Name : Nam

VIT

Vellore Institute of Technology

(Deemed to be University under section 3 of UGC Act, 1956)

Continuous Assessment Test 1(CAT 1) – Sept 2023

Programme	:	B.Tech. CSE B.Tech. CSE (AI&ML) B.Tech. CSE (CPS) B.Tech. CSE (AIR)	Semester	Fall 2023-24
Course Code	:	BCSE303L	Class Nbr(s)	CH2023240100698 CH2023240100697 CH2023240100699 CH2023240100696
Course Title	:	Operating Systems		
Faculty(s)	:	Dr. S. Harini Dr.K.Vallidevi Dr.G.Manju Dr.Arfuza Begum	Slot	F2+TF2
Time	:	90 Minutes	Max. Marks	50

Answer all the Questions

Q. No.	Sub-division	Question Text	Marks
1.		When you are tasked to design an OS for two different systems (A and B) as given below, what OS structure will you adopt – Monolithic, Layered, or Microkernel? Justify your answer.	
		a) A system 'A' used for a specific standalone application that is not connected to the internet. This system is allowed to be accessed by only a few people and hence security is not an issue here. The operating system should be simple and faster.	5
		b) A system 'B' that has very high priority to security and protection.	5
2.		In C programming language, design a parent process "P" that creates three child processes "C1", "C2" and "C3" in the same order as per the below constraints. • P should create C1 and block itself. C1 should complete execution and exits. After C1 exits, P should create C2 and block itself. C2 should complete execution and exits. After C2 exits, P should create C3 and exit. C3 should complete execution and exits. • Every time a parent creates a child, it should display its process id. Every time a child exits, P should print the process id of the child that exited • Child C1 should use exec (any version is fine) to perform "CAT" command	10

15/09/2023 23:20

		of Linux • Child C2 should use exec (any version is fine) to perform "DATE" command of Linux • Child C3 should exec (any version is fine) to perform "ls" command of Linux	
3.		Consider a system with a single CPU core and three processes A, B, C. Process A arrives at t = 0, and runs on the CPU for 10 time units before it finishes. Process B arrives at t = 6, and requires an initial CPU time of 3 units, after which it blocks to perform I/O for 3 time units. After returning from I/O wait, it executes for a further 5 units before terminating. Process C arrives at t = 8, and runs for 2 units of time on the CPU before terminating. For each of the scheduling policies below, calculate the time of completion of each of the three processes. Recall that only the size of the current CPU burst (excluding the time spent for waiting on I/O) is considered as the "job size" in these schedulers. a) FCFS b) SJF c) SRTF	10
4.		Create a C program to fork two user threads namely, T1 and T2. T1 prints its thread id and has to wait for a random amount of time before it can resume its execution. T2 prints its thread id and waits till T1 is ready to join. T1 resumes its operation and performs one system call and one user-defined function call. Both the calls are timed and displayed on the screen. After display, T1 and T2 joins and exits.	10
5.		A system has 4 processes and 5 allocatable resources. The current allocation and maximum needs are as follows:	10

	Allocated					Maximum				
A	2	1	3	2	2	2	2	3	2	4
B	3	1	2	2	1	3	3	3	2	1
C	2	2	1	2	2	3	2	4	2	2
D	2	2	2	2	1	2	2	3	3	1

If Available = [0 0 X 1 1], what is the smallest value of x for which this is a safe state? **(5 marks)**

Also check whether the following states are safe: **(5 marks)**

a. Available = [0 3 3 1 2]

b. Available = [1 0 0 2 2]