

311201**May-2025****BCA (DS) / BCA - II SEMESTER****Introduction to Operating Systems (BCG-102-V/BCA-23-102)**

Time : 3 Hours]

[Max. Marks : 75

Instructions :

1. *It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*
2. *Answer any four questions from Part-B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*

PART-A

1. (a) What is multi programming? (1.5)
- (b) What is dispatcher? (1.5)
- (c) Write in brief the need of Paging? (1.5)
- (d) What is Race condition? (1.5)
- (e) What is the Translation Lookaside Buffer (TLB)? (1.5)
- (f) What is Thrashing? (1.5)
- (g) What is Page fault? (1.5)
- (h) What is the difference between logical and physical address space? (1.5)

- (i) Write the formula for Total Disk Access Time. (1.5)
 (j) What is the role of the file control block (FCB)? (1.5)

PART-B

2. (a) What is a Operating System? Explain its functions in brief. (5)
 (b) Define Process. Explain the various states of a process with help of a diagram. (10)
3. (a) Explain inter-process communication (IPC) mechanisms. (5)
 (b) What is fragmentation? Explain its two types. Write down the techniques for handling fragmentation. (10)
4. (a) Consider the following set of processes, with the length of the CPU burst time given in milliseconds : (10)

	Arrival Time	Burst Time
P ₀	1	5
P ₁	2	3
P ₂	3	8
P ₃	4	4
P ₄	5	6

- (i) Draw two Gantt charts that illustrate the execution of these processes using the following scheduling algorithms: SJF preemptive and non-preemptive both.

- (ii) What is the waiting time of each process for each of these scheduling algorithms?

- (b) Explain segmentation with proper diagram. (5)

5. (a) Consider the following page reference string :
 7, 1, 0, 2, 0, 1, 3, 0, 4, 2, 1, 7, 3, 0, 4. Calculate number of page faults for 3 frames as per following algorithms :
 (i) LRU (ii) Optimal Page replacement. (5)
- (b) Using Banker's algorithm, Find if the system is in safe state : (10)

Process	Max	Allocation	Available
	A, B, C, D	A, B, C, D	A, B, C, D
P ₀	6 0 1 2	4 0 0 1	3 2 1 1
P ₁	2 7 5 0	1 1 0 0	
P ₂	2 3 5 6	1 2 5 4	
P ₃	1 6 5 3	0 6 3 3	
P ₄	1 6 5 6	0 2 1 2	

6. (a) Consider the following for disk scheduling :

Initial head position : 53, Request queue :

98, 183, 37, 122, 14, 124, 65, 67

Calculate total head movement for SCAN and C-SCAN algorithm. (10)

- (b) What is contiguous file allocation method? (5)

7. What is a deadlock? What are the necessary and sufficient conditions of a deadlock? Explain the method of deadlock avoidance and prevention. (15)