

## **Operating System**

**CS-603**

**Contact: 3L**

**Credits: 3**

### **Introduction [4L]**

Introduction to OS. Operating system functions, evaluation of O.S., Different types of O.S.: batch, multi-programmed, time-sharing, real-time, distributed, parallel.

### **System Structure[3L]**

Computer system operation, I/O structure, storage structure, storage hierarchy, different types of protections, operating system structure (simple, layered, virtual machine), O/S services, system calls.

### **Process Management [17L]**

**Processes [3L]:** Concept of processes, process scheduling, operations on processes, co-operating processes, inter-process communication.

**Threads [2L]:** overview, benefits of threads, user and kernel threads.

**CPU scheduling [3L]:** scheduling criteria, preemptive & non-preemptive scheduling, scheduling algorithms (FCFS, SJF, RR, priority), algorithm evaluation, multi-processor scheduling.

**Process Synchronization [5L]:** background, critical section problem, critical region, synchronization hardware, classical problems of synchronization, semaphores.

**Deadlocks [4L]:** system model, deadlock characterization, methods for handling deadlocks, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock.

### **Storage Management [19L]**

**Memory Management [5L]:** background, logical vs. physical address space, swapping, contiguous memory allocation, paging, segmentation, segmentation with paging.

**Virtual Memory [3L]:** background, demand paging, performance, page replacement, page replacement algorithms (FCFS, LRU), allocation of frames, thrashing.

**File Systems [4L]:** file concept, access methods, directory structure, file system structure, allocation methods (contiguous, linked, indexed), free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency & performance.

**I/O Management [4L]:** I/O hardware, polling, interrupts, DMA, application I/O interface (block and character devices, network devices, clocks and timers, blocking and nonblocking I/O), kernel I/O subsystem (scheduling, buffering, caching, spooling and device reservation, error handling), performance.

**Disk Management [3L]:** disk structure, disk scheduling (FCFS, SSTF, SCAN,C-SCAN) , disk reliability, disk formatting, boot block, bad blocks.

### **Protection & Security [4L]**

Goals of protection, domain of protection, security problem, authentication, one time password, program threats, system threats, threat monitoring, encryption.

### **Text Books / References :**

1. Milenkovic M., "Operating System : Concept & Design", McGraw Hill.
2. Tanenbaum A.S., "Operating System Design & Implementation", Practice Hall NJ.
3. Silbersehatz A. and Peterson J. L., "Operating System Concepts", Wiley.
4. Dhamdhare: Operating System TMH
5. Stalling, William, "Operating Systems", Maxwell McMillan International Editions, 1992.
6. Dietel H. N., "An Introduction to Operating Systems", Addison Wesley.