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: IV**
Branch: Computer Science and Engineering **Duration: 3 hrs.**
Course Code: 22CS4PCOPS / 19CS4PCOPS **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 all the operating system services.	1	1	10
	b)		Describe system call, with an example of copy system call in detail.	1	1	10
			OR			
2	a)		Explain the process state diagram. Explain briefly the process control block.	1	1	10
	b)		Explain briefly different operating system structure.	1	1	10
			UNIT - II			
3	a)		Analyze all multithreading models. Discuss threading issues.	2	2	10
	b)		Analyze any four process scheduling Algorithms with examples.	2	2	10
			OR			
4	a)		Write a c-program to implement SJF algorithm with arrival time and calculate TAT and WT	3	3	10
	b)		Draw the Gantt Chart illustrating the execution of these processes using FCFS, Non-preemptive SJF.What is the TAT and WT of each process in all cases. At what time the Ready-q has maximum number of processes in all the cases.	1	1	10

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

			UNIT - III			
5	a)		Write a C program for Producer Consumer problem using Semaphores.	3	3	10
	b)		Assume that there are 5 processes, P0 to P4, and 4 types of resources (A,	3	3	10

B, C, D) and the maximum number of instances for the following resources are 3, 17, 16, 12 respectively. Following table shows the resource allocation state at the current instance:

Given Matrices								
	Allocation Matrix (N0 of the allocated resources By a process)				Max Matrix Max resources that may be used by a process			
	A	B	C	D	A	B	C	D
P_0	0	1	1	0	0	2	1	0
P_1	1	2	3	1	1	6	5	2
P_2	1	3	6	5	2	3	6	6
P_3	0	6	3	2	0	6	5	2
P_4	0	0	1	4	0	6	5	6
Total	2	12	14	12				

i) Use the safety algorithm to test if the system is in a safe state or not?

ii) If the system is in a safe state, can the following requests be granted, why or why not? P1 requests (0,2,1,0).

OR

6	a)	Write a C program for Dining Philosopher problem using Semaphores.	*3*	*3*	**10**
	b)	Briefly explain which are the data Structure's required to implement Banker's Algorithm. Using Banker's algorithm, answer the following questions:- 1. What are the contents of need matrix? 2. Find if the system is in safe state? If it is, find the safe sequence. 3. If process P2 requests (0,1,1,3) resources can it be granted immediately.	*3*	*3*	**10**

process	Max				Allocation				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P0	2	0	0	1	4	2	1	2	3	3	2	1
P1	3	1	2	1	5	2	5	2				
P2	2	1	0	3	2	3	1	6				
P3	1	3	1	2	1	4	2	4				
P4	1	4	3	2	3	6	6	5				

UNIT - IV

7	a)	Write C Program for First Fit memory allocation.	*3*	*3*	**10**
	b)	With Neat diagram Describe about segmentation hardware.	*1*	*1*	**10**
		OR			
8	a)	With Neat diagram Describe the steps in handling page fault.	*1*	*1*	**10**
	b)	Use the reference string 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1 for a memory with three frames, Obtain page faults for 1.Fifo 2.Optimal 3.LRU Analyze them.	*3*	*3*	**10**

			UNIT - V			
	9	a)	Describe all file allocation methods.	*1*	*1*	**10**
		b)	Describe any two directory implementation with neat diagrams.	*1*	*1*	**10**
			OR			
	10	a)	With neat diagram describe moving head mechanism of disk.	*1*	*1*	**10**
		b)	Consider, for example, a disk queue with requests for I/O to blocks on cylinders 98, 183, 37, 122, 14, 124, 65, 67. R/W head is at 53 currently, also it is moving towards left direction. Find total number of cylinder movement for below algorithms 1.FCFS 2.SSTF 3.SCAN Analyze which is best among them.	*3*	*3*	**10**

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