



**B. P. PODDAR INSTITUTE OF MANAGEMENT & TECHNOLOGY DEPARTMENT OF  
COMPUTER SCIENCE & ENGINEERING  
ACADEMIC YEAR: 2024-2025 ODD SEMESTER**

**Course Code** : PCC-CS502  
**Course Title** : Operating System  
**Class**: 3<sup>rd</sup> Year 5<sup>th</sup> Sem

**Lesson Plan**

Required Text Books and Reference books:

- B1. Operating System Concepts Essentials, 9th Edition by Avi Silberschatz, Peter Galvin, Greg Gagne, Wiley Asia Student Edition.
- B2. Operating Systems: Internals and Design Principles, 5th Edition, William Stallings, Prentice Hall of India.
- B3. Operating System Concepts, Ekta Walia, Khanna Publishing House (AICTE Recommended Textbook – 2018)
- B4. Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, Irwin Publishing
- B5. Operating Systems: A Modern Perspective, 2nd Edition by Gary J. Nutt, AddisonWesley
- B6. Design of the Unix Operating Systems, 8th Edition by Maurice Bach, Prentice-Hall of India
- B7. Understanding the Linux Kernel, 3rd Edition, Daniel P. Bovet, MarcoCesati, O'Reilly and Associates

Lecture No.	Topics to be covered	Ref	Teaching Aid	Testing Method
1	Introduction: Generations Concept of Operating systems, Systems, Types of Operating Systems	B1	<b>BB, PPT</b>	<b>Discussion</b>
2	OS Services, System Calls, Structure of an OS - Layered, Monolithic, Microkernel Operating Systems	B1	<b>BB, PPT</b>	<b>Discussion</b>
3	Concept of Virtual Machine. Case study on UNIX and WINDOWS Operating System	B1	<b>PPT</b>	<b>Discussion</b>
4	Processes: Definition, Process Relationship, Different states of a Process	B3	<b>BB</b>	<b>Discussion</b>
5	Process State transitions, Process Control Block (PCB), Context switching	<b>B3</b>	<b>BB</b>	<b>Discussion</b>
6	Thread: Definition, Various states, Benefits of threads	B3	<b>BB</b>	<b>Discussion</b>
7	Types of threads, Concept of multithreads	B3	<b>BB</b>	<b>Discussion</b>
8	Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers	B2	<b>BB</b>	<b>Discussion</b>
9	Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time	B2	<b>BB</b>	<b>Discussion</b>

10	Scheduling algorithms: Pre-emptive and Non pre-emptive, FCFS	B2	<b>BB</b>	<b>Discussion, Illustration by example , Assignments</b>
11	Scheduling algorithms: SJF	B2	<b>BB</b>	<b>Discussion, Illustration by example , Assignments</b>
12	Scheduling algorithms: RR	B2	<b>BB</b>	<b>Discussion, Illustration by example , Assignments</b>
13	Multiprocessor scheduling: Real Time scheduling: RM and EDF	B2	<b>BB</b>	<b>Discussion</b>
14	Modern Scheduling and Thread Models (multi-core processor scheduling, real-world scheduler implementations and thread libraries/APIs)	B2	<b>BB</b>	<b>Discussion</b>
15	Inter-process Communication: Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution, Strict Alternation	B6	<b>BB</b>	<b>Discussion</b>
16	Peterson's Solution, The Producer Consumer Problem	B6	<b>BB</b>	<b>Discussion, Assignments</b>
17	Semaphores, Event Counters, Monitors	B6	<b>BB</b>	<b>Discussion</b>
18	Message Passing, Classical IPC Problems: Reader's & Writer Problem	B6	<b>BB</b>	<b>Discussion</b>
19	Dinning Philosopher Problematic	B6	<b>BB</b>	<b>Discussion</b>
20	Deadlocks: Definition, Necessary and sufficient conditions for Deadlock	B3	<b>BB</b>	<b>Discussion</b>
21	Deadlock Prevention	B3	<b>BB</b>	<b>Discussion</b>
22	Deadlock Avoidance: Banker's algorithm	B3	<b>BB</b>	<b>Discussion, Illustration by example , Assignments</b>
23	Deadlock detection	B3	<b>BB</b>	<b>Discussion</b>
24	Deadlock Recovery	B3	<b>BB</b>	<b>Discussion, Assignments</b>
25	Memory Management: Basic concept, Logical and Physical address map	B5	<b>BB, PPT</b>	<b>Discussion, Assignments</b>
26	Memory allocation: Contiguous Memory allocation– Fixed	B5	<b>BB</b>	<b>Discussion</b>
27	Memory allocation: variable partition, Internal and External fragmentation, Compaction	B5	<b>BB</b>	<b>Discussion</b>
28	Paging: Principle of operation –Page allocation Hardware support for paging	B5	<b>BB</b>	<b>Discussion</b>
29	Protection and sharing, Disadvantages of paging	B5	<b>BB</b>	<b>Discussion</b>

30	Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference	B5	<b>BB</b>	<b>Discussion</b>
31	Page fault , Working Set , Dirty page/Dirty bit – Demand paging	B5	<b>BB</b>	<b>Discussion</b>
32	Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently	B5	<b>BB</b>	<b>Discussion</b>
33	I/O Hardware: I/O devices, Device controllers, Direct memory access Principles of I/O Software: Goals of Interrupt handlers	B7	<b>BB</b>	<b>Discussion</b>
34	Device drivers, Device independent I/O software, Secondary-Storage Structure: Disk structure	B7	<b>BB</b>	<b>Discussion</b>
35	Disk scheduling algorithms File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed)	B5	<b>BB</b>	<b>Discussion</b>
36	Free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table) efficiency and performance	B5	<b>BB</b>	<b>Discussion</b>
37	Disk Management: Disk structure, Disk scheduling - FCFS, SSTF	B5	<b>BB</b>	<b>Discussion</b>
38	SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks	B5	<b>BB</b>	<b>Discussion</b>
39	OS Security Concepts (access control models, secure OS architectures, sandboxing, or security features like ASLR etc.)	B7	<b>BB</b>	<b>Discussion</b>
40	Previous year Question Paper discussion		<b>BB, PPT</b>	<b>Illustration by example, Problem Solving, Flip Class</b>