

K. J. Somaiya Institute of Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

May – June 2026			
B. Tech Program: Artificial Intelligence & Data Science Scheme III			
Regular Examination: SY Semester: III			
Course Code: AIC403 and Course Name: Operating System			
Date of Exam: 23/05/26	Duration: 02.5 Hours		Max. Marks: 60

Instructions:

- (1) All questions are compulsory.
- (2) Draw neat diagrams wherever applicable.
- (3) Assume suitable data, if necessary.

Q. No.	Question	Max. Marks	CO	BT level																							
Q 1	Solve any two questions out of three: (05 marks each)	10																									
a)	Write a short note on the evolution of OS?		CO1	Un																							
b)	What are zombies and orphans in process management?		CO2	Un																							
c)	Explain critical section problems in detail. Give the three requirements that should be satisfied by a solution to the critical section problem.		CO3	Un																							
Q 2	Solve any two questions out of three. (10 marks each)	10																									
a)	Write short notes on: Memory segmentation		CO4	Un																							
b)	Explain Dining Philosophers Problem.		CO3	Un																							
c)	Explain file allocation methods. Compare contiguous, linked, and indexed allocation.		CO5	Un																							
Q.3	Solve any two questions out of three. (10 marks each)	20																									
a)	Explain the concept of paging and address translation in a paging system with suitable diagrams. Also differentiate between simple paging and virtual memory paging.		CO4	Un																							
b)	Consider the following set of processes with their Arrival Time (AT) , Burst Time (BT) , and Priority (P) . (Assume lower number = higher priority) <table border="1"><thead><tr><th>Process</th><th>Arrival Time</th><th>Burst Time</th><th>Priority</th></tr></thead><tbody><tr><td>P1</td><td>0</td><td>5</td><td>2</td></tr><tr><td>P2</td><td>1</td><td>3</td><td>1</td></tr><tr><td>P3</td><td>2</td><td>4</td><td>3</td></tr><tr><td>P4</td><td>3</td><td>2</td><td>2</td></tr><tr><td>P5</td><td>4</td><td>1</td><td>1</td></tr></tbody></table>		Process	Arrival Time	Burst Time	Priority	P1	0	5	2	P2	1	3	1	P3	2	4	3	P4	3	2	2	P5	4	1	1	CO2
Process	Arrival Time	Burst Time	Priority																								
P1	0	5	2																								
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	1. Apply Non-Preemptive Priority Scheduling: draw Gantt chart, calculate WT, TAT, average WT and average TAT. 2. Apply Preemptive Priority Scheduling: draw Gantt chart, calculate WT, TAT, average WT and average TAT. 3. Compare both algorithms based on response time and starvation possibility.																																																				
c)	Consider the following sequence of page references: 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3 Using 3 Frames: a. Compute page faults using FIFO b. Compute page faults using LRU c. Compute page faults using Optimal		CO4	Ap																																																	
Q.4	Solve any two questions out of three. (10 marks each)	20																																																			
a)	Analyze how semaphores are used to solve the Reader–Writer Problem and examine the synchronization issues between concurrent readers and writers.		CO3	An																																																	
b)	Consider a system with five processes (P0 to P4) and three resource types A, B, and C. The current system state is given below: <table><tr><td></td><td colspan="3">Allocation</td><td colspan="3">Max</td></tr><tr><td>Process</td><td>A</td><td>B</td><td>C</td><td>A</td><td>B</td><td>C</td></tr><tr><td>P0</td><td>0</td><td>1</td><td>2</td><td>2</td><td>2</td><td>3</td></tr><tr><td>P1</td><td>1</td><td>0</td><td>1</td><td>3</td><td>1</td><td>2</td></tr><tr><td>P2</td><td>1</td><td>2</td><td>0</td><td>2</td><td>3</td><td>1</td></tr><tr><td>P3</td><td>0</td><td>1</td><td>1</td><td>1</td><td>2</td><td>2</td></tr><tr><td>P4</td><td>2</td><td>0</td><td>0</td><td>3</td><td>1</td><td>1</td></tr></table> Available Resources=1 2 1 1. Compute the Need Matrix. 2. Check whether the system is in a safe state. 3. If safe, determine a safe sequence. 4. Suppose process P0 requests (1, 0, 1): Can the request be granted immediately? Justify using Banker’s Algorithm.		Allocation			Max			Process	A	B	C	A	B	C	P0	0	1	2	2	2	3	P1	1	0	1	3	1	2	P2	1	2	0	2	3	1	P3	0	1	1	1	2	2	P4	2	0	0	3	1	1		CO4	Ap
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c)	A disk contains 200 tracks (0-199). Request queue contains track no. 95, 180, 34, 119, 11, 123, 62, 70, 150, 28 Initial head position = 50 Answer the following: 1. Perform disk scheduling using SSTF, SCAN, and C-SCAN algorithms and show the complete seek sequence. 2. Calculate the total head movement for each algorithm. 3. Compare the performance of SSTF, SCAN, and C-SCAN.		CO6	Ap
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