U.S.N.										

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

Autonomous Institute Affiliated to VTU

April 2024 Semester End Main Examinations

Programme: B.E. **Semester: III**
Branch: Electronics and Telecommunication Engineering **Duration: 3 hrs.**
Course Code: 23ET3ESOS3 **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.

		UNIT - I	CO	PO	Marks
1	a)	Explain time-sharing system and Schedule operations of time sharing system having 10msec CPU time for the following programs. Programs have a cyclic behavior and each cycle contains a burst of CPU and I/O activity Processes | CPU burst(msec) | I/O Burst(msec) P1 | 15 | 100 P2 | 20 | 40 P3 | 30 | 60	CO2	PO1	**07**
	b)	With a neat diagram, explain batch processing system	CO1		**06**
	c)	With a diagram, explain two strategies of resource allocation	CO1		**07**
		UNIT - II			
2	a)	With a diagram, explain process state in operating system	CO1		**06**
	b)	Consider the following processes. Apply RR scheduling policy with δ = 1sec. Calculate mean turn-around time and Mean Weighted turn-around time and plot timing chart Process | P1 | P2 | P3 | P4 Arrival time (sec) | 0 | 2 | 3 | 9 Service time (sec) | 7 | 4 | 2 | 1	CO3	PO2	**08**
	c)	With an example, explain Earliest Deadline First scheduling policy	CO2	PO1	**06**
		OR			
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	**06**

			<table><tr><td>Process</td><td>P1</td><td>P2</td><td>P3</td></tr><tr><td>Time Period (ms)</td><td>20</td><td>50</td><td>30</td></tr><tr><td>Service time (ms)</td><td>10</td><td>10</td><td>5</td></tr></table>			
		b)	With a diagram, explain the process creation in operating system	*CO1*		**06**
		c)	Consider the following processes. Apply HRN scheduling policy. Calculate mean turn-around time and Mean Weighted turn-around time and plot it. <table><tr><td>Process</td><td>P1</td><td>P2</td><td>P3</td><td>P4</td><td>P5</td><td>P6</td><td>P7</td></tr><tr><td>Arrival time (sec)</td><td>0</td><td>1</td><td>2</td><td>3</td><td>3</td><td>4</td><td>5</td></tr><tr><td>Service time (sec)</td><td>8</td><td>6</td><td>5</td><td>3</td><td>4</td><td>1</td><td>2</td></tr></table>	*CO2*	*PO1*	**08**
			UNIT - III			
	4	a)	With a neat diagram, explain stack memory allocation to a process	*CO1*		**06**
		b)	Derive an expression for effective memory access time with relevant equations.	*CO2*	*PO1*	**04**
		c)	For the given page reference string and reference time strings use the Least Recently Used (LRU) page replacement policy to verify whether it exhibits stack property for allocation n= 3 and m=4, Justify the answer. Page reference string: 5, 4, 1, 2, 4, 4, 3, 5, 4, 3, 2, 1, 3, Reference time string: t_1, t_2, t_3, t_4, t_5, t_6, t_7, t_8, t_9, t_{10}, t_{11}, t_{12}, t_{13}.	*CO3*	*PO2*	**10**
			OR			
	5	a)	With an example, explain Buddy system allocator and Power of 2 Allocator in memory management.	*CO1*		**07**
		b)	Explain the fields of page table in virtual memory management.	*CO1*		**06**
		c)	A process has been allocated 2 page frames. Assume that none of the pages of the process are available in the memory initially. The process makes the following sequence of page references: 1, 2, 1, 3, 7, 4, 5, 6, 3, 1. If FIFO page replacement policy is used, how many page faults occur for the above reference string?	*CO2*	*PO1*	**07**
			UNIT – IV			
	6	a)	Explain Kernel actions and algorithm in message passing using symmetric naming and blocking send for event at send to Pj by Pi.	*CO1*		**06**
		b)	A system contains four 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.	*CO3*	*PO2*	**06**

				R1	R2	R3		R1	R2	R3			
				P1	7	5	3	P1	0	1	0		
				P2	3	2	2	P2	2	0	0		
				P3	9	0	2	P3	3	0	2		
				P4	2	2	2	P4	2	1	1		
				P5	4	3	3	P5	0	0	2		
				Max_Need					Allocated State				
		c)	A system has five processes P1, P2, P3,P4, P5 and 7, 2, 6 resource unit of resource classes R1, R2, R3 respectively. Following is the current state of the system. Process P1 and P3 are running processes. (i)Check whether the system is in deadlock (ii) if P2 makes additional request for a resource class R3, then will the system be in a deadlock? If yes, which processes are in deadlock justify the answer. Allocated Resource Requested Resource Free Resources				*CO3*	*PO2*	**08**
				R1	R2	R3		R1	R2	R3			
				P1	0	1	0	P1	0	0	0		
				P2	2	0	0	P2	2	0	2		
				P3	3	0	3	P3	0	0	0		
				P4	2	1	1	P4	1	0	0		
				P5	0	0	2	P5	0	0	2		
				R1	R2	R3							
				0	0	0							
			UNIT - V										
	7	a)	With an example, explain mounting of file system.					*CO1*		**07**			
		b)	With diagram explain layered design of operating system.					*CO1*		**06**			
		c)	With diagram explain microkernel based operating system.					*CO1*		**07**			

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