

Reg. No.:

Name :



VIT
Vellore Institute of Technology
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Continuous Assessment Test-I – August 2024

Programme	B.Tech (CSE and its Specialization)	Semester	Fall 2024-25
Course	Operating Systems	Code	BCSE303L
Faculty	Dr.SIVAGAMI M Dr.KUMAR R Dr.MANIMEGALAI Dr.MONICA Dr.ANANDAN P Dr.VALLIDEVI K Dr.MANJU G Dr.LEKI CHOM THUNON	Slot(s)	F1+TF1
		Class Nbr(s)	CH2024250100890 CH2024250100450 CH2024250100922 CH2024250101449 CH2024250100535 CH2024250100898 CH2024250100895 CH2024250100681
Time	1½ Hours	Max. Marks	50

Answer ALL Questions

1. A tech company is designing a new smart home hub that will manage various connected devices, such as smart lights, thermostats, and security cameras. The hub needs to support real-time processing of sensor data, provide a user-friendly interface, and ensure seamless communication between devices. The team decides to implement a layered operating system to achieve these goals. [10]

Suppose you are tasked with designing the layered OS architecture for this smart home hub.

- How would you structure the OS into layers? What functionalities would each layer provide? (4 marks)
- Describe how the layering approach will help in achieving easy updates and maintenance of the OS functionalities. (3 marks)
- Another tech company design the same OS using microkernel architecture. As an OS expert discuss the difference between these two OS designs with respect to the corresponding structure. Comment. (3 marks)

2. int main()

```
{
    float a=2.0;
    a=a+2.0;
    fork();
    printf("%f", a);
}
```

return 0;

}

Illustrate the working of the above code snippet which executes on the operating system from storing to execution. (3 Marks)

Write your interpretation of the output. (2 Marks)

3. ✓ A system administrator tasked with monitoring and managing server processes. While inspecting the process table, you notice a process with a status of "Z" (zombie). The Parent Process ID (PPID) of this zombie process is 3421. However, the parent process is still running. [10]

- a. ✓ How this process has become a zombie? (2 marks)
- b. ✓ What steps can you take to resolve this issue, ensuring the zombie process is removed from the process table without disrupting the parent process? (3 marks)
- c. ✓ Devise a C program that demonstrates the creation of an orphan process. (5 marks)

4. ✓ Assume that 5 students S1, S2, S3, S4 and S5 are willing to access Internet in a system in centre A. S1 needs the system for 5 ms, S2 for 3 ms, S3 for 9 ms, S4 for 4 ms and S5 for 7 ms. Allow them to access the system based on their CGPA 8.2, 7.3, 8.5, 9.2 and 7.9 respectively. [15]

Allow the students based on the following scenario:

Students with Higher CGPA should be allowed first. Display the waiting time of each student to complete their work. (5 marks) ✓

In centre B, 5 students S1, S2, S3, S4 and S5 are willing to access Internet in a system. S1 needs the system for 5 ms, S2 for 3 ms, S3 for 9 ms, S4 for 4 ms and S5 for 7 ms. Allow them to access the system based on their CGPA 8.2, 7.3, 8.5, 9.2 and 7.9 respectively. But every student has to be allowed for a quantum period of 3 ms evenly till their browsing time completes. Display the waiting time of each student to get a first chance to access the internet service. (7 marks) ✓

Write the role of dispatcher, short term scheduler in process management module of the operating systems. (3 marks) ✓

5. Parent process creates two child processes A, B and they initialize their own array of elements. Let the child process A display the array elements along with their average and child process B display the maximum element of the respective array. Devise a C program for this scenario. (7 marks) ✓ [10]

A server wants to handle 1000 user queries from 1000 clients. The programmer has decided to handle each client using 1 thread. Hence this program requires 1000 threads. Discuss how do you implement this scenario efficiently using threads. (3 marks)