**Unit 1: Introduction to Operating System**

1. Define an operating system and explain its main objectives.
2. Discuss the evolution and generations of operating systems.
3. What are the different types of operating systems? Explain with examples.
4. List and explain the primary functions of an operating system.

**Unit 2: Operating System Structure**

1. Explain the layered system structure in operating systems.
2. Differentiate between monolithic kernel and microkernel.
3. What is the role of the shell in an operating system?
4. Write a short note on virtual machines.

**Unit 3: Process Management**

1. Define process and describe the process model.
2. Explain process states with a state transition diagram.
3. Write short notes on:
   * Process Control Block (PCB)
   * Operations on processes
4. Differentiate between single-threaded and multi-threaded processes.
5. What is mutual exclusion? Explain Peterson’s solution for mutual exclusion.
6. Explain semaphores with an example. How do they help achieve synchronization?
7. Solve numerical examples based on scheduling algorithms like FCFS, Round Robin, and Shortest Job First.
8. Describe classical IPC problems like the Dining Philosophers Problem.
9. Explain different multithreading models.

**Unit 4: Deadlocks**

1. What are the necessary conditions for a deadlock? Explain with examples.
2. Explain the Banker's Algorithm for deadlock avoidance.
3. How does the Resource Allocation Graph help detect deadlocks?
4. What are the methods to recover from a deadlock?

**Unit 5: Memory Management**

1. Differentiate between logical and physical address spaces.
2. Explain internal and external fragmentation.
3. Describe paging and segmentation with diagrams.
4. Solve numerical problems based on page replacement algorithms (FIFO, LRU, Optimal).
5. Explain demand paging and thrashing.
6. Write short notes on memory allocation techniques.

**Unit 6: Input/Output Device Management**

1. What is direct memory access (DMA), and why is it important?
2. Discuss the different layers of I/O software.
3. Solve numerical examples based on disk scheduling algorithms (FCFS, SSTF, SCAN).
4. Explain memory-mapped I/O and its advantages.

**Unit 7: File System Interface Management**

1. Describe the different file access methods.
2. Explain single-level and hierarchical directory systems with examples.
3. What are access control lists? How are they used for file protection?
4. Write short notes on file attributes and file operations.

**Unit 8: Security Management**

1. What are the common security problems in operating systems?
2. Differentiate between user authentication methods like passwords, biometrics, and OTP.
3. Explain program threats like Trojan horses and buffer overflows.

**Unit 9: Distributed Operating System**

1. What are the advantages of distributed systems over centralized systems?
2. Explain the concept of clock synchronization in distributed systems.
3. Write a short note on message passing in distributed systems.
4. Compare distributed systems with independent PCs.