Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–IV EXAMINATION – WINTER 2025

Subject Code:3141601 Date:13-11-2025

Subject Name:Operating System and Virtualization

Time:02:30 PM TO 05:00 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)**	What is Operating System? Draw general architecture of OS.	**03**
	(b)	How multiprogramming increase system performance?	**04**
	(c)	Which are the different states of the process? Explain process state diagram.	**07**
Q.2	**(a)**	What is context switching? How it is performed?	**03**
	(b)	Give the difference between process and thread.	**04**
	(c)	Five jobs A through E arrived at a computer centre with following details **Job** **Arrival Time** **CPU Time** A 0 9 B 1 5 C 2 2 D 3 6 E 4 8 Calculate the Turnaround Time and Waiting Time for all processes applying (i) First Come First Serve (ii) Shortest Job First and (iii) Round Robin (with Time Quantum=3) algorithms.	**07**
		OR	
	(c)	Explain HRRN and feedback queue scheduling algorithms.	**07**
Q.3	**(a)**	What is race condition? Explain with example.	**03**
	(b)	What is mutual exclusion? Give the conditions for mutual exclusion.	**04**
	(c)	What is critical region? Explain Peterson's solution for mutual exclusion.	**07**
		OR	
Q.3	**(a)**	What is busy waiting? How to deal with it?	**03**
	(b)	What is Deadlock? List the conditions that lead to deadlock.	**04**
	(c)	What is Semaphore? Give the implementation of Readers-Writers Problem using Semaphore.	**07**
Q.4	**(a)**	How to detect the deadlock?	**03**
	(b)	Consider a paging system with TLB in which 80% TLB hit occurs. If system takes 20 nanoseconds to search a page from TLB and 100 nanoseconds to access memory what is the effective access time?	**04**
	(c)	Explain Paging in details.	**07**
		OR	
Q.4	**(a)**	What is demand paging?	**03**
	(b)	What is fragmentation? How to solve it?	**04**

	(c)	Consider the following page reference string: 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1 How many page faults would occur for following page replacement algorithm, considering 3 free frames i) FIFO ii) LRU iii) Optimal.	**07**
Q.5	**(a)**	What is OS based virtualization?	**03**
	(b)	Write short note on Direct memory access (DMA).	**04**
	(c)	Suppose that a disk drive has 200 cylinders. Numbered 0 to 199. The drive is currently serving at cylinder 53 and previous request was at cylinder 43. The queue of pending requests in FIFO order is 98, 183, 37, 122, 14, 124, 65, 67 Starting from the current head position what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests for each of following disk scheduling algorithms. a) FCFS b) SSTF c) SCAN d) LOOK.	**07**

OR

Q.5	**(a)**	Explain Unix Commands: cat, sort, grep.	**03**
	(b)	Write a shell script to calculate factorial of given number.	**04**
	(c)	Explain ESX server and also write the differences between ESX server and VMware server.	**07**
