OPERATING SYSTEMS

COURSE CODE: 20CA3104 **L T P C**

3 0 0 3

COURSE OUTCOMES:

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

CO1: Understand functional architecture of an operating system.
CO2: Compare CPU scheduling algorithms.
CO3: Analyze process coordination.
CO4: Differentiate File System and directory implementations.
CO5: Analyse different program and network threats to the system.

UNIT-I **(10 Lectures)**

INTRODUCTION AND SYSTEM STRUCTURE

Introduction: What Operating System Do, computer system organization, computer system architecture, operating system structure: Distributed systems, special purpose systems, Computing environments, operating system services, system calls and its types, operating systems generation.

Learning Outcomes:

At the end of the module, students will be able to

- List Operating system services. (L2)
- Understand the concept of system calls. (L2)
- Analyze various Computing systems(L4)

UNIT-II **(10 Lectures)**

PROCESS MANAGEMENT

Process Concept: Process, Process Control Blocks, Operations on Processes, Inter process Communication.

Multithreaded Programming: Multithreading Models, Thread Libraries, Threading Issues

Process Scheduling: Scheduling Criteria, scheduling algorithms (FCFS, SJF, Round Robin, and Priority) and their evaluation,Multi-processor scheduling. Case Study: Linux.

Learning Outcomes:

At the end of the module, students will be able to

- Explain Process concepts and Identify the operations on process(L2)
- Analyze Inter Process Communication(L4)
- Understand Multithreading(L2)
- Analyzing and Applying Scheduling Algorithms(L3,L4)

UNIT-III **(10 Lectures)**

PROCESS COORDINATION

Synchronization: The Critical- section problem, Peterson's Solution, Synchronization Hardware, semaphores, classic problems of synchronization, monitors, Synchronization examples, atomic transactions. Case Study: Linux

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

Learning Outcomes:
At the end of the module, students will be able to
- Explain the synchronization problems(L2)
- Analyze and understand the problems of Deadlocks(L4,L2)
- Understand the methods of handling deadlocks(L2)

UNIT-IV **(10 Lectures)**
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)
File systems and implementation:File Concept, Access Methods, Directory Structure, File System Mounting. File system structure, File System Implementation, Directory Implementation, Allocation Methods, Free-space Management

Learning Outcomes:
At the end of the module, students will be able to
- Explain the memory management strategies (L2)
- Differentiate paging and segmentation(L4)
- Understand the File concepts and directory structure(L2)
- Analyze Virtual memory(L4)

UNIT-V **(10 Lectures)**
STORAGE MANAGEMENT
Secondary-storage structure:Overview of Mass-storage structure, disk structure, disk attachment, disk scheduling, swap-space management.
PROTECTION AND SECURITY
Goals and Principles of Protection, Domain of protection, Access Matrix, Implementation of Access Matrix, Access control, Revocation of Access Rights, The Security problem, program threats, system and network threats

Learning Outcomes:
At the end of the module, students will be able to
- Understand and Apply disk scheduling concepts(L2,L3)
- Differentiate Protection and Security(L4)
- Explain Program, System & Network threats (L2)
- Analyze Security problem (L4)

TEXT BOOK:

Abraham Silberschatz, Peter B. Galvin, Greg Gagne,*Operating System Principles*, 8thEdition, John Wiley &Sons.

REFERENCES:
1. William Stallings, "*Operating Systems – Internal and Design Principles"*, 6thEdition, Pearson education/PHI, 2011.
2. D.M. Dhamdhere, "*Operating systems - A Concept based Approach"*, 2ndEdition, TMH, 2010.
3. Charles Crowley, "*Operating Systems - A Design Approach"*, 1st Edition, TMH.
4. Andrew S Tanenbaum, "*Modern Operating Systems"*, 3rd Edition, Pearson, 2010.