



**Practice Set**  
**End Semester Examination, Spring- 2026**

**Program: Diploma CSE**

**Semester: IV**

**Course: Operating System**

**Course Code: 3DPCC204**

**Unit -1**

**Section A: 10 marks each**

1. Define Operating System. List and explain any four major functions of an OS.
2. Explain the difference between User Mode and Kernel Mode with a neat diagram.
3. What is a System Call? Explain how it acts as an interface between programs and the hardware.
4. Describe the Layered Structure of an Operating System. Why is it easy to debug?
5. Write short notes on Batch Processing Systems and Time-Sharing Systems.
6. Explain the concept of a Virtual Machine. How does it allow running multiple OS on one hardware?

**Section B: 20 marks each**

1. Compare Multi-Processing Operating System and Multi-Programming Operating System. Explain any five OS Services provided to the user.
2. Explain the Concept of a Virtual Machine. What is a System Call? Describe the mechanism of how a system call transitions the system from User Mode to Kernel Mode using a trap/interrupt.

**Unit - 2**

**Section A: 10 marks each**

7. Define a Process. Draw and explain the various states in a Process State Transition Diagram.
8. What is a Process Control Block? List any four components stored inside it.
9. Define a Thread. List three advantages of using threads over processes.
10. Explain Context Switching. Why is it necessary for multitasking?

11. Differentiate between Pre-emptive and Non-pre-emptive scheduling with examples. Provide one example algorithm for each type.
12. Explain the three types of Schedulers with the help of a proper diagram showing how they manage processes.
13. For the following set of processes,  
 calculate the Average Waiting Time and Average Turnaround Time using the First-Come, First-Served (FCFS) scheduling algorithm.

Process	Arrival Time (AT)	Burst Time (BT)
P1	5	2
P2	0	3
P3	2	1
P4	1	4

**Section B: 20 marks each**

3. Draw the Thread State Diagram and explain its states. Explain the differences between a Process and a Thread.
4. For the process table below:

Calculate the Completion Time (CT), Turnaround Time (TAT), and Waiting Time (WT) for each process using the SRTF scheduling algorithm.

Process	Arrival Time (AT)	Burst Time (BT)
P1	0	8
P2	1	4
P3	2	9
P4	3	5

Define the following terms and provide their standard mathematical formulas used in scheduling:

Arrival Time (AT),  
 Burst Time (BT),  
 Turnaround Time (TAT),  
 Waiting Time (WT),  
 Response Time (RT)

**Unit-3**

**Section A: 10 marks each**

14. Define Critical Section. What are the three requirements a solution must satisfy?
15. What is a Race Condition? Explain with a simple example of a shared counter.
16. For the following set of processes,
17. Describe the Producer-Consumer Problem in brief.
18. Define Deadlock. List the four necessary conditions for a deadlock to occur.
19. Explain Deadlock Prevention. How can we eliminate the "Circular Wait" condition?

**Section B: 20 marks each**

5. Explain Peterson's Solution for synchronization. Describe Dining Philosophers Problem and its impact on the system.
6. Explain Deadlock Avoidance using the Banker's Algorithm. What are the methods for Deadlock Recovery?

**Unit-4**

**Section A: 10 marks each**

21. Explain Logical Address vs. Physical Address. Who performs the translation?
22. Define the following terms: Page, Frame, and Paging. What is the specific role of a Page Table in memory management?
23. Explain the different types of Contiguous Memory Management techniques (Fixed Partitioning vs. Variable Partitioning).
24. Explain Demand Paging. How does the OS handle a Page Fault?
25. What is Virtual Memory? Explain the basic need for Virtual Memory in modern computing.
26. Explain the First-In-First-Out (FIFO) page replacement algorithm with an example.

**Section B: 20 marks each**

7. Explain Contiguous Memory Allocation and the Compaction process. Describe Virtual Memory and its advantages for running large programs.
8. Consider the following page reference string:

1, 2, 3, 4, 2, 1, 5, 6, 2, 1 Assuming the number of available frames is 4, calculate and compare the number of Page Faults using the following algorithms:

1. FIFO (First-In-First-Out)
2. LRU (Least Recently Used)

**Unit-5**

**Section A: 10 marks each**

27. What is Direct Memory Access? Why is it faster for data transfer?
28. Define a File. Explain any four common file operations.
29. Describe the Directory Structure. What is the difference between a single-level and two-level directory?
30. Explain Contiguous Allocation for files. Mention one disadvantage.

**Section B: 20 marks each**

9. Explain Disk Structure with a diagram. Explain Linked and Indexed Allocation for files.
10. Consider a disk with 200 tracks (0-199). The disk head is currently at track 100. Calculate the total head movement using the SSTF, FCFS algorithm for the following request queue: 55, 150, 30, 120, 90. Compare the results.

**Prepared By: Ms. Simran Raj**

**Disclaimer:** - This is a Model Paper. The Question in End term examination will differ from the Model Paper. This Model paper is meant for practice only.