

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

May – June 2025

B. Tech Program: **Artificial Intelligence & Data Science Scheme: IIB**
KT Examination: **SY Semester: IV**

Course Code: **AIC404** and Course Name: **Operating System**

Date of Exam: 26/05/25

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.

(2) Draw neat diagram.																					
(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)	Define Operating system. List types of Operating System.		CO1	Un																	
b)	What is the Critical section? State four conditions to solve critical section problems.		CO3	Un																	
c)	List and explain types of schedulers?		CO2	Un																	
Q 2	Solve any two questions out of three: (05 marks each)	10																			
a)	What is DMA? Explain in detail with a suitable diagram.		CO6	Un																	
b)	State and explain Memory management techniques.		CO4	Un																	
c)	Explain objectives of file management.		CO5	Un																	
Q.3	Solve any two questions out of three. (10 marks each)	20																			
a)	What is a system call? List and explain process management system call with examples.		CO1	Un																	
b)	For the given reference string: 8, 0, 2, 1, 0, 4, 0, 3, 1, 3, 0, 1, 5, 6, 4 <ul style="list-style-type: none">Calculate the number of page faults using the FIFO page replacement algorithmCalculate the number of page faults using the LRU page replacement algorithm(Consider Number of Frames: 3)		CO4	Ap																	
c)	<table border="1"><thead><tr><th>Process</th><th>Arrival Time</th><th>Burst Time</th></tr></thead><tbody><tr><td>P1</td><td>0</td><td>5</td></tr><tr><td>P2</td><td>2</td><td>4</td></tr><tr><td>P3</td><td>4</td><td>3</td></tr><tr><td>P4</td><td>3</td><td>5</td></tr><tr><td>P5</td><td>4</td><td>6</td></tr></tbody></table>		Process	Arrival Time	Burst Time	P1	0	5	P2	2	4	P3	4	3	P4	3	5	P5	4	6	CO2
Process	Arrival Time	Burst Time																			
P1	0	5																			
P2	2	4																			
P3	4	3																			
P4	3	5																			
P5	4	6																			

May – June 2025

B. Tech Program: **Artificial Intelligence & Data Science** Scheme: **IIB**

KT Examination: **SY** Semester: **IV**

Course Code: **AIC404** and Course Name: **Operating System**

Date of Exam: 26/05/25

Duration: 02.5 Hours

Max. Marks: 60

	Apply i) First-Come-First-Serve (FCFS) ii) Preemptive Shortest Job First algorithms to the following set of processes and compare their performance. <ul style="list-style-type: none">Construct Gantt chartsCalculate Completion Time (CT), Turnaround Time (TAT), and Waiting Time (WT) for each process																																																																									
Q.4	Solve any two questions out of three. (10 marks each)	20																																																																								
a)	What is the Reader-Writer Problem? Explain the solution to the reader-writer problem using a semaphore.		CO3	Un																																																																						
b)	Consider the following snapshot of a system: <table><tr><th></th><th colspan="3">Allocation Matrix</th><th colspan="3">Max Matrix</th><th colspan="3">Available Matrix</th></tr><tr><th></th><th>A</th><th>B</th><th>C</th><th>A</th><th>B</th><th>C</th><th>A</th><th>B</th><th>C</th></tr><tr><td>P0</td><td>0</td><td>1</td><td>0</td><td>7</td><td>5</td><td>3</td><td>3</td><td>3</td><td>2</td></tr><tr><td>P1</td><td>2</td><td>0</td><td>0</td><td>3</td><td>2</td><td>2</td><td></td><td></td><td></td></tr><tr><td>P2</td><td>3</td><td>0</td><td>2</td><td>9</td><td>0</td><td>2</td><td></td><td></td><td></td></tr><tr><td>P3</td><td>2</td><td>1</td><td>1</td><td>2</td><td>2</td><td>2</td><td></td><td></td><td></td></tr><tr><td>P4</td><td>0</td><td>0</td><td>2</td><td>4</td><td>3</td><td>3</td><td></td><td></td><td></td></tr></table> <p>Answer the following questions using the banker's algorithm:</p> <ol style="list-style-type: none">Calculate Need a matrix?Is the system in a safe stateIf a request from process P_1 arrives for (1, 2, 2), can the request be granted immediately.		Allocation Matrix			Max Matrix			Available Matrix				A	B	C	A	B	C	A	B	C	P0	0	1	0	7	5	3	3	3	2	P1	2	0	0	3	2	2				P2	3	0	2	9	0	2				P3	2	1	1	2	2	2				P4	0	0	2	4	3	3					CO4	Ap
	Allocation Matrix			Max Matrix			Available Matrix																																																																			
	A	B	C	A	B	C	A	B	C																																																																	
P0	0	1	0	7	5	3	3	3	2																																																																	
P1	2	0	0	3	2	2																																																																				
P2	3	0	2	9	0	2																																																																				
P3	2	1	1	2	2	2																																																																				
P4	0	0	2	4	3	3																																																																				
c)	Perform the analysis FCFS, SSTF, SCAN, CLOOK for the following sequence of disk track requests: 37,128,100,176,137,51,20,54,125. Assume that the disk head is initially positioned over track 100 and is moving in the direction of decreasing track number.		CO6	Ap																																																																						
