U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

January / February 2025 Semester End Main Examinations

Programme: B.E. **Semester: III**
Branch: Information Science and Engineering **Duration: 3 hrs.**
Course Code: 23IS3PCOPS /22IS3PCOPS /19IS3ESOPS **Max Marks: 100**
Course: Operating Systems

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

			CO	PO	Marks
		UNIT - I			
1	a)	Explicate the components of computer system. Elaborate on user's view and system view of the operating system.	CO1	PO1	**10**
	b)	Operating system makes one set of services available to users and another set for ensuring the efficient operation of the system. Describe the various operating system services belonging to both these sets.	CO1	PO1	**10**
		OR			
2	a)	Explore the different types of computing environments.	CO1	PO1	**10**
	b)	What are interrupts? Provide details on the basic mechanism to handle interrupts.	CO1	PO1	**10**
		UNIT - II			
3	a)	Elaborate on Process states and Process Control Block.	CO2	PO1	**10**
	b)	Using semaphores for synchronization, provide the solution for Bounded-Buffer problem and Readers-Writers problem. Write relevant code snippets.	CO4	PO2	**10**
		OR			
4	a)	Exchange of information takes place by means of messages to provide Inter Process communication. In this context, explicate the different approaches in message passing systems.	CO2	PO1	**12**
	b)	Describe Peterson's solution and Mutex locks with respect to critical section problem.	CO4	PO2	**8**
		UNIT - III			
5	a)	Consider the following set of processes, with the length of the CPU burst time given in milliseconds:	CO3	PO2	**12**

			<table><tr><th>Process</th><th>Burst Time</th><th>Priority</th></tr><tr><td>P_1</td><td>2</td><td>2</td></tr><tr><td>P_2</td><td>1</td><td>1</td></tr><tr><td>P_3</td><td>8</td><td>4</td></tr><tr><td>P_4</td><td>4</td><td>2</td></tr><tr><td>P_5</td><td>5</td><td>3</td></tr></table> The processes are assumed to have arrived in the order P_1, P_2, P_3, P_4, P_5, all at time 0. a. Draw four Gantt charts that illustrate the execution of these processes using the following scheduling algorithms: FCFS, SJF, nonpreemptive priority (a larger priority number implies a higher priority), and RR (quantum = 2). b. What is the turnaround time of each process for each of the scheduling algorithms in part a? c. What is the waiting time of each process for each of these scheduling algorithms? d. Which of the algorithms results in the minimum average waiting time (over all processes)?			
	b)	Mention the necessary conditions for deadlock situation to arise. Explain how deadlock can be prevented based on these conditions.	*CO2*	*PO1*	**8**
		OR			
6	a)	Consider the following snapshot of a system: <table><tr><th></th><th>Allocation A B C D</th><th>Max A B C D</th><th>Available A B C D</th></tr><tr><td>T_0</td><td>0 0 1 2</td><td>0 0 1 2</td><td>1 5 2 0</td></tr><tr><td>T_1</td><td>1 0 0 0</td><td>1 7 5 0</td><td></td></tr><tr><td>T_2</td><td>1 3 5 4</td><td>2 3 5 6</td><td></td></tr><tr><td>T_3</td><td>0 6 3 2</td><td>0 6 5 2</td><td></td></tr><tr><td>T_4</td><td>0 0 1 4</td><td>0 6 5 6</td><td></td></tr></table> Answer the following questions using the banker's algorithm: a. What is the content of the matrix Need? b. Is the system in a safe state? c. If a request from thread T_1 arrives for (0,4,2,0), can the request be granted immediately?	*CO4*	*PO2*	**10**
	b)	Highlight on Multilevel queue scheduling and Multilevel feedback queue scheduling.	*CO3*	*PO2*	**10**
		UNIT - IV			
7	a)	Provide details on memory mapping mechanism using Segmentation with suitable illustration.	*CO2*	*PO1*	**10**
	b)	Consider the following page reference string: 7, 2, 3, 1, 2, 5, 3, 4, 6, 7, 7, 1, 0, 5, 4, 6, 2, 3, 0, 1 Assuming demand paging with three frames, how many page faults would occur for the following replacement algorithms?	*CO3*	*PO2*	**10**

			• LRU replacement • FIFO replacement • Optimal replacement Which algorithm results in fewest page faults?			
			OR			
	8	a)	With a suitable depiction, write the sequence of steps involved in demand paging.	*CO4*	*PO2*	**8**
		b)	With suitable diagrammatic illustrations (if any), describe the following terms (i) Shared pages (ii) Hierarchical paging (iii) Thrashing	*CO2*	*PO1*	**12**
			UNIT - V			
	9	a)	Consider a disk queue with requests for I/O to blocks on cylinders 98, 183, 37, 122, 14, 124, 65, 67, in that order. Disk drive has 200 cylinders, numbered 0 to 199. Assume that the disk head is initially at cylinder 53. Apply FCFS, SCAN and C-SCAN disk scheduling algorithms to determine total head movement with pictorial representation.	*CO3*	*PO2*	**12**
		b)	Elucidate on File operations.	*CO3*	*PO2*	**8**
			OR			
	10	a)	Interpret the different schemes for defining the logical structure of a directory.	*CO3*	*PO2*	**10**
		b)	Identify the different file attributes. Explicate on Sequential and Direct access methods.	*CO3*	*PO2*	**10**

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