



**First Semester MCA Degree Examination, Dec.2025/Jan.2026**  
**Operating Systems**

Time: 3 hrs.

Max. Marks: 100

Note- 1. Answer any FIVE full questions, choosing ONE full question from each module.  
2. M : Marks , L: Bloom's level , C: Course outcomes.

Module – 1			M	L	CO																																																																																										
Q.1	a.	Define an Operating System. Discuss various Computing Environments.	08	L1	CO1																																																																																										
	b.	Define Process. Explain Process Control Block (PCB). Discuss various states of process with state transition diagram.	12	L1	CO2																																																																																										
OR																																																																																															
Q.2	a.	Define layered architecture. Explain the layered architecture of Unix operating System.	10	L1	CO1																																																																																										
	b.	Explain Inter-process Communication in detail.	10	L2	CO2																																																																																										
Module – 2																																																																																															
Q.3	a.	Explain Peterson algorithm for 2-Process solution	10	L2	CO2																																																																																										
	b.	The processes with given BT, determine AWT and ATT for FCFS,SJF (Non Pre-emptive) , Priority(High Value High Priority) and RR with QT=2.	10	L3	CO2																																																																																										
		<table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th>Processes</th> <th>P1</th> <th>P2</th> <th>P3</th> <th>P4</th> <th>P5</th> </tr> </thead> <tbody> <tr> <td>BT</td> <td style="text-align: center;">2</td> <td style="text-align: center;">1</td> <td style="text-align: center;">8</td> <td style="text-align: center;">4</td> <td style="text-align: center;">5</td> </tr> <tr> <td>Priority</td> <td style="text-align: center;">2</td> <td style="text-align: center;">1</td> <td style="text-align: center;">4</td> <td style="text-align: center;">2</td> <td style="text-align: center;">3</td> </tr> </tbody> </table>	Processes	P1	P2	P3	P4	P5	BT	2	1	8	4	5	Priority	2	1	4	2	3																																																																											
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Q.4	a.	Define semaphore. Explain operations on semaphore.	05	L1	CO2																																																																																										
	b.	Explain Reader-Writer problem using semaphore.	05	L2	CO2																																																																																										
	c.	Illustrate Dining philosopher problem using semaphore with an example.	10	L3	CO2																																																																																										
Module – 3																																																																																															
Q.5	a.	Illustrate Banker's Algorithm for safety and Resource-Request for deadlock avoidance along with data structures used in it with an example.	10	L3	CO2																																																																																										
	b.	Define Deadlock. Explain deadlock prevention strategies.	10	L1	CO2																																																																																										
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Q.6	a.	Five processes with 4 resource type A=3 , B=17 , C=16 , D=12 For the problem determine need matrix and compute safe sequence	10	L3	CO2																																																																																										
			<table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Process</th> <th colspan="4">Allocation</th> <th colspan="4">Max</th> <th colspan="4">Available</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> </tr> </thead> <tbody> <tr> <td>P0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">2</td> <td style="text-align: center;">1</td> <td style="text-align: center;">0</td> <td style="text-align: center;">1</td> <td style="text-align: center;">5</td> <td style="text-align: center;">2</td> <td style="text-align: center;">0</td> </tr> <tr> <td>P1</td> <td style="text-align: center;">1</td> <td style="text-align: center;">2</td> <td style="text-align: center;">3</td> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> <td style="text-align: center;">6</td> <td style="text-align: center;">5</td> <td style="text-align: center;">2</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>P2</td> <td style="text-align: center;">1</td> <td style="text-align: center;">3</td> <td style="text-align: center;">6</td> <td style="text-align: center;">5</td> <td style="text-align: center;">2</td> <td style="text-align: center;">3</td> <td style="text-align: center;">6</td> <td style="text-align: center;">6</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>P3</td> <td style="text-align: center;">0</td> <td style="text-align: center;">6</td> <td style="text-align: center;">3</td> <td style="text-align: center;">2</td> <td style="text-align: center;">0</td> <td style="text-align: center;">6</td> <td style="text-align: center;">5</td> <td style="text-align: center;">2</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>P4</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">1</td> <td style="text-align: center;">4</td> <td style="text-align: center;">0</td> <td style="text-align: center;">6</td> <td style="text-align: center;">5</td> <td style="text-align: center;">6</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Process	Allocation				Max				Available				A	B	C	D	A	B	C	D	A	B	C	D	P0	0	1	1	0	0	2	1	0	1	5	2	0	P1	1	2	3	1	1	6	5	2					P2	1	3	6	5	2	3	6	6					P3	0	6	3	2	0	6	5	2					P4	0	0	1	4	0	6	5	6						
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b.	Explain Deadlock detection for Single instance and Multiple instances.		10	L2	CO2																																																																																										

Module – 4

Q.7	a.	Illustrate Paging with Hardware and TLB.	10	L3	CO3
	b.	Explain Segmentation with a neat diagram.	05	L2	CO3
	c.	Explain different strategies used in contiguous memory allocation.	05	L2	CO3

OR

Q.8	a.	Elaborate Steps involved in handling page fault with neat diagram.	08	L3	CO3
	b.	For the following page reference string: 2 3 2 1 5 2 4 5 3 2 5 2 How many page faults would occur in FIFO, LRU and Optimal technique with frame numbers as 3.	12	L2	CO3

Module – 5

Q.9	a.	Discuss on the File Access Methods in details	10	L2	CO3
	b.	Discuss the various Directory structures.	10	L2	CO3

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OR

Q.10	a.	Define File. Explain the various operations performed on a file.	08	L1	CO3
	b.	Discuss three secondary storage allocation methods.	12	L2	CO3

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