

# राष्ट्रीय प्रौद्योगिकी संस्थान पटना / NATIONAL INSTITUE OF TECHNOLOGY PATNA

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No:- Date:

**CS022004 Operating System** (L-T-P-Cr): (3-0-2-4)

Pre-requisites: C programming, Computer Organizational and Architecture

### **Objectives:**

- To understand concepts of OS, process & process scheduling.
- To understand process synchronization and deadlock handling methods.
- To understand various memory management techniques.
- To learn about file system design and implementation and disk Management.

#### **Course Outcomes:**

S.NO	Outcomes	Mapping to POs
CO-1	Familiarize with the basic concepts of OS, process, and process scheduling.	PO1, PO2, PO3
CO-2	Learn about process synchronization and deadlock handling methods.	PO2, PO3, PO4
CO-3	Understand the concept of memory management and virtual memory.	PO2, PO3
CO-4	Learn about various file systems and disk management techniques.	PO2, PO3, PO4

## **Syllabus**

UNIT I Lectures: 5

**Introduction:** Introduction to OS, Operating system functions, evaluation of OS, OS Services, OS Structures, System Calls, Building and booting OS, Processes, Threads, and Multithreading. Different types of OS: batch, multi-programmed, time-sharing, real-time, distributed, parallel.

UNIT II Lectures: 7

**Processes:** Concept of processes, operations on processes, inter-process communication, Communication in Client-Server Systems, Process scheduling criteria, preemptive & non-preemptive scheduling, and various scheduling algorithms.

UNIT III Lectures: 10

**Process Synchronization:** background, critical section problem, critical region, synchronization hardware, classical synchronization problems, semaphores, Monitors. **Deadlocks:** system model, deadlock characterization, methods for handling deadlocks, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock.

UNIT IV Lectures: 10

**Memory Management:** background, logical vs. physical address space, swapping, contiguous memory allocation, paging, segmentation.

**Virtual Memory:** background, demand paging, page replacement, page replacement algorithms, allocation of frames, thrashing.

UNIT V Lectures: 10

File Systems: File concept, Access Methods, Directory structure, File system mounting, File System structure, File system Implementation, Allocation methods, Free space management **Disk Management:** disk structure, disk scheduling (FCFS, SSTF, SCAN, C-SCAN)

OS Security: Domain of Protection, Access matrix, Implementation of Access matrix, System security

## **Text/Reference Books:**

- 1) Operating System Concepts by Silberschatz A. and Peterson J. L., Wiley
- 2) Operating Systems by Dhamdhere, TMH
- 3) Operating Systems by Deitel, Deitel & Choffnes.
- 4) Operating Systems by Stalling, Pearson