U.S.N.										

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: Computer Science & Engineering **Duration: 3 hrs.**
Course Code: : 22CS4PCOPS **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)	Explain the services provided by OS.	CO1	PO1	**10**
	b)	What are the advantages and disadvantages of OS with layered structure.	CO2	PO2	**4**
	c)	Explain various states of a process with a diagram.	CO1	PO1	**6**
		UNIT - II			
2	a)	Explain different types of multithreaded models.	CO1	PO1	**6**
	b)	Consider two processes, P1 and P2, where period p1=50 and period p2 =75. Processing times are t1=25 and t2=30. Can these two processes be scheduled using rate monotonic scheduling? Explain with Gantt chart.	CO1	PO1	**4**
	c)	Consider the following set of processes. Process | Arrival time | Burst time | Priority P1 | 1 | 3 | 2 P2 | 2 | 1 | 1 P3 | 3 | 2 | 3 P4 | 5 | 3 | 1 P5 | 6 | 4 | 2 i. Draw Gantt chart illustrating the execution of these using FCFS, Non-preemptive SJF, Non-preemptive priority(higher value- high priority and Round Robin(quantum=2) ii. What is the turnaround time of each process for each scheduling algorithm mentioned above? iii. What is the wait time of each process for each scheduling algorithm mentioned above?	CO1	PO1	**10**

<table>
<tr><td></td><td></td><td></td><td colspan="9">UNIT - III</td><td></td><td></td><td></td></tr>
<tr><td>3</td><td>a)</td><td colspan="9">Implement Reader-Writer’s algorithm (with semaphores).</td><td>C03</td><td>PO3</td><td>10</td></tr>
<tr><td></td><td>b)</td><td colspan="9">Consider the following snapshot of a system:
<table><tr><td>Process</td><td colspan="3">Allocation</td><td colspan="3">MAX</td><td colspan="3">Available</td></tr><tr><td>P0</td><td>0</td><td>1</td><td>0</td><td>7</td><td>5</td><td>3</td><td>3</td><td>3</td><td>2</td></tr><tr><td>P1</td><td>2</td><td>0</td><td>0</td><td>3</td><td>2</td><td>2</td><td></td><td></td><td></td></tr><tr><td>P2</td><td>3</td><td>0</td><td>2</td><td>9</td><td>0</td><td>2</td><td></td><td></td><td></td></tr><tr><td>P3</td><td>2</td><td>1</td><td>1</td><td>2</td><td>2</td><td>2</td><td></td><td></td><td></td></tr><tr><td>P4</td><td>0</td><td>0</td><td>2</td><td>4</td><td>3</td><td>3</td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>
Apply Banker’s algorithm to find whether system is in safe state or not. Give order of execution if state is safe.</td><td>CO1</td><td>PO1</td><td>10</td></tr>
<tr><td></td><td></td><td colspan="9">UNIT - IV</td><td></td><td></td><td></td></tr>
<tr><td>4</td><td>a)</td><td colspan="9">Differentiate between static linking and dynamic linking. What are the advantages of dynamic linking?</td><td>CO2</td><td>PO2</td><td>6</td></tr>
<tr><td></td><td>b)</td><td colspan="9">Given the memory partitions of 100K,300K, 200K,600K,400K, apply the First fit, Best Fit and Worst Fit algorithms to place 150K,250K, 350K,550K, 600K files. Which algorithm makes best use of memory.</td><td>CO1</td><td>PO1</td><td>8</td></tr>
<tr><td></td><td>c)</td><td colspan="9">Compare external fragmentation with internal fragmentation. What is the solution for external fragmentation?</td><td>CO2</td><td>PO2</td><td>6</td></tr>
<tr><td></td><td></td><td colspan="9">OR</td><td></td><td></td><td></td></tr>
<tr><td>5</td><td>a)</td><td colspan="9">Consider the following page reference string
1,4,2,3,2,1,5,3,6,2,3,1
Assume the number of page frames as 3.
Apply LRU, FIFO and Optimal page replacement techniques for page replacement and number of page faults in each case.</td><td>CO1</td><td>PO1</td><td>12</td></tr>
<tr><td></td><td>b)</td><td colspan="9">Explain Optimal page replacement technique with an example.</td><td>CO1</td><td>PO1</td><td>5</td></tr>
<tr><td></td><td>c)</td><td colspan="9">Explain Belady’s anomaly in page replacement.</td><td>CO1</td><td>PO1</td><td>3</td></tr>
<tr><td></td><td></td><td colspan="9">UNIT - V</td><td></td><td></td><td></td></tr>
<tr><td>6</td><td>a)</td><td colspan="9">What are the advantages and disadvantages of contiguous and linked file allocation methods.</td><td>CO2</td><td>PO2</td><td>8</td></tr>
<tr><td></td><td>b)</td><td colspan="9">Discuss linked list and Hash table method for directory implementation with major advantages and disadvantages.</td><td>CO1</td><td>PO1</td><td>6</td></tr>
<tr><td></td><td>c)</td><td colspan="9">Explain layered file system with necessary diagram.</td><td>CO1</td><td>PO1</td><td>6</td></tr>
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			OR			
	7	a)	Apply FCFS, SSTF, SCAN, C-SCAN and LOOK algorithms for accessing locations 22,25,19,30,65,70,150,125 on a disk with 200 cylinders from 0 to 199. Find the order of accessing. Assume current head position is 20.	*CO1*	*PO1*	**10**
		b)	What is access matrix? Explain with an example.	*CO1*	*PO1*	**5**
		c)	Describe on Disk structures used in file system implementation	*CO1*	*PO1*	**5**

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