

CE354: OPERATING SYSTEM

Pre-requisite courses:

- Introduction to computer and computer organization.

Sr. No.	Title of the unit	Minimum number of hours
1.	Introduction	03
2.	Process Management	07
3.	Inter process Communication	09
4.	Deadlock	07
5.	Memory Management	12
6.	Input Output Management	04
7.	File Systems	06
8.	System Protection	04
9.	Unix/Linux File System	04
10.	Case study of XV6 operating system	04
	Total hours (Theory) :	60
	Total hours (Lab) :	30
	Total hours :	90

Detailed Syllabus:

1.	Introduction	03 Hours	05%
	What is an OS? Evolution Of OS, OS Services, Types Of OS, Concepts of OS, Different Views Of OS		
2.	Process Management	07 Hours	12%
	Process, Process Control Block, Process States, Threads, Types of Threads and Dispatching, Concurrent Threads, CPU Scheduling, Protection: Address space, Address Translation		
3.	Inter process Communication	09 Hours	15%
	Race Conditions, Critical Section, Co-operating Thread/		

	Mutual Exclusion. Hardware Solution, Strict Alternation, and Peterson's Solution. The Producer Consumer Problem, Semaphores, Event Counters, Monitors. Message Passing and Classical IPC Problems: Reader's & Writer Problem, Dining Philosopher Problem.		
4.	Deadlock	07 Hours	12%
	Deadlock Problem, Deadlock Characterization, Deadlock Detection, Deadlock recovery, Deadlock avoidance: Banker's algorithm for single & multiple Resources. Deadlock Prevention.		
5.	Memory Management	12 Hours	20%
	Multiprogramming with Fixed and variable partitions, Paging: Principle Of Operation, Page Allocation, H/W Support For Paging. Multilevel paging, Segmentation, Swapping. Virtual Memory: Concept, Performance of Demand Paging, Page Replacement Algorithms, Thrashing and Working Sets.		
6.	Input Output Management	04 Hours	05%
	I/O Devices, Device Controllers, Direct Memory Access. Principles Of Input/output S/W : Goals Of The I/O S/W, Interrupt Handler, Device Driver, Device Independent. I/O Software Disks: RAID levels, Disk Scheduling Algorithm, Error Handling		
7.	File Systems	06 Hours	16%
	File Naming, File Structure, File Types, File Access, File Attributes, File Operations, Memory Mapped Files. Directories: Hierarchical Directory System, Pathnames, Directory Operations. File System Implementation, Contiguous Allocation, Linked List Allocation, Linked List Using Index, Inodes.		
8.	System Protection	04 Hours	06%
	Goals of protection, Principles of protection, Domain of protection, Access matrix, Implementation of Access matrix, Access control		
9.	Unix/Linux File System	04 Hours	04%

	Buffer Cache, Inodes, The system calls - ialloc, ifree, namei, alloc and free. Mounting and Unmounting , files systems, Network File systems. EXT file system in linux		
10.	Case study of XV6 operating system	04 Hours	05%

Recommended Study Material:

❖ Text book:

1. Modern Operating Systems -By Andrew S. Tanenbaum, Third Edition PHI
2. Operating System Concepts Avi Silberschatz, Peter Baer Galvin, Greg Gagne, Ninth Edition, Wiley

❖ Reference book:

1. Operating Systems, D.M. Dhamdhare, TMH
2. Operating Systems Internals and Design Principles, William Stallings, Seventh Edition, Prentice Hall
3. Unix System Concepts & Applications, Sumitabha Das, TMH
4. Unix Shell Programming, Yashwant Kanitkar, BPB Publications

❖ Web material:

1. NPTEL course: <https://nptel.ac.in/courses/106/106/106106144/>
2. Simulator: <https://cpudemo.azurewebsites.net/#/>

❖ Software:

1. Simulator: OS Sim (OS Concepts Simulator)