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. **Semester: III**

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

Course Code: 23ET3ESOS3 **Max Marks: 100**

Course: OPERATING SYSTEM

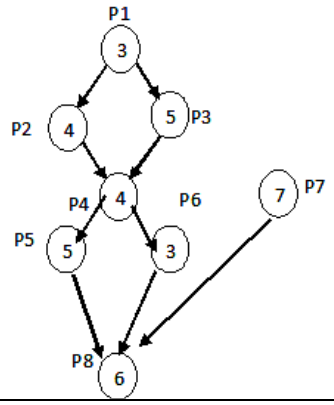
Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

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 diagram explain abstract view of an Operating system	*CO1*	-	**06**
	b)	Define computational structure and explain operating system responsibilities	*CO1*	-	**06**
	c)	Consider multiprogramming system which has two program, P1: CPU-bound (higher priority), P2: I/O-bound (lower priority). Use timing chart to analyze the process when CPU bound program has higher priority. If P3 of CPU bound program with intermediate priority is added to above system, identify the influence of additional program P3. Justify the answer	*CO2*	*PO1*	**08**
		OR			
2	a)	With an example explain co-executing programs	*CO1*	-	**06**
	b)	Explain the features and special techniques of distributed operating system	*CO1*	-	**06**
	c)	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.	*CO3*	*PO2*	**08**

Processes	CPU burst(msec)	I/O Burst(msec)
P1	10	80
P2	15	40
P3	30	60

		UNIT - II			
3	a)	Explain three approaches of real time scheduling. For the following PPG calculate the deadline of individual processes.	*CO2*	*PO1*	**08**

						
	b)	Consider the following processes apply rate monotonic scheduling policy, verify the condition for scheduling these processes. Calculate the Priority of each process and plot the timing chart for one cycle Process | P1 | P2 | P3 Time Period (ms) | 5 | 10 | 20 Service time (ms) | 2 | 3 | 5	*CO3*	*PO2*	**06**
	c)	With an example explain Earliest Deadline first (EDF) scheduling	*CO1*	-	**06**
		OR			
4	a)	With an example explain SRN scheduling.	*CO1*	-	**07**
	b)	With an example explain least completed next.	*CO1*	-	**07**
	c)	Write a C program to demonstrate how to create a two processes using fork call.	*CO1*	-	**06**
		UNIT - III			
5	a)	What is Stack? With a neat diagram and an example explain process involved in stack	*CO1*	-	**06**
	b)	Explain with a neat diagram Buddy system & power of 2 allocator	*CO1*	-	**08**
	c)	Logical address space of P extends from 0 to 140Kbytes, while the physical address space extends from 0 to 640Kbytes. Data area *xyz* in the program of process P has the address 51488. This is the logical address of *xyz*. Refer figure and also assume the start address of the each free memory area. Obtain Effective memory address and explain memory fragmentation.	*CO3*	*PO2*	**06**

