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: Electronics & Telecommunication Engineering **Duration: 3 hrs.**

Course Code: 23ET3ESOS3 **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.

		UNIT - I	*CO*	*PO*	Marks
1	a)	With neat diagram explain batch processing system and turnaround time.	*CO1*	-	**07**
	b)	Explain real time operating system with its types	*CO1*	-	**06**
	c)	Consider multiprogramming system which has two program, P1: CPU-bound (lower priority), P2: I/O-bound (higher priority). Use timing chart to analyze the process when I/O bound program has higher priority. If P3 of I/O bound program with intermediate priority is added to above system, identify the influence of additional program P3.	*CO2*	*PO1*	**07**
		OR			
2	a)	Explain three techniques of distributed operating system	*CO1*	-	**06**
	b)	A time sharing system contains n = 3 programs, using time slice of 5msec and each executing in a cyclic behavior as given in the following table. Schedule the processes and draw the timing diagram for one cycle. Calculate Response time (rt) and efficiency (η). Assume σ = 1msec. Processes | CPU burst(msec) | I/O Burst(msec) P1 | 5 | 50 P2 | 15 | 40 P3 | 25 | 30	*CO3*	*PO2*	**07**
	c)	Define resource allocation. Explain the two popular strategies for resource allocation	*CO1*	-	**07**
		UNIT - II			
3	a)	Consider the following processes apply Rate Monotonic Scheduling (RMS). Verify the condition for scheduling these processes. Calculate the Priority of each process and plot the timing chart for one cycle	*CO3*	*PO2*	**07**

			Process: P1, P2, P3 Time Period (ms): 20, 50, 30 Service time (ms): 5, 10, 5			
		b)	With flow diagram explain process creation	*CO1*	-	**06**
		c)	Consider the following processes apply FCFS scheduling policy and Calculate mean turn-around time and Mean Weighted turn-around time and plot it Process: P1, P2, P3, P4 Arrival time (sec): 0, 2, 2, 4 Service time (sec): 2, 5, 3, 7	*CO3*	*PO2*	**07**
			OR			
	4	a)	With state diagram explain different state of a process	*CO1*	-	**06**
		b)	Consider the following processes apply RR scheduling policy with δ = 2sec. Calculate mean turn-around time and Mean Weighted turn-around time and plot it Process: P1, P2, P3, P4, P5 Arrival time (sec): 0, 2, 2, 4, 5 Service time (sec): 4, 3, 2, 5, 3	*CO3*	*PO2*	**08**
		c)	Explain fundamental techniques of scheduling	*CO1*	-	**06**
			UNIT - III			
	5	a)	What is Stack? With a neat diagram and an example explain process involved in stack	*CO1*	-	**06**
		b)	For the given page reference string and reference time strings use that First In First Out (FIFO) page replacement policy to verify whether it exhibits stack property for allocation n= 3 and m=4, Justify the answer with relevant information Page reference string: 5, 4, 1, 2, 4, 4, 3, 5, 4, 3, 2, 3, Reference time string: t1, t2, t3, t4, t5, t6, t7, t8, t9, t10, t11, t12	*CO3*	*PO2*	**08**
		c)	Explain with a neat diagram Buddy system and power 2-allocation	*CO1*	-	**06**
			OR			
	6	a)	For the given page reference string and reference time strings show how many page fault occurs in Least Recently Used (LRU) and FIFO page replacement policy. Which is the best replacement policy justify the answer. Assume alloci = 2 Page reference string: 0, 1, 0, 2, 0, 1, 2, Reference time string: t1, t2, t3, t4, t5, t6, t7,	*CO3*	*PO2*	**08**

<table>
<tr><td></td><td></td><td>b)</td><td>Explain the following
i) Page-in and Page-out operation
ii) Page fault
iii) fields in a page table entry</td><td>CO1</td><td>-</td><td>06</td></tr>
<tr><td></td><td></td><td>c)</td><td>Explain paging and Consider process P and R in a system using page size of 1 KB. Process P has the start address 0 and a size of 5500 bytes. Process R has the start address 0 and a size of 2700 bytes. Obtain the Effective memory address for the following logical addresses : (i)3328 of P process (ii)1128 of process R

