GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–IV (NEW) EXAMINATION – WINTER 2023

Subject Code:3141601   **Date:11-01-2024**
Subject Name: Operating System and Virtualization
Time: 10:30 AM TO 01:00 PM   **Total Marks:70**
Instructions:
1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

			MARKS
Q.1	**(a)**	Define OS. Explain the basic functions of OS.	03
	(b)	List types of OS structure and Differentiate between Monolithic and Microkernel.	04
	(c)	What is system call? Explain steps for system call execution with neat diagram.	07
Q.2	**(a)**	What is PCB? Discuss its major fields.	03
	(b)	Explain process states model along with transition by a labelled diagram.	04
	(c)	What do you mean by scheduling? Discuss in brief types of scheduling and kind of schedulers too.	07
		OR	
	(c)	Consider Five Processes P1 to P5 arrived at same time. They have estimated running time 10,2,6,8 and 4 seconds, respectively. Their Priorities are 3,2,5,4 and 1, respectively with 5 being highest Priority. Find the average turnaround time and average waiting time for Round Robin (q=3) and Priority Scheduling algorithm.	07
Q.3	**(a)**	Give the functions of following UNIX commands: ps, fork, join	03
	(b)	What is deadlock? List the necessary conditions that lead to the deadlock. How deadlock can be prevented?	04
	(c)	What is Semaphore? Give the implementation of Bounded Buffer (Producer Consumer) Problem using Semaphore.	07
		OR	
Q.3	**(a)**	Explain Race condition, mutual exclusion and critical region.	03
	(b)	Explain the use of Banker's Algorithm for deadlock avoidance.	04
	(c)	What is Critical section Problem and list the requirements to solve it. Write Peterson's Solution for the same.	07
Q.4	**(a)**	Give difference between Internal and External Fragmentation.	03
	(b)	Discuss DMA in brief.	04
	(c)	What is Paging? Explain paging mechanism in MMU with example	07
		OR	
Q.4	**(a)**	Give difference between Paging and Segmentation	03
	(b)	What is Buffering? Why is it required in I/O handling?	04
	(c)	Consider the page references 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, with 4 page frame. Find number of page fault using Optimal Page replacement and Least Recently Used algorithm	07
Q.5	**(a)**	Explain Device controller in brief	03
	(b)	How virtual address is converted into physical address with example	04

(c) Define seek time and rotational latency. Assume that a   **07**
disk drive has 200 cylinders, numbered 0 to 199. The drive is
currently serving a request at cylinder 100. The queue of
pending requests is 23, 89, 132, 42, 189.
Calculate seek time for FCFS and SSTF disk scheduling
algorithm.

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OR

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Q.5   **(a)** What is RAID? Explain in brief.   **03**
     (b) Explain memory management with bitmaps.   **04**
     (c) Explain virtual machine and virtualization concepts in brief.   **07**

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