U.S.N.										

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

Autonomous Institute Affiliated to VTU

February 2025 Semester End Main Examinations

Programme: B.E. **Semester: IV**
Branch: Computer Science and 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.

		UNIT - I	CO	PO	Marks
1	a)	Define operating systems. Explain the dual mode operation with a neat block diagram.	1	1	**7**
	b)	Define a process. Explain the various states of a process with a diagram.	1	1	**7**
	c)	What are schedulers? Explain three types of schedulers.	1	1	**6**
		OR			
2	a)	Explain the set of OS functions exists not for helping the user but for ensuring the efficient operations of the system.	1	1	**5**
	b)	For each of the following transitions between process states, indicate whether the transition is possible. If it is possible, give an example of one thing that would cause it. (i) Run---to---Ready (ii) Run---to---Blocked (iii) Run---to---wait (iv) Blocked---to---Run (v) Run---to---Terminated.	2	2	**5**
	c)	Define system calls. Explain different views of operating system.	1	1	**10**
		UNIT - II			
3	a)	Discuss various issues that need to be considered with multithreaded programs.	2	2	**6**
	b)	Explain different types of multithreading models.	2	2	**6**

		c)	Consider the following set of processes with length of the CPU burst time given in milliseconds i. Draw Gantt chart illustrating the execution of these processing using FCFS, Non-Preemptive SJF, Non-Preemptive Priority and Round robin (with Quantum=2) Scheduling. ii. What is the turnaround time of each process for each scheduling algorithm mentioned above? iii. What is the waiting time of each process in all four cases?	*2*	*2*	**8**

Process	Arrival Time	Burst Time	Priority
P1	0	10	3
P2	0	1	1
P3	3	2	3
P4	5	1	4
P5	10	5	2

		OR				
4	a)	Write a Gantt-charts for SRTF and Pre-emptive priority (Smaller ===highest priority). Find the Average TAT and Average WT for both the algorithms.	*2*	*2*	**10**

Process	Arrival Time	Burst Time	Priority
A	0	5	4
B	2	4	2
C	2	2	6
D	4	4	3

	b)	Draw the Gantt chart for SJF and RR(TQ=3) find Average TAT, Average WT for both the algorithms.	*2*	*2*	**10**

Process	Arrival Time	CPU Time
P1	5	5
P2	4	6
P3	3	7
P4	1	9
P5	2	2
P6	6	3

		UNIT-III				
5	a)	What is race condition? Explain Reader-Writer's problem with semaphores.	*2*	*2*	**10**
	b)	Consider the following snapshot of a system Apply Banker's Algorithm to *solve* the following questions I. What is the content of feed Matrix?	*2*	*2*	**10**

PROCESS	ALLOCATION			MAX			AVAILBLE		
	A	B	C	A	B	C	A	B	C
P0	0	0	2	0	0	4	1	0	2
P1	1	0	0	2	0	1			
P2	1	3	5	1	3	7			
P3	6	3	2	8	4	2			
P4	1	4	3	1	5	7			

			II. Is the system in a safe state? III. If a request form process P2 arrives for (0 0 2) can the request be granted immediately?			
			OR			
6	a)		Explain how the dining-philosophers problem is considered as a classic synchronization problem.	*1*	*1*	**5**
	b)		Considering a system with five processes P 0 through P 4 and three resources of type A, B, C. Resource type A has 10 instances, B has 5 instances and type C has 7 instances. Suppose at time t 0 following snapshot of the system has been taken:	*2*	*2*	**10**

process	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P0	0	1	0	7	5	3	3	3	2
P1	2	0	0	3	2	2			
P2	3	0	2	9	0	2			
P3	2	1	1	2	2	2			
P4	0	0	2	4	3	3			

1)What will be the content of the Need matrix?
2) Is the system in a safe state? If Yes, then what is the safe sequence?
3) What will happen if process P 1 requests one additional instance of resource type A and two instances of resource type C, whether the request can be immediately granted, is the system in a safe state if yes, then what is the safe sequence?

	c)		What is a deadlock? Explain the necessary conditions to attain deadlock.	*1*	*1*	**5**
			UNIT - IV			
7	a)		Given memory partitions of 200K, 700K, 500K, 300K, 100K, 400K Apply First Fit, Best Fit and Worst Fit algorithms to place 315K, 427K, 250K, 550K Which algorithm makes the most efficient use of memory.	*2*	*2*	**8**
	b)		How Translation Look-Aside Buffer (TLB) *is* used to **solve** the problem of simple paging scheme.	*2*	*2*	**4**
	c)		Explain Hashed Page Table with a neat diagram.	*2*	*2*	**8**
			OR			
8	a)		Explain Copy-on-Write with illustrative example.	*2*	*2*	**4**
	b)		Consider the following page reference string 4, 3, 2, 1, 4, 3, 5, 4, 3, 2, 1, 5. Assume the number of free frames as 3, How many pages fault would occur in case of LRU, FIFO, and OPTIMAL algorithm.	*2*	*2*	**9**
	c)		What is demand paging? How page fault is handled in demand paging.	*2*	*2*	**7**

			UNIT - V			
	9	a)	List the free space management techniques. Describe any one in detail	*3*	*3*	**4**
		b)	Explain Linked file allocation method. Discuss its advantages and disadvantages.	*3*	*3*	**8**
		c)	Discuss the two approaches of directory implementation in detail.	*3*	*3*	**8**
			OR			
	10	a)	Explain the goals and principles of protection.	*3*	*3*	**5**
		b)	What is Access Matrix? Explain access matrix with copy right with suitable example.	*3*	*3*	**5**
		c)	Suppose a disk has 50 cylinders named 0 to 49. The Read/Write head is currently serving at cylinder 15. The queue of pending request is in order: 4, 40, 11, 35, 7, 14 starting from the current head position. What is the total distance travelled (in cylinders) by the disk arm to satisfy the request using the following algorithm? FCFS, SSTF, LOOK and SCAN	*3*	*3*	**10**

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