Reg. No.:

Name   :

VIT

Vellore Institute of Technology

Continuous Assessment Test-I – September 2023

Programme	: B.Tech(CSE)	Semester	: Fall 23-24
Course	:	Code	: BCSE303L
	Operating Systems	ClassNbr	: CH2023240100890, CH2023240101112
Faculty	: Dr. L. Shyamala, Dr. Braveen	Slot	: C1+TC1
Time	: 90 Minutes	Max. Marks	: 50

	Answer all Questions	Mark

1.	(i) To implement a kernel, different types of structures are used. Identify the structure type of kernel that facilitates a dynamically loadable module that can be added to a running system without rebooting the system or rebuilding the kernel. (3 Mark)
	
	 (ii) Considering the below C code execution, explain in detail how protection is achieved through abstraction in a microkernel operating system. Justify your answer with a neat diagram. (7 Mark)
	 ``c
	main()
	{
	int i,n;
	scanf("%d\n",&n);
	for (i=0; i<n; i++)
	printf("%d\n", i);
	}
	``
		10

2.	(i) Consider a child process "A" which completed the execution using exit() system call but still has an entry in the process table. The parent process is sleeping or unaware of the child's exit. What will happen to the child process? In this state, if the kill() is executed by the parent will it work on the child? Justify your answer for this situation with a proper diagram. (4 Mark) (ii) The OS is responsible for executing a process. Explain how OS handles the execution of the process in detail and also discuss the related system call associated with the process management with a proper diagram. (6 Mark)	10
3.	Assume that there are 4 customers C1, C2, C3, and C4 arrive at 3 ms, 8 ms, 0 ms, 5 ms and are waiting in the queue at the help desk of a bank. Each customer takes 5ms, 3ms, 9ms and 4ms to complete their requests and have token numbers as 3, 1, 2, and 4 respectively. Compute the average waiting time and average turnaround time using the appropriate algorithm with respect to the following scenario: (i)Allow the customers based on their token numbers. (5 Mark) (ii)Allow the customers based on the shortest request time.(5 Mark)	10

4.	a)	Consider four processes P, Q, R, and S scheduled on a CPU as per round robin algorithm with a time quantum of 4 units. The processes arrive in the order P, Q, R, S, all at time t = 0. There is exactly one context switch from S to Q, exactly one context switch from R to Q, and exactly two context switches from Q to R. There is no context switch from S to P. Switching to a ready process after the termination of another process is also considered a context switch. Which one of the following CPU burst time (in time units) of these processes is NOT possible for the above-mentioned scenario? Justify your answer. (6 mark) (a)P=4,Q=10,R=6,S=2 (b) P=2,Q=9,R=5, S=1 (c) P=3, Q=7, R=7, S=3.	10
	b)	A scheduling algorithm assigns priority proportional to the waiting time of a process. Every process starts with priority zero (the lowest priority). The scheduler re-evaluates the process priorities every T time unit and decides the next process to schedule. Which one of the following is TRUE if the processes have no I/O operations and all arrive at time zero? Justify your answer with an example. (4 mark) (a) This algorithm is equivalent to FCFS algorithm (b) This algorithm equivalent to Round Robin algorithm (c) This algorithm equivalent to SJF algorithm	
5.	a	Write a C program using the fork() system call that finds whether the given number is Armstrong or not in the child process (Child1). The parent must display "Welcome" message before the child starts its function. The input number should be accepted from the command line. Create another child from child1 to display "Thank you" message after completing the process. The parent should display "Bye" message after all child processes are completed. Display error messages, if (a) The user input is not a valid integer number. (b) The operating system is not able to create the child. Note: Armstrong number is a number that is equal to the sum of cubes of its digits. For example 0, 1, 153, 370, 371 and 407.	10