

COURSE TITLE : **OPERATING SYSTEMS**
COURSE CODE : **4071**
COURSE CATEGORY : **A**
PERIODS/WEEK : **5**
PERIODS/SEMESTER : **90**
CREDITS : **5**

TIME SCHEDULE

MODULE	TOPICS	PERIODS
1	Introduction to OS	19
	Test I	1
2	Process management	24
	Test II	1
3	Memory Management	22
	Test III	1
4	Device and Information management	22
	Test IV	1
	Total	90

OBJECTIVES

MODULE I: INTRODUCTION TO OS

1.1.0 Introduction to systems software.

- 1.1.1 Discuss assembler and its functions
- 1.1.2 Discuss loader and its functions
- 1.1.3 Discuss compilers and interpreters and their functions
- 1.1.4 Discuss operating system and its functions

1.2.0 Understanding operating systems

- 1.2.1 Discuss different definitions of operating systems
- 1.2.2 Describe the goals of OS

1.3.0 Know about different types of Operating Systems

- 1.3.1 Understand batch systems
- 1.3.2 Understand multiprogramming systems
- 1.3.3 Understand time sharing
- 1.3.4 Understand multiprocessor systems
- 1.3.5 Understand real time systems
- 1.3.6 Discuss DOS, Unix, Windows, and Linux operating systems

1.4.0 Understand Operating System components

- 1.4.1 Discuss process management
- 1.4.2 Discuss main-memory management
- 1.4.3 Discuss file management
- 1.4.4 Discuss I/O management
- 1.4.5 Discuss Networking, protection system and command interpreter system

MODULE II: PROCESS MANAGEMENT

2.1.0 Understand processes and threads

- 2.1.1 Define process
- 2.1.2 Learn about process control block (PCB) and its general structure.
- 2.1.2 Understand the different states of a process with the help of state diagram.
- 2.1.4 Define a thread
- 2.1.5 Compare between threads and processes
- 2.1.6 Understand multi-threading.

2.2.0 Understand CPU scheduling

- 2.2.1 Learn about various schedulers – long, medium and short term- with the help of queuing diagrams.
- 2.2.2 Understand context switching
- 2.2.3 Understand CPU and I/O burst cycles
- 2.2.4 Understand CPU bound and I/O bound processes
- 2.2.5 Understand the difference between preemptive and non-preemptive scheduling
- 2.2.6 Discuss various scheduling criteria
- 2.2.7 Discuss the scheduling algorithms - FCFS, SJF, Priority, and RR scheduling algorithms and their Gantt charts
- 2.2.8 Discuss Multilevel queue and Multilevel feedback queue scheduling

2.3.0 Understand Process synchronization

- 2.3.1 Understand co-operating processes
- 2.3.2 Understand race condition
- 2.3.3 Know about critical section of processes
- 2.3.4 Define Critical Section Problem and its solutions
- 2.3.4 Understand resource allocation graphs
- 2.3.5 Understand deadlock and its causes
- 2.3.6 Discuss deadlock prevention and detection

MODULE III: MEMORY MANAGEMENT

3.1.0 Understand memory management

- 3.1.1 Understand different address bindings – compile, link and run time bindings
- 3.1.2 Understand the difference between logical address and physical address.
- 3.1.3 Understand contiguous memory allocation – fixed partition and variable partition
- 3.1.4 Understand first fit, best fit and worst fit allocation strategies
- 3.1.5 Define fragmentation – internal and external, and suggest solutions
- 3.1.6 Understand paging and paging hardware
- 3.1.7 Discuss segmentation, and the advantages of segmentation over paging

3.2.0 Understand virtual memory

- 3.2.1 Understand the concept of virtual memory
- 3.2.2 Understand demand paging
- 3.2.3 Understand page-faults and how to handle page faults.
- 3.2.4 Discuss page replacement algorithms: FIFO, optimal, LRU,
- 3.2.5 Learn the concept of thrashing

MODULE IV: FILE SYSTEMS AND I/O SYSTEMS

4.1.0 Understand the file system

- 4.1.1 Understand the concept of file and directory
- 4.1.2 Discuss the various file operations

- 4.1.3 Understand the file organization concepts – sequential and indexed
- 4.1.4 Know about different directory structures – single level, two-level, and tree structured directories
- 4.1.5 Know about different allocation methods – contiguous, linked and indexed allocations

4.2.0 Understand I/O systems

- 4.2.1 Understand the concept of I/O systems
- 4.2.2 Discuss the application of I/O interface
- 4.2.3 Discuss the overview of Kernel I/O subsystem
- 4.2.4 Understand the disk structure
- 4.2.5 Discuss the disk scheduling algorithms – FCFS, SSTF, SCAN, C- SCAN
- 4.2.6 Discuss disk management and swap space management

CONTENT DETAILS

MODULE I

Introduction to system software – assembler, loader, compiler, OS
Definition of OS, goals, types of operating systems, Operating system components.

MODULE II

Process management concepts, process, process state, PCB, thread, CPU scheduling concepts, scheduling queues, schedulers, burst cycles, CPU scheduling algorithms, scheduling criteria, process synchronization, critical section problem, deadlock

MODULE III

Memory management concepts, address binding, logical and physical addresses, swapping, contiguous memory allocation, memory allocation methods, fragmentation, paging, segmentation, virtual memory

MODULE IV

File systems – concepts, file operations, directory structure, file system structure, allocation methods
I/O systems – concepts, I/O interface, kernel I/O subsystem, disk structure, scheduling algorithms, management

TEXT BOOK :

1. Operating System Concepts – Silberschatz, Galvin & Gagne (Wiley-6th Edition)

REFERENCE BOOKS:

1. Operating Systems, internals and design principles – William Stallings (Pearson 6th Edition)
2. Operating systems – Er. Rajiv Chopra (S.Chand – Revised Edition)