

U.S.N.

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

Autonomous Institute Affiliated to VTU

June 2025 Semester End Main Examinations**Programme: B.E.****Branch: Information Science and Engineering****Course Code: 23IS3PCOPS/22IS3PCOPS****Course: Operating Systems****Semester: III****Duration: 3 hrs.****Max Marks: 100**

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.			UNIT - I	CO	PO	Marks
	1	a)	Elucidate the Operating system services.	CO1	PO1	10
		b)	Interpret the role of operating system with respect to two viewpoints.	CO1	PO1	10
			OR			
	2	a)	List and explain the various Kernel Data Structures used in Operating System.	CO1	PO1	8
		b)	Explain various Computing Environments in detail.	CO1	PO1	12
			UNIT - II			
	3	a)	With a neat diagram describe the various states of a process.	CO1	PO1	4
		b)	Inter Process Communication (IPC) is possible through shared memory and message passing. Justify the statement with suitable diagrams.	CO2	PO3	10
		c)	Write briefly the process of the classic synchronization problem of Dining Philosopher's.	CO2	PO2	6
			OR			
	4	a)	Context Switching between two processes P_0 and P_1 is observed, represent and write the entire process involved in switching using a neat diagram.	CO2	PO1	10
		b)	Illustrate the shared memory concept of cooperating processes using producer consumer problem.	CO2	PO2	10
			UNIT - III			
	5	a)	Differentiate between Preemptive and Non-Preemptive CPU Scheduling.	CO3	PO2	5

	b)	Explicate the scheduling criteria of CPU scheduling algorithms.	CO3	PO2	5																																																																																										
	c)	<p>Consider the following set of processes, with the length of the CPU burst given in milliseconds:</p> <table border="1"><thead><tr><th>Process</th><th>BurstTime</th><th>Priority</th></tr></thead><tbody><tr><td>P1</td><td>2</td><td>2</td></tr><tr><td>P2</td><td>1</td><td>1</td></tr><tr><td>P3</td><td>8</td><td>4</td></tr><tr><td>P4</td><td>4</td><td>2</td></tr><tr><td>P5</td><td>5</td><td>3</td></tr></tbody></table> <p>The processes are assumed to have arrived in the order P1, P2, P3, P4, P5, all at time 0.</p> <p>a. Draw four Gantt charts that illustrate the execution of these processes using the following scheduling algorithms: FCFS, SJF, non preemptive priority (a larger priority number implies a higher priority), and RR (quantum = 2).</p> <p>b. What is the turnaround time of each process for each of the scheduling algorithms in part a?</p> <p>c. What is the waiting time of each process for each of these scheduling algorithms?</p> <p>d. Which of the algorithms results in the minimum average waiting time (over all processes)?</p>	Process	BurstTime	Priority	P1	2	2	P2	1	1	P3	8	4	P4	4	2	P5	5	3	CO3	PO3	10																																																																								
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6	a)	<p>Consider the following snapshot of a system:</p> <table border="1"><thead><tr><th rowspan="2">Process</th><th colspan="4">Allocation</th><th colspan="4">Max</th><th colspan="4">Available</th></tr><tr><th>A</th><th>B</th><th>C</th><th>D</th><th>A</th><th>B</th><th>C</th><th>D</th><th>A</th><th>B</th><th>C</th><th>D</th></tr></thead><tbody><tr><td>P0</td><td>2</td><td>0</td><td>0</td><td>1</td><td>4</td><td>2</td><td>1</td><td>2</td><td>3</td><td>3</td><td>2</td><td>1</td></tr><tr><td>P1</td><td>3</td><td>1</td><td>2</td><td>1</td><td>5</td><td>2</td><td>5</td><td>2</td><td></td><td></td><td></td><td></td></tr><tr><td>P2</td><td>2</td><td>1</td><td>0</td><td>3</td><td>2</td><td>3</td><td>1</td><td>6</td><td></td><td></td><td></td><td></td></tr><tr><td>P3</td><td>1</td><td>3</td><td>1</td><td>2</td><td>1</td><td>4</td><td>2</td><td>4</td><td></td><td></td><td></td><td></td></tr><tr><td>P4</td><td>1</td><td>4</td><td>3</td><td>2</td><td>3</td><td>6</td><td>6</td><td>5</td><td></td><td></td><td></td><td></td></tr></tbody></table> <p>Apply Banker's algorithm and answer the following. i) Is the system in safe state? If so, give the safe sequence. ii) If process P2 requests (0,1,1,3) resources can it be granted immediately?</p>	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					CO3	PO3	10
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	b)	Explain in detail the deadlock prevention methods.	CO4	PO2	5																																																																																										
	c)	A system has 4 resource types R1, R2, R3, R4 with single instance and 5 processes P1, P2, P3, P4, P5. Consider the following snapshot at time t ₀ :	CO4	PO3	5																																																																																										

		<p>R1 is held by P2, R3 is held by P4, R2 is held by P1, P4 requests R1 and R4, P5 requests R1, P1 requests R3, P3 requests R3.</p> <p>Predict the following:</p> <ol style="list-style-type: none"> Can Resource allocation graph be constructed? Draw if yes. Can system be checked for safe or unsafe state? Justify. 			
		UNIT - IV			
7	a)	Describe the importance of Demand-paging in memory management scheme. With a neat diagram explain the steps involved in handling a page fault.	CO3	PO2	10
	b)	Given six memory partitions of 300kb, 600kb, 350kb, 200kb, 750kb and 125kb(in order), how would each of the First-fit, Best-fit, and Worst-fit algorithms place processes of 115kb, 500kb, 358kb, 200kb and 375kb (in order)?	CO3	PO3	10
		OR			
8	a)	<p>Consider the following page reference string 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6.</p> <p>Assuming there are 3 memory frames, how many page faults would occur in the case of</p> <ol style="list-style-type: none"> LRU algorithm optimal algorithm FIFO algorithm. <p>Note that initially all frames are empty.</p>	CO3	PO3	10
	b)	Define Translation-Look aside Buffer (TLB). Elucidate with a neat diagram the role of TLB in a simple paging system.	CO3	PO2	10
		UNIT - V			
9	a)	Explain different file access methods.	CO3	PO1	10
	b)	<p>A disk drive has 250 cylinders, numbered 0 to 249. The drive is currently serving a request at cylinder 70. The queue of pending requests, in FIFO order is 60, 98, 183, 37, 122, 14, 124, 65, 67. Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests for each of the following disk-scheduling algorithms?</p> <ol style="list-style-type: none"> FCFS SCAN (Note: Disk arm moves towards left) C-SCAN 	CO4	PO3	10
		OR			
10	a)	Discuss the various file attributes and file operations in detail.	CO3	PO1	10
	b)	Consider the following disk request sequence for a disk with 100 tracks 98, 137, 122, 183, 14, 133, 65, 78 Head pointer starts at 54 and moves in left direction. Show the total head movement for a	CO4	PO3	5

			200 track disk (0-199) applying the following disk scheduling algorithms: i)SCAN ii)C-SCAN			
		c)	With a neat diagram outline the mechanism of a Hard Disk Drive (HDD).	<i>CO3</i>	<i>PO1</i>	5

REAPPEAR EXAMS 2024-25