U.S.N.										

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

Autonomous Institute Affiliated to VTU

September / October 2024 Supplementary Examinations

Program: 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.

		UNIT - I	*CO*	*PO*	Marks
1	a)	Explain the role of kernel and user modes in designing an operating system.	*CO* 1	*PO* 1	**5**
	b)	Briefly discuss events that causes process termination.	*CO* 1	*PO* 1	**5**
	c)	Design a solution for implementation of multithreaded web server with a neat diagram.	*CO* 2	*PO* 2	**10**
		UNIT - II			
2	a)	Consider the set of 6 processes whose arrival time and burst time are given below: Process Id | Arrival time | Burst time P1 | 0 | 7 P2 | 1 | 5 P3 | 2 | 3 P4 | 3 | 1 P5 | 4 | 2 P6 | 5 | 1 Apply the Shortest Job First Scheduling algorithms for both pre-emptive and non-pre-emptive to answer the following questions. i. Represent the execution of these processes using Gantt chart. ii. Calculate the average waiting time. iii. Calculate the average turnaround time.	*CO* 3	*PO* 3	**10**
	b)	Provide solutions to avoid race condition.	*CO* 2	*PO* 2	**5**
	c)	Elaborate on the design issues faced during the implementation of Message-Passing Systems.	*CO* 2	*PO* 2	**5**
		OR			
3	a)	In the following example, there are six processes named as P1, P2, P3, P4, P5 and P6. Assume the time quantum of the system as 5 units. With the help of Gantt chart calculate Average turnaround time, Average waiting time, using Round Robin algorithm.	*CO* 3	*PO* 3	**10**

			<table><tr><th>Process ID</th><th>Arrival time</th><th>Burst time</th></tr><tr><td>P1</td><td>0</td><td>7</td></tr><tr><td>P2</td><td>1</td><td>4</td></tr><tr><td>P3</td><td>2</td><td>15</td></tr><tr><td>P4</td><td>3</td><td>11</td></tr><tr><td>P5</td><td>4</td><td>20</td></tr><tr><td>P6</td><td>4</td><td>9</td></tr></table>			
	b)	Demonstrate how semaphore can be used as synchronization tool.	***CO*** 3	***PO*** 3	**10**
		UNIT - III			
4	a)	Consider the page reference string given below: 6 ,0 ,5 ,2 ,0 ,3 ,0 ,4 ,2 ,3 ,0 ,3 ,2 ,5 ,2 ,0 ,5 ,6 ,0 ,5 Assuming three empty frames in memory, calculate number of page faults, hit ratio, and miss ratio for LRU and FIFO page replacement algorithms.	***CO*** 3	***PO*** 3	**10**
	b)	Illustrate the mechanism of converting virtual address to physical address with the help of neat labelled diagram.	***CO3***	***PO 3***	**10**
		OR			
5	a)	Consider the following page reference string assuming three empty frames in memory. 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6. Calculate number of page faults, hit ratio and miss ratio for Second chance and Optimal page replacement algorithms.	***CO*** 3	***PO*** 3	**10**
	b)	Explore the techniques for managing free memory.			**10**
		UNIT - IV			
6	a)	i. Consider a disk with 200 tracks (0-199) with the Read-write head initially at the track 50 and the disk queue having input/output requests in the following order: -95, 180, 34, 119, 11, 123, 62, 64 Find the total number of track movements of the Read/Write head using FCFS and SSTF. ii Describe the mechanism of SCAN and LOOK disk scheduling algorithms.	***CO*** 3	***PO*** 3	**10**
	b)	Explain the following types of file system implementation: i) Contiguous ii) Linked list	***CO*** 1	***PO*** 1	**10**
		UNIT - V			
7	a)	i) Elucidate two deadlock recovery mechanisms. ii) Briefly describe the working of Ostrich algorithm.	***CO*** 2	***PO*** 2	**10**

		b)	Consider the following system snapshot with resources A, B, C and D and process P0 to P4. Using banker's algorithm, Answer the following questions: a) What are the contents of the need matrix? b) Is the system in a safe state? If Yes, then what is the safe sequence? c) If a request from process P4 arrives for additional resources of (1,2,0,0), can the banker's algorithm grant the request immediately? Show the new system state and other criteria	***CO*** 3	***PO*** 3	**10**

Process
P0
P1
P2
P3
P4

MAX			
A	B	C	D
6	0	1	2
1	7	5	0
2	3	5	6
1	6	5	3
1	6	5	6

ALLOCATION			
A	B	C	D
4	0	0	1
1	1	0	0
1	2	5	4
0	6	3	3
0	2	1	2

AVAILABLE			
A	B	C	D
3	2	1	1

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