

IMSC (CS) (Old) Sem.-5
Operating System
December-2025

Time : 3.00 Hours]

[Max.Marks : 70

Instructions:

- Write both the Sections in separate answer books.
- Both Sections have equal weightage.
- Draw diagrams wherever necessary.
- Make assumptions wherever necessary.

SECTION – I

Q1. a. Answer the following short questions (Any 4): (4 Marks)

1. What is an Operating System?
2. What is a file?
3. Expand the term "GUI".
4. What is a process?
5. What is an interrupt?

Q1. b. Explain different types of Operating Systems (Batch, Time-sharing, Real-time) in simple words. (7 Marks)

Q2. Answer the following: (12 Marks)

- a. State any six functions of an Operating System.
- b. Explain Process States (Ready, Running, Waiting) in simple language.

OR

Q2. Attempt the following: (12 Marks)

- a. Write any six differences between Hardware and Software.
- b. Explain User Mode and Kernel Mode.

Q3. Answer the following (12 Marks)

- a. Solve the following FCFS scheduling problem:
Processes: P₁, P₂, P₃, P₄
Burst Times: 5, 3, 8, 6
Calculate:
 1. Waiting Time (WT)
 2. Turnaround Time (TAT)
- b. Explain Preemptive and Non-preemptive scheduling with examples.

OR

Q3. Answer the following: (12 Marks)

- a. Round Robin Scheduling (Time Quantum = 4 ms)
Processes: P₁=10 ms, P₂=6 ms, P₃=4 ms
Calculate the Gantt chart.
- b. Define Throughput, Response Time, CPU Utilization.

SECTION - II

Q-4 a. Fill in the blanks (Any FOUR): (4 Marks)

1. _____ occurs when processes wait for each other endlessly.
2. A semaphore is used for _____.
3. Deadlock can be avoided using _____ algorithm.
4. Hold and Wait is a _____ condition.
5. _____ resource allocation graph shows deadlock.

b. Banker's Algorithm (Simple Problem) There are 3 (7 Marks)
processes (P1, P2, P3) and 3 resources (A, B, C). Available = (3, 2, 2)

Process	Max	Allocation
P1	7 5 3	0 1 0
P2	3 2 2	2 0 0
P3	9 0 2	3 0 2

Is the system in a safe state? Show steps.

Q-5 Answer the following: (12 Marks)

- a. What is Paging? Explain with a neat diagram.
- b. Explain Segmentation in simple language.

OR

Q-5 Answer the following: (12 Marks)

- a. What is Internal Fragmentation? Give an example.
- b. Explain FIFO Page Replacement with a small example.

Q6. Answer the following: (12 Marks)

- a. Write short notes:
 - i) File Types
 - ii) Directory Structure Types

b. Disk Scheduling Problem:

- Requests: 40, 10, 22, 2, 50
- Initial head: 20
- Calculate total head movement using:
 - a. FCFS
 - b. SSTF

OR

Q6. Answer the following: (12 Marks)

- a. What is Buffering? Explain with the example.
- b. Explain I/O Devices with any four examples.