



VIT

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

REG.NO.:

SLOT: C1 +TC1

SCHOOL OF COMPUTER SCIENCE AND ENGINEERING
CONTINUOUS ASSESSMENT TEST - I
FALL SEMESTER 2025-2026

Programme Name & Branch : B.Tech CSE (all branches)
Course Code and Course Name : BCSE303L - Operating Systems

Faculty Name(s) : ARUN KUMAR T, BHULAKSHMI BONTHU, PADMAVATHY T, ANISHA M. LAL, USHUS ELIZABETH ZACHARIAH, KARTHIKA M S, RUBY D, DEEPA K, MOHANA SUNDARI L, MALINI S, VENKATA LAKSHMI NARAYANA K, SURESH P, GLADYS GNANA KIRUBA B, NAVEENKUMAR J, THIRUNAVUKKARASAN M, THANUJA R, MOHANKUMAR B, SIVAPRAKASH S, RAJKUMAR S, HITESHWAR KUMAR AZAD

Class Number(s) : VL2025260101329, 1316, 1364, 1313, 1332, 1361, 1318, 1336, 1352, 1348, 0589, 1322, 1340, 1320, 1356, 1325, 2374, 1345, 1315, 1338

Date of Examination : 19.08.2025

Exam Duration : 90 minutes

Maximum Marks: 50

General instruction(s):

- Answer All Questions

Q. No	Question	M	CO	BL
1.	A software development company is tasked with designing an operating system for three different environments: • Client A wants an operating system for a small device like a smart sensor. They need it to be fast and efficient and are okay if it's hard to update or modify. • Client B is building a reliable server system where crashes must be avoided. They want different parts of the OS to run separately so that a failure in one does not crash the whole system. • Client C needs a flexible desktop OS where they can add or remove features like drivers at any time, even while the system is running. i. Identify the best OS design for each client. Give the architecture and explain why each one is the best choice. (6 marks) ii. List advantages and disadvantage of each OS design mentioned above. (4 marks)	10	C O 1	B L 2
2.	A banking transaction system handles thousands of operations per second. Consider the following sequence of events for a single transaction process in the OS: • The process is created to handle a customer's request. • It waits for user authentication data from the network. • Once data arrives, it performs verification using the CPU. • During verification, a high-priority fraud detection process pre-empts it. • After resuming, it accesses the database to fetch account details. • Due to a database lock, it must wait until the resource becomes available. • Finally, it completes the transaction and terminates.	10	C O 1	B L 4



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	i. Draw the Process State Diagram and trace the exact state transitions for the above scenario. (7 marks) ii. Suppose a process is waiting for an I/O device and the I/O completes explain step-by-step what happens to the process's state and how the PCB is updated (3 marks)																																											
3.	a. Explain three advantages and three disadvantages of user-level threads compared to kernel-level threads. (6 Marks) b. If the server needs to take advantage of multiple CPU cores, which type of thread implementation would be better? Justify your answer with two reasons. (4 Marks)		C O 1	B L 2																																								
4.	Consider the following set of five processes with their Arrival Time and CPU Burst Time (in ms). The CPU scheduling policy is Round Robin with a time quantum of 2ms. i. Draw the Gantt chart (4 marks) ii. Calculate the Response time, Completion time, average turnaround time and average waiting time. (4 marks) iii. Why context switches in Round Robin can reduce CPU efficiency.(2 marks) <table><tr><th>Process ID</th><th>Arrival Time</th><th>CPU Burst Time</th></tr><tr><td>P1</td><td>0</td><td>9</td></tr><tr><td>P2</td><td>1</td><td>5</td></tr><tr><td>P3</td><td>2</td><td>7</td></tr><tr><td>P4</td><td>3</td><td>4</td></tr><tr><td>P5</td><td>4</td><td>6</td></tr></table>	Process ID	Arrival Time	CPU Burst Time	P1	0	9	P2	1	5	P3	2	7	P4	3	4	P5	4	6	10	C O 2	B L 3																						
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5.	Consider a system that uses Multilevel Queue Scheduling with two queues: Queue 1: High-priority queue using Pre-emptive Shortest Job First scheduling. Queue 2: Low-priority queue using FCFS scheduling. Given the following set of processes with their arrival times, burst times, and queue assignments, draw the Gantt chart and calculate the average turnaround time and average waiting time. <table><tr><th>Process ID</th><th>Arrival Time</th><th>Burst Time</th><th>Queue No.</th></tr><tr><td>P1</td><td>0</td><td>6</td><td>2</td></tr><tr><td>P2</td><td>2</td><td>2</td><td>1</td></tr><tr><td>P3</td><td>5</td><td>1</td><td>2</td></tr><tr><td>P4</td><td>6</td><td>5</td><td>2</td></tr><tr><td>P5</td><td>7</td><td>2</td><td>1</td></tr><tr><td>P6</td><td>8</td><td>4</td><td>2</td></tr><tr><td>P7</td><td>9</td><td>8</td><td>1</td></tr><tr><td>P8</td><td>11</td><td>3</td><td>2</td></tr><tr><td>P9</td><td>14</td><td>2</td><td>1</td></tr></table>	Process ID	Arrival Time	Burst Time	Queue No.	P1	0	6	2	P2	2	2	1	P3	5	1	2	P4	6	5	2	P5	7	2	1	P6	8	4	2	P7	9	8	1	P8	11	3	2	P9	14	2	1	10	C O 2	B L 3
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