



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
IT44	Operating Systems	3	-	-	3	-	-	3
		Examination Scheme						
		ISE		MSE		ESE		
		10		30		100 (60%weightage)		

Pre-requisite Course Codes		
After successful completion of the course, student will be able to:		
Course Outcomes	CO1	Describe the basic functions of operating systems.
	CO2	Implement various process scheduling algorithm.
	CO3	Design inter process communication solution
	CO4	Categorize various memory management techniques
	CO5	Apply disk scheduling algorithms.
	CO6	Differentiate among various file systems.
	CO7	Explore functions of operating systems in different environment.

Module No.	Unit No.	Topics	Ref.	Hrs.
1		Introduction to Operating systems		04
	1.1	Introduction to operating system, Functions of Operating systems, Evolution of Operating Systems, RTOS, Mobile OS, Booting.	1	
	1.2	Processes and Interrupts, User mode and kernel mode, Kernel architectures: Monolithic, Micro-kernel.	1,2	
	1.3	Process System Calls.	1,2	
2		Processes and Threads.		09
	2.1	Life cycle of a process, context switching, Process Control Block, Inter-process communication (IPC).	1,2	
	2.2	Process Scheduling: FCFS, RR, SJF , Priority , Comparison of different scheduling policies.	1	
	2.3	Threads and Thread management.	1	
3		Process Synchronization		09
	3.1	Race conditions and Locks, Conditional Variables	1	
	3.2	Mutual Exclusion- Hardware and Software Approaches, Semaphores, Monitors.	1	
	3.3	Examples of synchronization problems: Readers Writers problem, Dining Philosophers problem, Producer Consumer problem.	1	



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		Deadlocks :principles of deadlock, deadlock detection, Deadlock Avoidance: Bankers algorithm, Deadlock Prevention.		
4		Memory Management		06
	4.1	Basics of Memory Management, Address Space of a Process	1	
	4.2	Paging, TLB cache, Page table design	1	
	4.3	Working set model, Thrashing, Demand Paging, Page Replacement Algorithms: FIFO, LRU, Optimal.	1	
	4.4	Frame Allocation Policies, Kernel Memory Allocation	1	
	4.5	Segmentation	1	
5		File Management		06
	5.1	Files and File Systems, Layers of Abstraction in File Systems	1	
	5.2	Design Choices for File and Directory Metadata	1	
	5.3	File System Consistency	1	
	5.4	Buffer Cache and Memory-mapped Files	1	
	5.5	Unix and Windows file systems	1	
6		I/O Management		05
	6.1	Kernel I/O subsystem	1	
	6.2	Communication and Data Transfer with I/O Devices	1	
	6.3	Secondary Storage Disks, Disk Scheduling and disk scheduling algorithms : FCFS, SSTF, SCAN, CSCAN, LOOK , Disk cache, RAID	1	
7		Explore operating system functions in real time operating system, mobile operating system, distributed operating system and cloud environment.	1	
			Total	42

References:

1. Silberschatz A., Galvin P., Gagne G. “*Operating Systems Principles*”, 9th edition, Willey.
2. Maurice J. Bach, “*The Design of Unix Operating System*”, Prentice Hall.