VIT
Vellore Institute of Technology
CHENNAI

Continuous Assessment Test (CAT) – I - JANUARY 2025

Programme	:	B.Tech (CSE and its Specialization)	Semester	Winter Semester 2024-25
Course Code & Course Title	:	BCSE303L Operating Systems	Class Number	CH2024250502585 CH2024250502589 CH2024250502592
Faculty	:	Dr.M.Revathi Dr. Afruza Begum Dr. P.Anandan	Slot	B1+TB1
			Max. Mark	50
Duration	:	90 Minutes		

General Instructions:
- Write only your registration number on the question paper in the box provided and do not write other information.

Answer all questions

Q. No	Sub Sec.	Description	Marks
1		Assume that you have been appointed as an Operating System Design Engineer for a mobile phone company. Propose a suitable architecture with neat sketch for the above. Also provide a detailed explanation of structure with the key functionalities. **(7 marks)** Compare the proposed architecture with the other architecture, highlighting at least three advantages and disadvantages. **(3 marks)**	10
2	a	A hospital's central server is executing multiple diagnostic tasks submitted by different departments. Each task has a specified duration (burst time), priority (based on urgency), and submission time (arrival time). The diagnostic tasks ae as follows:	20

Task	Priority (Lower = Urgent)	Duration (ms)	Submission Time (ms)
T1	3	10	0
T2	2	5	1
T3	1	8	2
T4	4	6	3
T5	5	12	5

The IT team from the hospital is given with the task of identifying an effective technique for executing the above tasks under the following

conditions

i. Execute the tasks in the order of their arrival times and calculate the waiting time and Turnaround time for each task. (6 marks)

ii. Execute the tasks in the order of burst time. Interrupt the ongoing task and replace with a task with less burst time when it is arrived. Identify a suitable algorithm and calculate the waiting time and turnaround time for each task. (4 marks)

iii. Execute the tasks based on urgency levels. Current ongoing task may be pre-empted with higher priority tasks. Calculate the waiting time and turnaround time, response time for each task and throughput of the scheduling algorithm. (8 marks)

iv. Compare each algorithm based on average waiting time and turnaround time and suggest the best algorithm for the given scenario. (2 marks)

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a) Devise a program to create the processes as per the process hierarchy mentioned in the diagram to perform various arithmetic operations
P1: Collects two input numbers from the user.
P2: Performs addition of the two numbers collected in P1.
P3: Performs subtraction of the two numbers collected in P1.
P4: Calculate the square of output obtained in P2.
P5: Print the process id of the processes P1,P2,P3,P4 and P5
The program should ensure that each parent process waits for its child processes to complete before terminating. (12 Marks)

b) Assume that in the given program the process P1 terminates unexpectedly. What happens to the processes P2, P3, P4 and P5? Suggest the solution to handle it effectively. (3 marks).

A company is developing a web server that needs to handle multiple client requests to read data from a database. What are the benefits of using multithreading for this web server compared to multi-process approach? (5 Marks)