

2026

COMPUTER SCIENCE — HONOURS

Paper : DSCC-7

(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) Define multitasking.
- (b) Differentiate between paging and segmentation.
- (c) Explain aging in scheduling.
- (d) What is known as Belady's anomaly?
- (e) State the purpose of system calls.
- (f) Differentiate between deadlock and starvation.
- (g) Mention the task of Medium-term scheduler.
- (h) Explain in brief about race condition.

Section - A

Answer **any three** questions.

2. (a) Briefly explain :

- (i) Waiting time
- (ii) Turn around time
- (iii) Response time
- (iv) Throughput.

(b) What is file server?

4+1

3. (a) "Longterm scheduler selects a good process mix of I/O bound and CPU bound process." – Justify.

(b) Mention the functions of a dispatcher.

3+2

Please Turn Over

(6850)

4. (a) What do you mean by memory hierarchy?
 (b) How localities of reference become the unavoidable tools to implement memory hierarchy? 3+2
5. Explain the various states of a process with a diagram. 5
6. Write a note on Dining Philosopher problem. 5

Section - B

Answer *any five* questions.

7. (a) What is a process? How is it different from a program?
 (b) Consider the following set of processes with arrival time and burst time :

Process	Arrival Time	Burst Time
P1	0	12
P2	2	8
P3	4	15
P4	6	10

Implement the following scheduling algorithms on the above scenario, draw the corresponding Gantt chart and calculate the average waiting time in each case.

- (i) Shortest Remaining Time First (SRTF)
 (ii) Round Robin (Time Quantum = 4). (1+1)+(4+4)
8. (a) What do you understand by external fragmentation?
 (b) Why does external fragmentation not occur in paging?
 (c) A system has 6 memory partitions of sizes :
 300 KB, 600 KB, 350 KB, 200 KB, 700 KB and 500 KB.
 Processes of sizes :
 212 KB, 417 KB, 112 KB and 426 KB arrive in that order.
 Allocate memory using First Fit, Best Fit and Worst-fit methods. 2+2+6

9. Consider the following page reference string :
 2, 3, 1, 5, 2, 4, 5, 3, 2, 1, 4, 5, 3
 Find the number of page faults, for 3 frames using :
 (a) LRU
 (b) Optimal. 5+5

10. (a) State the Banker's Safety Algorithm.
 (b) Given the following system snapshot :

Process	Allocation (ABCD)	Max (ABCD)	Available (ABCD)
P0	0103	6434	3211
P1	2001	3222	
P2	3021	9126	
P3	2110	4221	
P4	0022	2333	

- (i) Compute the Need matrix.
 (ii) Determine whether the system is in safe state. If safe, find one safe sequence.
 (iii) If process **P1** requests resources **(1, 0, 1, 0)**, determine whether the request can be granted immediately. 2+(1+4+3)
11. (a) Explain counting semaphore and binary semaphore with suitable examples.
 (b) A disk queue contains the following requests :
 98, 180, 37, 127, 14, 124, 65, 67
 Current head position is at 53. Calculate total head movement using
 (i) FCFS
 (ii) SSTF. (2+2)+(3+3)
12. (a) What is virtual memory? Why is it needed?
 (b) Explain the working of Translation Lookaside Buffer (TLB).
 (c) If memory access time is 120 ns and TLB access time is 20 ns with 80% hit ratio, calculate effective memory access time.
 (d) A paging system takes 20 nanoseconds to search TLB and 100% nanoseconds to access memory. What is the effective access time for a 98% hit ratio? 3+3+3+1

Please Turn Over

(6850)

13. (a) Differentiate between protection and security.
(b) Define contiguous file allocation. Mention one advantage and one disadvantage of this method.
(c) Differentiate between linked file allocation and indexed file allocation with suitable examples.

3+3+4

14. Write short notes on (*any two*) :

5×2

- (a) Real-Time Operating System
(b) Critical Section
(c) Inverted Paging
(d) Readers writers problem.
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