CBCS SCHEME

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MMC104

First Semester MCA Degree Examination, Dec.2024/Jan.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 the significance of Operating System? Illustrate various services provided by the Operating System.	10	L2	CO1
	b.	What is the purpose of system calls? Describe different types of system calls used in Operating system with examples.	10	L2	CO1
		OR			
Q.2	a.	Illustrate the following operating system architectures with a neat diagram: (i) Microkernel (ii) Layered	10	L2	CO1
	b.	Illustrate with a neat diagram various states of process. Also discuss the significance of process control block (PCB).	10	L2	CO1
		Module – 2			
Q.3	a.	"CPU scheduling ensures proper execution of processes". Justify. Illustrate different scheduling criteria used by CPU scheduling algorithms.	10	L2	CO1
	b.	Discuss how dining philosophers problem is solved using semaphores.	10	L3	CO1
		OR			
Q.4	a.	What do you mean by Critical Section Problem? Explain the solution to the critical-section problem using mutex locks.	10	L2	CO1
	b.	Consider the set of processes with Arrival Time, CPU burst time (in milliseconds) and priority as shown below. (Lower number represents higher priority). Draw the Gantt Chart and calculate the Average waiting time and Average Turnaround time using 1) SJF Scheduling (Non Pre-emptive) 2) Priority Scheduling (Non Pre-emptive) (Note: Consider Arrival Time for both algorithms.)	10	L3	CO1

Process	Arrival Time	Burst Time	Priority
P1	0	10	3
P2	1	1	1
P3	2	2	4
P4	3	1	5
P5	4	5	2

		Module – 3	M	L	C
Q.5	a.	Illustrate deadlocks with their necessary conditions.	10	L2	CO2
	b.	Describe the working principles of Banker's algorithm for the following snapshot and find either the system is in safe state or not.	10	L2	CO2
		OR			
Q.6	a.	Discuss deadlock detection with a neat diagram.	10	L2	CO2
	b.	Explain different methods used for recovering from a deadlock in an operating system.	10	L2	CO2
		Module – 4			
Q.7	a.	Describe in detail the concept of Paging with a neat diagram.	10	L3	CO3
	b.	Differentiate between internal and external fragmentation.	10	L2	CO3
		OR			
Q.8	a.	Consider the page reference string: 1,0,7,1,0,2,1,2,3,0,3,2,4,0,3,6,2,1 for a memory with three frames. Determine the number of page faults using the FIFO, Optimal, and LRU replacement algorithms. Which algorithm is most efficient?	10	L3	CO3
	b.	Interpret the concepts of demand paging with neat diagram.	10	L2	CO3
		Module – 5			
Q.9	a.	Illustrate the following access methods. i) Sequential access ii) Direct access	08	L2	CO3
	b.	Illustrate in detail the various operations performed on a file.	08	L2	CO3
	c.	Explain the following: i) Bit vector ii) Linked list	04	L2	CO3
		OR			
Q.10	a.	Illustrate various levels of directory structures.	10	L2	CO3
	b.	List the different file allocation methods and explain any two methods in detail.	10	L2	CO3

	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P_0	0	0	1	2	0	0	1	2	1	5	2	0
P_1	1	0	0	0	1	7	5	0				
P_2	1	3	5	4	2	3	5	6				
P_3	0	6	3	2	0	6	5	2				
P_4	0	0	1	4	0	6	5	6				

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