Free-space Management. Usage of open, create, read, write, close, lseek, stat, ioctl system calls.

TEXT BOOKS:

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley
2. Advanced programming in the UNIX environment, W.R. Stevens, Pearson education.

REFERENCE BOOKS:

1. Operating Systems- Internals and Design Principles, William Stallings, Fifth Edition–2005, Pearson Education/PHI
2. Operating System A Design Approach- Crowley, TMH.
3. Modern Operating Systems, Andrew S. Tanenbaum 2nd edition, Pearson/PHI
4. UNIX programming environment, Kernighan and Pike, PHI/ Pearson Education
5. UNIX Internals -The New Frontiers, U. Vahalia, Pearson Education.

ELECTRONIC RESOURCES:

1. https://onlinecourses.nptel.ac.in/noc25_cs141/preview
2. https://onlinecourses.nptel.ac.in/noc24_cs80/preview
3. <https://www.w3schools.in/operating-system/intro>
4. https://www.tutorialspoint.com/operating_system/index.htm

MATERIALS ONLINE:

1. Course template
2. Tutorial question bank
3. Tech talk and Concept Video topics
4. Open-ended experiments
5. Definitions and terminology
6. Assignments
7. Model question paper – I
8. Model question paper – II
9. Lecture notes
10. E-Learning Readiness Videos (ELRV)