U.S.N.										

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

Autonomous Institute Affiliated to VTU

December 2023 Supplementary Examinations

Programme: B.E. **Semester: IV**
Branch: Artificial Intelligence and Machine Learning **Duration: 3 hrs.**
Course Code: 22AM4PCOPS **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.

				CO	PO	Marks
			UNIT - I			
1	a)		Define Operating System. Explain mainframe and server operating systems.	CO1	PO1	**6**
	b)		Identify and explain the different states of a process with the help of a state transition diagram.	CO1	PO1	**10**
	c)		Demonstrate the working principle of classical Thread Model.	CO1	PO1	**4**
			UNIT - II			
2	a)		Provide a solution to Readers and Writers Problem using semaphores.	CO1	PO1	**10**
	b)		Define mutual exclusion and critical section problem. Explain the software solution for 2- process synchronization	CO1	PO1	**10**
			OR			
3	a)		Justify the need of inter-process communication. Infer the characteristics of shared memory and message-passing systems.	CO1	PO1	**10**
	b)		Consider the following set of 5 processes, with the length of the CPU-burst time in milliseconds given below:	CO1	PO1	**10**

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

The processes are assumed to have arrived in the order P1, P2, P3, P4, P5, all at time 0. Apply priority scheduling algorithm (a smaller priority number implies a higher priority), and Round Robin (quantum= 1) to answer the following questions:

i) Draw Gantt charts illustrating the execution of these processes.

			ii) Calculate the average turnaround time and average waiting for each of the scheduling algorithms.			
			UNIT – III			
	4	a)	If FIFO, LRU page replacement algorithms are used with three and four page frames, calculate page faults that will occur with the reference string below: 0 ,1 ,7 ,2 ,3 ,2 ,7 ,1 ,0 ,3. Assume all the pages are initially empty.	*CO2*	*PO2*	**10**
		b)	Explain the process of paging. Determine the steps involved in paging with the help of a diagram.	*CO1*	*PO1*	**10**
			OR			
	5	a)	Define address space. With a neat diagram elaborate the process of swapping.	*CO1*	*PO1*	**10**
		b)	Explore different memory management techniques to handle free memory spaces.	*CO1*	*PO1*	**10**
			UNIT - IV			
	6	a)	Enumerate various file operations and explain any 4 of them.	*CO3*	*PO1*	**6**
		b)	Elaborate on single level and hierarchical directory systems.	*CO3*	*PO1*	**8**
		c)	Summarize linked list and contiguous file allocation methods.	*CO3*	*PO1*	**6**
			UNIT - V			
	7	a)	Define deadlock. Specify the necessary conditions for a deadlock to occur.	*CO3*	*PO1*	**6**
		b)	Consider the following snapshot of a system: **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 Apply Bankers' algorithm to: i) Calculate the need matrix. ii) Is the system in a safe state? If so, find the sequence.	*CO3*	*PO3*	**10**
		c)	Describe the ways by which deadlocks can be avoided.	*CO3*	*PO1*	**4**

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