

First Semester MCA Degree Examination, June/July 2026
Operating System

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	C																		
Q.1	a.	What is an Operating System? Explain the various services of the Operating system.	10	L2	CO1																		
	b.	What is System Call? Explain the different types of System calls.	10	L2	CO1																		
OR																							
Q.2	a.	Illustrate the abstract view of the components of a Computer System with a neat diagram.	10	L2	CO1																		
	b.	Discuss the essential properties of batch, real-time and distributing Operating system.	10	L2	CO1																		
Module – 2																							
Q.3	a.	Consider the following set of processes with CPU burst time (in msec). <table border="1"><thead><tr><th>Process</th><th>Burst Time</th><th>Priority</th></tr></thead><tbody><tr><td>P1</td><td>10</td><td>3</td></tr><tr><td>P2</td><td>1</td><td>1</td></tr><tr><td>P3</td><td>2</td><td>4</td></tr><tr><td>P4</td><td>1</td><td>5</td></tr><tr><td>P5</td><td>5</td><td>2</td></tr></tbody></table> i) Draw a Gantt chart and consider time/ quantum of 4 milliseconds ii) Compare the waiting time for the above process using FCFS, SJF and Priority scheduling algorithm.	Process	Burst Time	Priority	P1	10	3	P2	1	1	P3	2	4	P4	1	5	P5	5	2	10	L3	CO2
Process	Burst Time	Priority																					
P1	10	3																					
P2	1	1																					
P3	2	4																					
P4	1	5																					
P5	5	2																					
	b.	Define a Process. Explain process states with a neat diagram.	10	L2	CO1																		
OR																							
Q.4	a.	Consider the following set of processes with CPU burst time (in msec). <table border="1"><thead><tr><th>Process</th><th>Burst Time</th><th>Arrival Time</th></tr></thead><tbody><tr><td>P1</td><td>1</td><td>8</td></tr><tr><td>P2</td><td>2</td><td>4</td></tr><tr><td>P3</td><td>3</td><td>9</td></tr><tr><td>P4</td><td>4</td><td>5</td></tr></tbody></table> i) Draw a Gantt chart and consider time/ quantum of 4 milliseconds ii) Compare the waiting time for the above process using FCFS, SJF(PREEMPTIVE) and RR scheduling algorithm.	Process	Burst Time	Arrival Time	P1	1	8	P2	2	4	P3	3	9	P4	4	5	10	L3	CO2			
Process	Burst Time	Arrival Time																					
P1	1	8																					
P2	2	4																					
P3	3	9																					
P4	4	5																					
	b.	What is a critical Section? Explain the Reader's-Writer's problem and write the solution using semaphore.	10	L2	CO2																		

1 of 2

Module – 3

Q.5	a.	What is a deadlock? What are the necessary conditions for a deadlock to occur?	10	L2	CO2																								
	b.	Consider the following snapshot of the system <table><tr><th>Process</th><th>Allocation</th><th>Max</th><th>Available</th></tr><tr><td></td><td>A B C</td><td>A B C</td><td>A B C</td></tr><tr><td>P0</td><td>0 1 0</td><td>7 5 3</td><td rowspan="5">3 3 2</td></tr><tr><td>P1</td><td>2 0 0</td><td>3 2 2</td></tr><tr><td>P2</td><td>3 0 2</td><td>9 0 2</td></tr><tr><td>P3</td><td>2 1 1</td><td>2 2 2</td></tr><tr><td>P4</td><td>0 0 2</td><td>4 3 3</td></tr></table> Answer the following question using Banker's Algorithm i) Construct a need matrix ii) Is the system in a safe state? iii) If a process p1 makes the request (1,0,2)? Can the request be granted immediately?	Process	Allocation	Max	Available		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	10	L3	CO2
Process	Allocation	Max	Available																										
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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																											

OR

Q.6	a.	Explain the various steps to recover from a deadlock with example	10	L2	CO2																								
	b.	Consider the following snapshot of the system Answer the following question using Banker's Algorithm i) Construct a need matrix ii) Is the system in a safe state? iii) If a process p1 makes the request (1,1,0,0) can the request be granted immediately <table><tr><th>Process</th><th>Allocation</th><th>Max</th><th>Available</th></tr><tr><td></td><td>A B C D</td><td>A B C D</td><td>A B C D</td></tr><tr><td>P0</td><td>2 0 0 1</td><td>4 2 1 2</td><td rowspan="5">3 3 2 1</td></tr><tr><td>P1</td><td>3 1 2 1</td><td>5 2 5 2</td></tr><tr><td>P2</td><td>2 1 0 3</td><td>2 3 1 6</td></tr><tr><td>P3</td><td>1 3 1 2</td><td>1 4 2 4</td></tr><tr><td>P4</td><td>1 4 3 2</td><td>3 6 6 5</td></tr></table>	Process	Allocation	Max	Available		A B C D	A B C D	A B C D	P0	2 0 0 1	4 2 1 2	3 3 2 1	P1	3 1 2 1	5 2 5 2	P2	2 1 0 3	2 3 1 6	P3	1 3 1 2	1 4 2 4	P4	1 4 3 2	3 6 6 5	10	L2	CO2
Process	Allocation	Max	Available																										
	A B C D	A B C D	A B C D																										
P0	2 0 0 1	4 2 1 2	3 3 2 1																										
P1	3 1 2 1	5 2 5 2																											
P2	2 1 0 3	2 3 1 6																											
P3	1 3 1 2	1 4 2 4																											
P4	1 4 3 2	3 6 6 5																											

Module – 4

Q.7	a.	What is paging? Explain the paging hardware with a neat diagram.	10	L2	CO3
	b.	What is demand paging? Explain how demand paging can be implemented.	10	L2	CO3

OR

Q.8	a.	Discuss the steps involved in handling page faults with a diagram.	10	L2	CO3
	b.	Explain Page-Replacement in detail.	10	L2	CO3

Module – 5

Q.9	a.	Define a file. List all the attributes of a file.	10	L2	CO3
	b.	Discuss the different file operations that can be performed on a file.	10	L2	CO3

OR

Q.10	a.	Explain the various directory structures with a neat diagram.	10	L2	CO3
	b.	Explain the following file -access methods i) Sequential access ii) Direct access	10	L2	CO3
