2025

COMPUTER SCIENCE — MDC

Paper : CC-4

(Operating System)

Full Marks : 75

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

1. Answer ***any five*** questions : 2×5

(a) State the difference between batch processing and time sharing systems.

(b) What is the purpose of context switch?

(c) What is the purpose of Process Control Block (PCB)?

(d) Why is mutual exclusion necessary for shared resources?

(e) What are the necessary conditions for deadlock to occur?

(f) What is the task of mid-term scheduler?

(g) What is virtual memory?

(h) What is the difference between logical and physical address?

Group - A

Answer ***any three*** questions.

2. Explain the various states of a process with proper diagram. 5

3. The main memory size is assumed to be 4KB and the page size is 1KB. If LRU algorithm is used for page replacement, then what pages should reside in main memory at the end for the following sequence of page references?

4, 8, 2, 3, 2, 8, 3, 1, 2, 6, 7. 5

4. Discuss about the Safe State with a suitable example. When does a 'race around' condition occur? 3+2

5. What are interrupts? How are interrupts handled by the operating system? 2+3

6. What is meant by starvation? Why does it happen in scheduling environment and state how to avoid it? 1+2+2

Group - B

Answer ***any five*** questions.

7. (a) Find and explain the average waiting time of the scheduling algorithms for the following process using FCFS, SJF and Round Robin scheduling algorithms.

Process	Burst Time
P1	29
P2	10
P3	7
P4	12
P5	3

(b) State the differences between Preemptive and Non-Preemptive Scheduling. (2+3+3)+2

8. (a) State the differences between Paging and Segmentation.

(b) Explain with illustration how combined Paged Segmentation is used. 3+7

9. (a) Consider a system with five processes P0, P1, P2, P3 and P4 and four resource types A, B, C and D. Suppose that we have the following snapshot of resource allocation state of the system.

	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P0	0	0	1	2	0	0	1	2	1	5	2	0
P1	1	0	0	0	1	7	5	0				
P2	1	3	5	4	2	3	5	6				
P3	0	6	3	2	0	6	5	2				
P4	0	0	1	4	0	6	5	6				

(i) Find the current need matrix.

(ii) Is the system in a safe state (using Banker's safety algorithm)?

(b) Explain the concept of "wait for" graph in deadlock detection. 7+3

10. (a) Discuss Demand Paging with suitable example.

(b) Given memory partition of 100K, 500K, 200K, 300K and 600K in order, if we have processes needing memory of 212K, 417K, 112K and 405K respectively. Which of the following memory allocation technique(s) will be suitable to allocate memory for all the processes?

(i) First-fit

(ii) Best-fit

(iii) Worst-fit. 4+6

11. On a disk with 250 cylinders, numbers 0 to 249, compute the total number of cylinders that the disk arm must move to satisfy all the requests in the disk queue. Assume the last request serviced was at cylinder 67 and the previous request at cylinder 50. The queue of pending request in FIFO order is : 92, 164, 111, 12, 77, 200, 248, 155. Perform the computation for the following scheduling algorithms. 2×5

(a) FIFO

(b) SSTF

(c) SCAN

(d) LOOK

(e) C-SCAN.

12. (a) Explain the critical section problem.

(b) Write the Banker's safety algorithm. 4+6

13. (a) Explain the contiguous, linked and indexed file allocation techniques with suitable example.

(b) Explain the different directory structure. 7+3

14. Write short notes on ***any two*** of the following : 5×2

(a) Round Robin Scheduling

(b) Belady's Anomaly

(c) Distributed Operating System

(d) Interprocess Communication.