			<table><tr><td>Memory</td><td>Size</td></tr><tr><td>FREE</td><td>50K</td></tr><tr><td colspan="2">Allocated: C</td></tr><tr><td>FREE</td><td>30K</td></tr><tr><td colspan="2">Allocated: D</td></tr><tr><td>FREE</td><td>80K</td></tr><tr><td colspan="2">Allocated: E</td></tr><tr><td>FREE</td><td>40K</td></tr></table>			
		OR				
6	a)	With an example explain LRU page replacement policy.	*CO1*	-	**07**
	b)	With relevant diagram explain desirable variation of page fault rate with memory allocation	*CO1*	-	**05**
	c)	For the given page reference string and reference time strings use that Least Recently Used (LRU) 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, 1, 3, Reference time string: t1, t2, t3, t4, t5, t6, t7, t8, t9, t10, t11, t12,t13	*CO3*	*PO2*	**08**
		UNIT - IV			
7	a)	Write the deadlock detection algorithm.	*CO1*	-	**07**
	b)	With an appropriate diagram, explain the deadlock prevention methods.	*CO1*	-	**07**
	c)	A system has four processes P1, P2, P3, P4 and 6,4,8,5 resource unit of resource classes R1, R2, R3, and R4. Process P2 makes a request of 1 unit of resource class R4. Check whether the system is in deadlock Allocated resources <table><tr><td></td><td>R1</td><td>R2</td><td>R3</td><td>R4</td></tr><tr><td>P1</td><td>2</td><td>0</td><td>2</td><td>1</td></tr><tr><td>P2</td><td>1</td><td>1</td><td>2</td><td>0</td></tr><tr><td>P3</td><td>1</td><td>1</td><td>2</td><td>2</td></tr><tr><td>P4</td><td>1</td><td>1</td><td>2</td><td>1</td></tr></table> Requested resources <table><tr><td></td><td>R1</td><td>R2</td><td>R3</td><td>R4</td></tr><tr><td>P1</td><td>1</td><td>1</td><td>1</td><td>1</td></tr><tr><td>P2</td><td></td><td></td><td></td><td></td></tr><tr><td>P3</td><td>6</td><td>3</td><td>2</td><td>2</td></tr><tr><td>P4</td><td>0</td><td>2</td><td>1</td><td>2</td></tr></table> Free resources <table><tr><td>R1</td><td>R2</td><td>R3</td><td>R4</td></tr><tr><td>1</td><td>1</td><td>0</td><td>1</td></tr></table>	*CO3*	*PO2*	**06**

<table>
<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>With neat diagram and example explain the mailbox</td><td>CO1</td><td>-</td><td>06</td></tr>
<tr><td></td><td></td><td>b)</td><td>Write an algorithm for bankers algorithm in deadlocks.</td><td>CO1</td><td>-</td><td>08</td></tr>
<tr><td></td><td></td><td>c)</td><td>A system contains three processes P1, P2, P3 and 7,7,10 resource units of resource classes R1, R2, R3. The allocation state of the system is (5, 4, 10). Process P2 has made a request (1, 1, 0) would the request be granted in the current state using Banker’s algorithm.
<table>
<tr><td></td><td>R1</td><td>R2</td><td>R3</td><td rowspan="5"></td><td></td><td>R1</td><td>R2</td><td>R3</td></tr>
<tr><td>P1</td><td>3</td><td>6</td><td>8</td><td>P1</td><td>2</td><td>2</td><td>3</td></tr>
<tr><td>P2</td><td>4</td><td>3</td><td>3</td><td>P2</td><td>2</td><td>0</td><td>3</td></tr>
<tr><td>P3</td><td>3</td><td>4</td><td>4</td><td>P3</td><td>1</td><td>2</td><td>4</td></tr>
<tr><td colspan="4">Max Need</td><td colspan="4">Allocated resources</td></tr>
</table></td><td>CO3</td><td>PO2</td><td>06</td></tr>
<tr><td></td><td></td><td></td><td>UNIT - V</td><td></td><td></td><td></td></tr>
<tr><td></td><td>9</td><td>a)</td><td>With diagram explain monolithic structure of operating system with it advantage and disadvantage</td><td>CO1</td><td>-</td><td>06</td></tr>
<tr><td></td><td></td><td>b)</td><td>Explain the different access methods in file organization</td><td>CO1</td><td>-</td><td>07</td></tr>
<tr><td></td><td></td><td>c)</td><td>With diagram explain kernel based operating system with it advantage and disadvantage</td><td>CO1</td><td>-</td><td>07</td></tr>
<tr><td></td><td></td><td></td><td>OR</td><td></td><td></td><td></td></tr>
<tr><td></td><td>10</td><td>a)</td><td>With diagram explain mounting of file system with an example</td><td>CO1</td><td>-</td><td>06</td></tr>
<tr><td></td><td></td><td>b)</td><td>With diagram explain layered structure of operating system with it advantage and disadvantage</td><td>CO1</td><td>-</td><td>07</td></tr>
<tr><td></td><td></td><td>c)</td><td>With diagram explain micro kernel based operating system with it advantage and disadvantage</td><td>CO1</td><td>-</td><td>07</td></tr>
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