U.S.N.										

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

Autonomous Institute Affiliated to VTU

October 2024 Supplementary Examinations

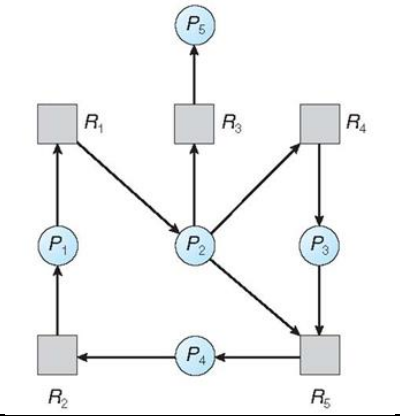
Programme: B.E. **Semester: III**
Branch: Information Science and Engineering **Duration: 3 hrs.**
Course Code: 23IS3PCOPS **Max Marks: 100**
Course: Operating Systems

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 **Cloud Computing** and **Real-time embedded** computing environments with suitable examples.	*CO1*		**06**
	b)	Describe how **Interrupt** is handled by Operating system. Write the **Interrupt timeline**.	*CO1*		**06**
	c)	The services and functions provided by an operating system can be divided into two main categories. Briefly describe the two categories with a schematic diagram.	*CO1*		**08**
		UNIT - II			
2	a)	Illustrate Direct and Indirect communication in Message Passing.	*CO1*		**08**
	b)	Consider the set of 5 processes whose arrival time and burst time are given below- **Process Id** / **Arrival time** / **Burst time** P1 / 3 / 1 P2 / 1 / 4 P3 / 4 / 2 P4 / 0 / 6 P5 / 2 / 3 If the CPU scheduling policy is SJF **preemptive**, calculate the **average waiting time and average turnaround time**.	*CO2*	*PO1*	**06**
	c)	Consider the set of 5 processes whose arrival time and burst time are given below: **Process Id** / **Arrival time** / **Burst time** P1 / 3 / 4 P2 / 5 / 3 P3 / 0 / 2 P4 / 5 / 1 P5 / 4 / 3 If the CPU scheduling policy is **FCFS**, calculate the **average waiting time and average turnaround time.** Also Explain **Convoy Effect in FCFS.**	*CO2*	*PO1*	**06**

			OR			
	3	a)	Explain the types of Multithreading models.	*CO1*		**06**
		b)	Consider the set of 5 processes whose arrival time and burst time are given below- **Process Id** | **Arrival time** | **Burst time** | **Priority** P1 | 0 | 4 | 2 P2 | 1 | 3 | 3 P3 | 2 | 1 | 4 P4 | 3 | 5 | 5 P5 | 4 | 2 | 5 If the CPU scheduling policy is **priority non-preemptive**, calculate the **average waiting time** and **average turnaround time**. (Higher number represents higher priority)	*CO2*	*PO1*	**06**
		c)	Consider the set of 6 processes whose arrival time and burst time are given below- **Process Id** | **Arrival time** | **Burst time** P1 | 0 | 4 P2 | 1 | 5 P3 | 2 | 2 P4 | 3 | 1 P5 | 4 | 6 P6 | 6 | 3 If the CPU scheduling policy is **Round Robin** with time **quantum = 2**, calculate the **average waiting time** and **average turnaround time.**	*CO2*	*PO1*	**08**
			UNIT - III			
	4	a)	State the Dining philosopher's problem and give a solution for the same using semaphores. Write the structure of philosophers for i.	*CO2*	*PO1*	**06**
		b)	i)Construct the Resource allocation graph from the given table below. Find if the system is in a deadlock state otherwise find a safe sequence.? | | **Allocation** | | **Need** | | | | **R1** | **R2** | **R1** | **R2** | | **Process P1** | 1 | 0 | 0 | 1 | | **Process P2** | 0 | 1 | 1 | 0 | ii) Write the corresponding Wait-for-graph for the given Resource allocation graph.	*CO3*	*PO2*	**08**



	c)	Consider the following snapshot of a system. Using the banker's algorithm, i) Write the content of need matrix. ii) Illustrate that the system is in safe state by demonstrating an order in which the processes may complete.	*CO3*	*PO2*	**06**

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

		UNIT - IV			
5	a)	Consider the reference string **6, 1, 1, 2, 0, 3, 4, 6, 0, 2, 1, 2, 1, 2, 0, 3, 2, 1, 4, 0** for a memory with **three frames** and calculate number of page faults by using: **i) FIFO (First In First Out)** **ii) Optimal Page replacement algorithms.**	*CO2*	*PO1*	**08**
	b)	Distinguish between **Internal Fragmentation** and **External Fragmentation.**	*CO1*		**06**
	c)	Explain the procedure of Swapping with a neat diagram.	*CO1*		**06**
		OR			
6	a)	Consider six memory partitions of size 200 KB, 400 KB, 600 KB, 500 KB, 300 KB and 250 KB. These partitions need to be allocated to four processes of sizes 357 KB, 210 KB, 468 KB and 491 KB in that order. Perform the allocation of processes using- i) First Fit Algorithm ii) Best Fit Algorithm iii) Worst Fit Algorithm Rank the algorithms in terms of how efficiently they use memory.	*CO3*	*PO2*	**06**

		b)	With a neat diagram, explain the steps in handling the page fault	*CO1*		**08**
		c)	Describe Hashed page table in Paging with a neat diagram.	*CO1*		**06**
			UNIT - V			
	7	a)	Suppose that a disk drive has 5000 cylinders numbered 0 to 4999. The drive is currently serving a request at cylinder 143. The queue of pending requests in FIFO order is- 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130. Starting from the current head position, what is the total distance that the disk arm moves to satisfy all the pending requests for each of the following disk scheduling algorithms? (i) FCFS (ii) SSTF (iii) SCAN	*CO2*	*PO1*	**08**
		b)	Explain One Level and Two Level directory structures with a neat diagram.	*CO1*		**06**
		c)	Elucidate how a stored information can be protected.	*CO1*		**06**

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