Operating Systems

UNITS	COURSE CONTENT	CONTACT HOURS
1	**Introduction and OS Structures:** Operating system overview, functions, history, types (batch, multiprogrammed, distributed, real-time), OS services, system calls, OS architecture and design	4L
2	**Process and CPU Management:** Process concepts, PCB, states, context switching, scheduling queues, multithreading, inter-process communication, scheduling criteria and algorithms (FCFS, SJF, Priority, RR)	7L
3	**Concurrency and Synchronization:** Critical section problem, semaphores, monitors, classical synchronization problems, deadlocks (prevention, avoidance, detection, recovery), case studies (UNIX/Linux/Windows)	7L
4	**Memory Management:** Contiguous allocation, paging, segmentation, virtual memory, page replacement algorithms (FIFO, LRU, Optimal), thrashing, case studies	5L
5	**File and Storage Management:** File concepts, access methods, directory structure, file system implementation, free-space management, disk structure and scheduling algorithms, protection	5L
6	**Device, Protection, and Security:** I/O systems, device drivers, protection mechanisms, access control, security models, case studies	4L
7	**Advanced Topics and Shell Programming:** Distributed/multiprocessor OS features, virtual machines, microkernels, practical shell programming tasks, performance evaluation, introduction to OS development	8L