Seat No. : _____

DI-102

December-2025

M.Sc. (CA & IT), Sem.-III

DSC-C-IMSCIT-232T : Operating System Concepts

Time : 2:00 Hours] **[Max. Marks : 50**

1. Answer the following questions : **10**
   (a) Define the term operating system and explain instruction execution cycle with suitable diagram.
   (b) Define process and explain five state process model in detail.

   OR

   (a) Explain serial and time-sharing system.
   (b) Differentiate process vs. thread and discuss benefits of multithreading.

2. Answer the following questions : **10**
   (a) What is dining philosophers problem ? Give the solution of dining philosophoers problem using monitor.
   (b) Explain internal and external fragmentation with suitable examples.

   OR

   (a) Discuss general message format with its components and explain message passing using mutual exclusion.
   (b) Explain concept of paging in detail with its advantages and limitations.

3. Answer the following questions : **10**
   (a) Given, the following reference string :
   7,0,1,2,0,3,0,4,2,3,0,3,2,3
   and a memory with 4 frames, calculate the number of page faults and page hits, also calculate ratio of page faults and page hits for the following page replacement algorithms :
   (1) Optimal Page replacement.
   (2) Least Recently Used (LRU).
   (b) Consider the following processes with their arrival times, burst time :

Process	Arrival Time	Burst Time
P1	0	12
P2	2	4
P3	3	6
P4	8	5

Question : Using Shortest Remaining Time First (SRTF) and Round Robin considering Time-Quantum as Two all with preemptive scheduling :

(1) Draw the Gantt chart for the scheduling.

(2) Calculate the following for each process :

- Completion Time (CT)
- Turnaround Time (TAT)
- Waiting Time (WT)
- Compute average Response Time and average Waiting Time.

OR

(b) Consider the following processes with their arrival times, burst time and priorities :

Process	Arrival Time	Burst Time	Priority
P1	2	6	2
P2	1	8	1
P3	0	3	3
P4	4	4	4

Question. Using First Come First Serve (FCFS) and Priority Scheduling (lower priority number = higher priority) all with non-preemptive scheduling :

(1) Draw the Gantt chart for the scheduling.

(2) Calculate the following for each process :

- Completion Time (CT)
- Turnaround Time (TAT)
- Waiting Time (WT)
- Compute average Response Time and average Waiting Time.

4. Answer the following questions : **10**

(a) Explain single and double I/O buffer with its suitable diagram in detail.

(b) Explain file system architecture in detail with suitable diagram.

OR

(a) Explain concept of B-tree with suitable example in detail.

(b) Discuss the case study of Linux operating system.

5. Answer the following questions : (Any **Five**) **10**

(1) Differentiate user mode and kernel mode.

(2) Explain concept of suspended process.

(3) What is virtual memory ?

(4) Define the term spinlocks and semaphore.

(5) What is system call ? Give an example.

(6) List out different file allocation methods.