

2026

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) What is the purpose of a system call?
 - (b) What do you understand by System Software? Give examples.
 - (c) What is the requirement of external fragmentation?
 - (d) State the differences between short-term and long-term scheduling.
 - (e) What is virtual memory?
 - (f) What is the difference between logical and physical address?
 - (g) What is the purpose of the Process Control Block (PCB)?
 - (h) What is busy waiting?

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 4 KB and the page size is 1 KB. 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? 5
- 4, 8, 2, 3, 2, 8, 3, 1, 2, 6, 7
4. What are the necessary conditions of deadlock? When does a 'race around' condition occur? 3+2

Please Turn Over

(6855)

5. Consider the given segment table of a system using simple segmentation.

Compute the physical address for each of the logical addresses. Which of the following addresses generate a segment fault?

Segment	Base	Length
0	330	124
1	876	211
2	111	99
3	498	302

- (i) 0, 99 (ii) 2, 78 (iii) 1, 265 (iv) 3, 222 5
6. Describe real time operating systems and its applications. 5

Group - B

Answer *any five* questions.

7. (a) What is a file? State the main features of a file.
 (b) Differentiate between binary semaphore and counting semaphore. Explain how semaphore can be used to solve the readers-writers problem. (2+2)+(3+3)
8. (a) What is a thread? Explain types of threads.
 (b) Consider a paging system with the page table stored in memory.
 (i) If the memory reference takes 200 ns, how long does a paged memory reference take?
 (ii) If we add TLB and 80% of all page-table references are found in TLB then what is the effective memory reference time? (Assume that TLB access time = 20 ns). (2+2)+(2+4)
9. Consider the following set of process, with the length of the CPU burst time given in milliseconds :

Process	Burst Time	Priority
P1	10	3
P2	1	1
P3	2	3
P4	1	4
P5	5	2

The processes are assumed to have arrived in the order P1, P2, P3, P4, P5, all at time 0.

- (a) Draw four Gantt charts that illustrate the execution of these processes using FCFS, SJF, A non preemptive priority (A smaller number implies a higher priority) and RR (quantum) scheduling.
 (b) What is the turnaround time of each process for each of the scheduling algorithm in part (a)?

6+4

10. Explain the contiguous, linked and indexed file allocation techniques with suitable example. 10
11. (a) Distinguish between paging and segmentation.
(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
12. (a) What is Cyclic Redundancy check?
(b) Explain different types of directory structure.
(c) What information is kept in file control block? 2+5+3
13. (a) Explain the critical section problem.
(b) Write the Banker's safety algorithm. 4+6
14. Write notes on (*any two*) : 5×2
(a) Round Robin scheduling
(b) Belady's Anomaly
(c) Distributed operating system
(d) Interprocess Communication.
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