USN | | | | | | | | | | MMC104

First Semester MCA Degree Examination, June/July 2025
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 Operating System? Explain the abstract view of the components of computer system with a neat diagram.	10	L2	CO1
	b.	Explain different type of services provided by the operating system.	10	L2	CO1
		OR			
Q.2	a.	Define a system call. How does system calls work? with neat diagram. Explain the types of system calls.	10	L2	CO1
	b.	What is inter process communication? Describe the implementation of shared memory and message passing model.	10	L2	CO1
		Module – 2			
Q.3	a.	Is CPU scheduling necessary? Discuss the five different scheduling criteria used in computing the scheduling mechanisms.	06	L2	CO2
	b.	Consider the five processes arrive at time 0 in the order given, with the length of CPU Burst given in milliseconds. Consider the FCFS, SJF, non-preemptive priority (a larger priority number implies a higher priority), and RR (quantum = 2) algorithms. Draw the Gantt chart for each of the scheduling. Determine average waiting time and average turnaround time for each of the scheduling algorithm. Which algorithm would give the minimum waiting time?	14	L3	CO2

Process	Burst Time	Priority
P1	2	2
P2	1	1
P3	8	4
P4	4	2
P5	5	3

		OR			
Q.4	a.	Define a semaphore. Outline the wait () and signal () operations and explain its usage and implementation.	10	L2	CO2
	b.	What is dining philosopher problem? Explain how semaphore is used as its solution along with necessary code.	10	L3	CO2
		Module – 3			
Q.5	a.	What is deadlock? What are the necessary conditions for a deadlock to occur?	05	L2	CO2
	b.	With a neat diagram explain Resource allocation graph.	07	L2	CO2
	c.	What is wait-for graph? Why it is necessary? Explain its usage for the Deadlock detection of a Single instance and Several instances of a Resource type.	08	L2	CO2

				OR											12	L2	CO2

Q.6	a.	Consider the following Snapshot of a system: Answer the following questions using Banker's algorithm.														12	L2	CO2

Table inside Q.6:

	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P0	0	0	1	2	0	0	1	2	1	5	2	0
P1	1	0	0	0	1	7	5	0				
P2	1	3	5	4	2	3	5	6				
P3	0	6	3	2	0	6	5	2				
P4	0	0	1	4	0	6	5	6				

    (i)   What is the content of matrix need?

    (ii) Is the system in a safe state? If yes, give the safe sequence.

    (iii) If the request from process P1 arrives for (0, 4, 2, 0), can the request be granted immediately.

	b.	Discuss the various approaches used for deadlock recovery.	08	L2	CO2

Module – 4					
Q.7	a.	What is segmentation? Explain the segmentation hardware with a neat diagram.	07	L2	CO3
	b.	What is paging? With neat diagram explain paging hardware with TLB.	08	L3	CO3
	c.	Explain the difference between internal fragmentation and external fragmentation.	05	L2	CO3
OR					
Q.8	a.	What is demand paging? Explain the steps in handling the page fault with a neat diagram.	10	L2	CO3
	b.	Consider the following page reference string: 7,0,1,2,0,3,0,4,2,3,0,3,2,1,2,0,1,7,0,1 with three frames. How many page faults would occur under i) LRU ii) FIFO iii) Optimal Algorithms. Which algorithm is the best algorithm for the given case.	10	L3	CO3
Module – 5					
Q.9	a.	What is file? Explain briefly the various operations performed on files.	05	L2	CO3
	b.	Explain the various file access methods.	06	L2	CO3
	c.	List and explain various types of directory structures with neat diagram.	09	L2	CO3
OR					
Q.10	a.	List and explain different file allocation methods.	10	L2	CO3
	b.	What do you mean by free space list? With suitable example, explain the methods of free space list implementation.	10	L2	CO3

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