

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

*Intp. Ang* May-June 2025

(B. Tech / M. Tech.) Program: Information Technology Scheme III II B.

*Symp* - Regular Examination: SY Semester: IV

Course Code: ITC403 and Course Name: Operating System

Date of Exam: 01 - 08 + 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.

Q. No.	Question	Max. Marks	CO	BT level																																																																					
Q 1	Solve any <b>two</b> questions out of three: (05 marks each)	10																																																																							
a)	Explain the services provided by the Operating System.		CO1	U																																																																					
b)	List and explain types of thread.		CO 2	U																																																																					
c)	Define resource allocation. Consider the following resource allocation of the system.  <table style="margin-left: 20px;"> <thead> <tr> <th rowspan="2">PID</th> <th colspan="3">Allocation</th> <th colspan="3">Max</th> <th colspan="3">Available</th> </tr> <tr> <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> </thead> <tbody> <tr> <td>P1</td> <td>1</td> <td>1</td> <td>2</td> <td>4</td> <td>3</td> <td>3</td> <td>2</td> <td>1</td> <td>0</td> </tr> <tr> <td>P2</td> <td>2</td> <td>1</td> <td>2</td> <td>3</td> <td>2</td> <td>2</td> <td></td> <td></td> <td></td> </tr> <tr> <td>P3</td> <td>0</td> <td>2</td> <td>0</td> <td>4</td> <td>4</td> <td>2</td> <td></td> <td></td> <td></td> </tr> <tr> <td>P4</td> <td>0</td> <td>6</td> <td>3</td> <td>2</td> <td>6</td> <td>3</td> <td></td> <td></td> <td></td> </tr> <tr> <td>P5</td> <td>1</td> <td>1</td> <td>2</td> <td>2</td> <td>2</td> <td>3</td> <td></td> <td></td> <td></td> </tr> </tbody> </table> Answer the following using Banker's algorithm. <ol style="list-style-type: none"> <li>1. Determine if the system is in safe state or not? (2M)</li> <li>2. If request P1 arrives for (1,1,0) resources, can the required resource be granted immediately? (2M)</li> </ol>	PID	Allocation			Max			Available			A	B	C	A	B	C	A	B	C	P1	1	1	2	4	3	3	2	1	0	P2	2	1	2	3	2	2				P3	0	2	0	4	4	2				P4	0	6	3	2	6	3				P5	1	1	2	2	2	3					CO 3	U
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P5	1	1	2	2	2	3																																																																			
Q 2	Solve any <b>two</b> questions out of three: (05 marks each)	10																																																																							
a)	Illustrate the significance of two level page table with examples.		CO 4	U																																																																					
b)	List and explain file system structure.		CO 5	U																																																																					
c)	Explain the advantages and disadvantages of open source operating system.		CO 6	U																																																																					

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Q.3	Solve any <b>two</b> questions out of three. (10 marks each)	20																	
			CO 1	U															
a)	List and explain in detail various data structures used in OS.		CO2	AP															
	Consider the following process request and calculate ATAT and AWT by using FCFS, SJF (Preemptive) and RR (quantum = 2) scheduling algorithm.																		
	<table border="1"> <thead> <tr> <th>PID</th> <th>Arrival Time</th> <th>Burst Time</th> </tr> </thead> <tbody> <tr> <td>P1</td> <td>0</td> <td>7</td> </tr> <tr> <td>P2</td> <td>1</td> <td>4</td> </tr> <tr> <td>P3</td> <td>3</td> <td>3</td> </tr> <tr> <td>P4</td> <td>5</td> <td>1</td> </tr> <tr> <td>P5</td> <td>7</td> <td>5</td> </tr> </tbody> </table>		PID	Arrival Time	Burst Time	P1	0	7	P2	1	4	P3	3	3	P4	5	1	P5	7
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P4	5	1																	
P5	7	5																	
c)	What is semaphore and its type? How is the classic synchronization problem - Dining Philosopher problem solved using semaphore?	20	CO 3	AP															
Q.4	Solve any <b>two</b> questions out of three. (10 marks each)		CO 4	U															
a)	<p>Explain FIFO and LRU page replacement algorithms and find page fault and hit rate by using following example</p> <p>A computer memory with a total of three physical pages, and page reference sequence: 1, 2, 3, 2, 1, 4, 3, 5, 6, 4, 3, 5, 3, 5, 6, 7, 2, 1, 5, 7.</p>		CO 5	U															
b)	Differentiate between LOOK and C-LOOK. Suppose the requests to be addressed are 82, 140, 170, 190, 70, 35, and 20. The Head pointer starts at 50, and it is also given that the disk arm should move "towards the larger value". Find the total seek time using SCAN, LOOK and C-LOOK.		CO6	U															
c)	Compare different types of Operating system with its advantages.																		

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