Page table of R<table><tr><td>Page Number</td><td>0</td><td>1</td><td>2</td></tr><tr><td>Page frame #</td><td>0</td><td>2</td><td>5</td></tr></table>Page Table of P<table><tr><td>Page Number</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td>Page frame #</td><td>1</td><td>3</td><td>9</td><td>6</td><td>7</td><td>8</td></tr></table></td><td>CO3</td><td>PO2</td><td>06</td></tr>
<tr><td></td><td></td><td></td><td>UNIT - IV</td><td></td><td></td><td></td></tr>
<tr><td>7</td><td>a)</td><td>A system contains five processes P1, P2, P3, P4, P5 and 10, 5, 7 resource units of resource classes R1, R2, R3. The allocation state of the system is (7, 2, 5). Process P1 has made request (1, 0, 2). Check whether request is safe and feasible.
<table><tr><td></td><td>R1</td><td>R2</td><td>R3</td><td></td><td></td><td>R1</td><td>R2</td><td>R3</td></tr><tr><td>P1</td><td>7</td><td>5</td><td>3</td><td></td><td>P1</td><td>0</td><td>1</td><td>0</td></tr><tr><td>P2</td><td>3</td><td>2</td><td>2</td><td></td><td>P2</td><td>2</td><td>0</td><td>0</td></tr><tr><td>P3</td><td>9</td><td>0</td><td>2</td><td></td><td>P3</td><td>3</td><td>0</td><td>2</td></tr><tr><td>P4</td><td>2</td><td>2</td><td>2</td><td></td><td>P4</td><td>2</td><td>1</td><td>1</td></tr><tr><td>P5</td><td>4</td><td>3</td><td>3</td><td></td><td>P5</td><td>0</td><td>0</td><td>2</td></tr><tr><td colspan="4">Max_Need</td><td></td><td colspan="4">Allocated State</td></tr></table></td><td>CO3</td><td>PO2</td><td>06</td></tr>
<tr><td></td><td></td><td>b)</td><td>Explain the exception conditions in message passing</td><td>CO1</td><td>-</td><td>06</td></tr>
<tr><td></td><td></td><td>c)</td><td>Write an algorithm for kernel actions in message passing using symmetric naming and blocking send</td><td>CO1</td><td>-</td><td>08</td></tr>
<tr><td></td><td></td><td></td><td>OR</td><td></td><td></td><td></td></tr>
<tr><td></td><td>8</td><td>a)</td><td>Explain the condition for resource deadlock</td><td>CO1</td><td>-</td><td>06</td></tr>
<tr><td></td><td></td><td>b)</td><td>A system has three processes P1, P2, P3 and 5, 7, 5 resource unit of resource classes R1, R2, R3 respectively. Process P3 makes a request of 1 unit of resource class R1. Check whether the system is in deadlock.</td><td>CO3</td><td>PO2</td><td>08</td></tr>
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			<table><tr><td></td><td>R1</td><td>R2</td><td>R3</td></tr><tr><td>P1</td><td>2</td><td>1</td><td>0</td></tr><tr><td>P2</td><td>1</td><td>3</td><td>1</td></tr><tr><td>P3</td><td>0</td><td>1</td><td>1</td></tr><tr><td>P4</td><td>1</td><td>2</td><td>2</td></tr></table> <table><tr><td></td><td>R1</td><td>R2</td><td>R3</td></tr><tr><td>P1</td><td>2</td><td>1</td><td>3</td></tr><tr><td>P2</td><td>1</td><td>4</td><td>0</td></tr><tr><td>P3</td><td>0</td><td>0</td><td>0</td></tr><tr><td>P4</td><td>1</td><td>0</td><td>2</td></tr></table> Allocated Resources Requested Resources <table><tr><td>R1</td><td>R2</td><td>R3</td></tr><tr><td>1</td><td>0</td><td>1</td></tr></table> Free_ Resources			
		c)	Explain with an example Direct and indirect naming	*CO1*	-	**06**
			UNIT - V			
	9	a)	Explain different file types in file system	*CO1*	-	**06**
		b)	Explain the following i. Policy and mechanism of operating system ii. Portability and extensibility of the operating system	*CO1*	-	**07**
		c)	With diagram explain layered structure of operating system with it advantage and disadvantage	*CO1*	-	**07**
			OR			
	10	a)	With diagram explain micro kernel based operating system with it advantage and disadvantage	*CO1*	-	**06**
		b)	Explain sequential and direct access file organization with diagram	*CO1*	-	**07**
		c)	With diagram explain mounting of file system	*CO1*	-	**07**

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