OPERATING SYSTEMS
(Common to CSE & IT)

Course Code : 15CT1110

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Course Outcomes:

At the end of the course, a student will be able to

CO 1 Discuss different computer operating systems.

CO 2 Compare CPU scheduling algorithms.

CO 3 Examine Page Replacement algorithms.

CO 4 Differentiate File System and directory implementations.

CO 5 Analyze different program and network threats to the system.

UNIT-I **(10 Lectures)**

INTRODUCTION & SYSTEM STRUCTURES:

What Operating System Do, computer system organization, computer system architecture, operating system structure, protection and security, distributed systems, special purpose systems, Computing environments, operating system services, system calls and its types, operating systems generation.

UNIT-II **(10 Lectures)**

PROCESS CONCEPT:

Process, Process Control Blocks, Operations on Processes, Interprocess Communication, Scheduling Criteria, scheduling algorithms (FCFS, SJF, Round Robin, Priority) and their evaluation, Multiprocessor scheduling.

Case Study: Linux.

SYNCHRONIZATION:

The Critical- section problem, Peterson's Solution, Synchronization

Hardware, semaphores, classic problems of synchronization, monitors, Synchronization examples, atomic transactions. Case Study: Linux

UNIT – III (10 Lectures)

DEAD LOCKS:

System model, deadlock characterization, Methods for Handling Deadlock, deadlock prevention, detection and Avoidance, recovery from deadlock.

MEMORY MANAGEMENT STRATEGIES:

Swapping, contiguous memory allocation, paging, structure of the page table, segmentation.

VIRTUAL-MEMORY MANAGEMENT:

Demand paging, Copy on write, page-Replacement algorithms (FIFO, LRU, LFU, Optimal Page Replacement)

UNIT-IV (10 Lectures)

FILE SYSTEMS:

File Concept, Access Methods, Directory Structure, File System Mounting.

IMPLEMENTING FILE SYSTEMS:

File system structure, File System Implementation, Directory Implementation, Allocation Methods, Free-space Management, Efficiency and performance, Log-Structured File Systems, Network File Systems. Case Study: Linux

SECONDARY-STORAGE STRUCTURE:

Overview of Mass-storage structure, disk structure, disk attachment, disk scheduling, swap-space management, RAID structure, stable-storage implementation, Tertiary storage structure.

UNIT-V (10 Lectures)

PROTECTION:

Goals of Protection, Principles of Protection, Domain of protection,Access Matrix, Implementation of Access Matrix, Access control, Revocation of Access Rights, Capability- Based systems, Language – Based Protection.

SYSTEM SECURITY:

The Security problem, program threats, system and network threats cryptography as a security tool, user authentication, implementing security defenses, firewalling to protect systems and networks, computer–security classifications. Case Study: Linux

TEXT BOOKS:

1. Abraham Silberchatz, Peter B. Galvin, Greg Gagne, *"Operating System Principles"*, 8th Edition, John Wiley & Sons.

REFERENCES:

1. William Stallings, *"Operating Systems – Internal and Design Principles"*, 6th Edition, Pearson education/PHI.
2. D.M. Dhamdhere, *"Operating systems - A Concept based Approach"*, 2nd Edition, TMH.
3. Charles Crowley, *"Operating Systems - A Design Approach"*, 1st Edition, TMH.
4. Andrew S Tanenbaum, *"Modern Operating Systems"*, 3rd Edition, Pearson/PHI.

WEB REFERENCES:

http://nptel.iitm.ac.in/courses/Webcoursecontents/IIScBANG/Operating%20Systems/New_index1.html