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

Autonomous Institute Affiliated to VTU

August 2024 Semester End Main Examinations

Programme: B.E. **Semester: IV**
Branch: Information Science and Engineering **Duration: 3 hrs.**
Course Code: 22IS4PCOPS **Max Marks: 100**
Course: OPERATING SYSTEM

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 Process management in an operating system.	CO1	PO1	**10**
	b)	Identify the different operating system services.	CO1	PO1	**10**
		UNIT - II			
2	a)	Discuss the following: (i) Many-to-one multithreading model (ii) One-to-one multithreading model (iii) Many-to-many multithreading model (iv) Short-term scheduler (v) Long-term scheduler (vi) Medium-term scheduler	CO1	PO1	**12**
	b)	Differentiate between Mutex locks and Semaphores. Explain Peterson's solution.	CO2	PO2	**8**
		OR			
3	a)	(i) Provide code snippets for Producer process using Shared memory. (ii) Provide code snippet for Consumer process using Shared memory.	CO2	PO2	**10**
	b)	Provide the code snippet for "Writers may starve", in the Readers-Writers problem. The code snippet should consist of structure of Writer process and Reader process.	CO2	PO2	**10**
		UNIT - III			
4	a)	Differentiate between FCFS and Round Robin CPU scheduling with illustrations.	CO2	PO2	**10**

		b)	Consider the following snapshot of a system: *Allocation* *Max* *A B C D* *A B C D* P_0 3 0 1 4 5 1 1 7 P_1 2 2 1 0 3 2 1 1 P_2 3 1 2 1 3 3 2 1 P_3 0 5 1 0 4 6 1 2 P_4 4 2 1 2 6 3 2 5 Using the Banker's algorithm, determine whether or not each of the following states is unsafe. If the state is safe, illustrate the order in which the processes may complete. Otherwise, illustrate why the state is unsafe. a) Available = (0, 3, 0, 1) b) Available = (1, 0, 0, 2)	CO2	PO2	**10**
			OR			
	5	a)	(i) Elucidate the Scheduling criteria of CPU scheduling algorithms. (ii) Explain Deadlock prevention methods.	CO1	PO1	**10**
		b)	Consider the following set of processes, with the length of the CPU burst given in milliseconds: Process | Burst Time | Priority P_1 | 2 | 2 P_2 | 1 | 1 P_3 | 8 | 4 P_4 | 4 | 2 P_5 | 5 | 3 The processes are assumed to have arrived in the order P_1, P_2, P_3, P_4, P_5, all at time 0. i. 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). ii. What is the turnaround time of each process for each of the scheduling algorithms in part a? iii. What is the waiting time of each process for each of these scheduling algorithms? iv. Which of the algorithms results in the minimum average waiting time (over all processes)?	CO2	PO2	**10**
			UNIT - IV			
	6	a)	Interpret the following techniques for structuring the page table. (i) Hierarchical paging (ii) Hashed page table (iii) Inverted page table	CO1	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? • LRU replacement • FIFO replacement • Optimal replacement	CO2	PO2	**10**
			UNIT - V			
	7	a)	The order for request of cylinders in a disk queue is: 98, 183, 37, 122, 14, 124, 65, 67 Initial head position is at 53. Determine the total head movements using FCFS and SSTF algorithms. Provide pictorial representation for the head movements.	CO2	PO2	**10**
		b)	Consider a disk queue with request for cylinders in the order as follows: 33, 72, 47, 8, 99, 74, 52, 75 The disk head is initially at cylinder 63. Provide the diagrammatic representation and compute the total head movements using SCAN and LOOK scheduling algorithms.	CO2	PO2	**10**

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