

**VIT**
Vellore Institute of TechnologyReg. No. : XXXXXXXXXX**Final Assessment Test (FAT) - July/August 2023**

Programme	B.Tech.	Semester	Fall Inter Semester 22-23
Course Title	OPERATING SYSTEMS	Course Code	BCSE303L
Faculty Name	Prof. Indra Priyadharshini S	Slot	E2+TE2
		Class Nbr	CH2022232500755
Time	3 Hours	Max. Marks	100

PART-A (7 X 10 Marks)**Answer all questions**

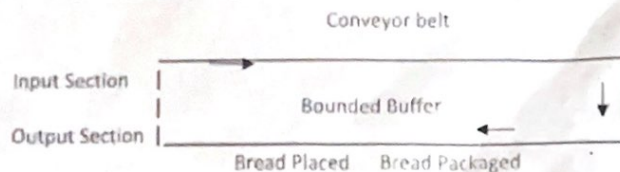
01. You are tasked with designing an operating system for a highly secure smartphone targeted at corporate executives. The device needs to handle sensitive information and protect against potential cyber threats. In this scenario, would you recommend implementing a micro kernel or layered structure for the operating system? Justify your choice by considering the pros and cons of each approach and how they align with the requirements of the project with neat sketch. [10]
02. Consider a scenario of a banking exam where 15 candidates will be appearing for the aptitude test. If the candidate secures more than 70 out of 100 in the test, then they will be attending the next round. Write a 'C' program to do the following task using parent and child processes. The parent process count the number of candidates who gets more than 70 and the child process prints the merit list based on the marks scored in descending order. [10]
03. Suppose a software development team has five tasks to complete. The tasks arrival time, the length of the CPU burst (milliseconds) is given along with the priority below: [10]

Process	Burst Time	Arrival Time	Priority
P1	7	4	5
P2	5	2	4
P3	3	3	1
P4	2	7	2
P5	3	1	3

04. Draw Gantt charts that illustrate the execution of these processes using the following scheduling algorithms: Non-preemptive SJF and Non-preemptive priority (Lower numbers indicate higher priority). [10]
05. Calculate the average waiting time for Non-preemptive SJF and Non-preemptive priority.
06. Compute the average turnaround time for Non-preemptive SJF and Non-preemptive priority.
04. How can the college allocate students for aptitude training effectively, considering that there are four departments (CSE, IT, ECE, and EEE) and three different year levels (first year, second year, and third year)? The college has 15 first-year students, 10 second-year students, and 8 third-year students available for training. The maximum number of students that can participate in the training and allocation is given below.

Department	Maximum			Allocation		
	First	Second	Third	First	Second	Third
CSE	2	3	3	2	1	1
IT	3	1	1	2	1	1
ECE	1	2	1	1	0	1
EEE	4	2	2	0	2	0

- a) Find the need matrix
 - b) Determine the sequence of all the departments in selecting the students for the training is in a safe sequence or not by using appropriate algorithm?
 - c) If the EEE department requests 5 first year student, will the request be granted immediately or not. Justify your answer.
95. French loaf has a conveyor belt system where freshly baked bread is transported from the oven [10]
to the packaging area. The conveyor belt has limited space, and there are workers responsible for placing the bread on the belt and packaging it. The conveyor belt can hold up to 12 loaves of bread at a time. The workers need to coordinate their actions to ensure the bread is efficiently placed on the belt and packaged. To facilitate this process, a bounded buffer system is implemented. The input section represents the space on the conveyor belt where workers can place the bread. The output section represents the area where workers pack the bread.



A Worker (placing bread) will add loaves to the input section only when there is an available space on the conveyor belt otherwise he has to wait. A worker (packaging bread) remove loaves from the output section only when there are loaves present, otherwise he has to wait. Design a semaphore based pseudo code solution to manage the baked bread collection and packaging process for French loaf by ensuring the conveyor belt does not overflow or underflow.

96. A group of five friends has teamed up for a sewing competition. Each team member has been [10]
provided with sufficient wool bundles and a book containing designs and details but only five darning needles are provided in total for the team. So, all the five friends have decided to sit in a circle with a darning needle to their left and right. They spend their time doing two jobs, viz., exploring (designs and details) and sewing. However, to sew, a teammate must have both needles. If a teammate picks up a needle and finds that the other one is not available, he/she has to put down the needle and continue exploring designs to make use of time. Provide a pseudo code for the above scenario. Justify your answer in detail to prevent deadlocks and ensure that each teammate gets a chance to sew.
97. Imagine you are the system administrator of a medium-sized company that operates in a highly [10]
regulated industry such as healthcare, where data security and compliance are critical. The company recently upgraded its file storage infrastructure and implemented a new approach to file allocation in its operating system. However, some employees have raised concerns about the potential risks and challenges related to data privacy, integrity, and regulatory compliance. In this scenario, critically evaluate the different file allocation strategies with neat sketches.

considering their impact on data security, compliance requirements, and overall system performance. Based on your analysis, recommend the most suitable file allocation strategy that would effectively address the company's data security concerns and regulatory compliance needs, while also optimizing file access speed and storage utilization. Furthermore, propose any potential enhancements or alternative strategies that could be implemented to further strengthen data protection and compliance measures in the file system, ensuring the company's adherence to industry regulations and safeguarding sensitive information.

PART-B (2 X 15 Marks)

Answer all questions

8. a. Consider a page reference string 1, 2, 3, 2, 4, 1, 3, 5, 2, 3, 6, 7, 1, 2, and 6 with physical memory size of four frames which are initially empty. Apply FIFO and Optimal page replacement algorithms and calculate the Page Hit Ratio and Page Fault Ratio. Compare the performance of both the algorithms in terms of number of faults generated. [10 marks] [15]
- b. Given memory partitions of 600 KB, 1000 KB, 700 KB, 800 KB and 1100 KB (in order), how would each of the first-fit, best-fit and worst-fit algorithms place processes of 712 KB, 917 KB, 612 KB and 926 KB (in that partition order)? Which algorithm makes the most efficient use of memory? [5 marks]
9. Consider a disk drive with 750 cylinders, numbered 0 to 749. Assume that the arm is at cylinder 350 and the previous request was at cylinder 200. Disk requests are received by a disk drive for the following cylinders 402, 35, 25, 660, 28, 524, 370, 15, 493, 55, 100, 350 in order. A seek takes 4msec per cylinder moved. Compute the total seek time needed to serve these requests using the following algorithms and find the best and the worst algorithms for this scenario. [15]
- a) FCFS [5 marks]
 - b) SSTF [5 marks]
 - c) C-LOOK [5 marks]



10]

[10]