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

SLOT: G1+TG1

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

Programme Name & Branch	: B. Tech- CSE (Common to all)
Course Code and Course Name	: BACSE106 & Operating Systems
Faculty Name(s)	: Anuradha J, Bhulakshmi Bonthu, Rajkumar S, Venkata Lakshmi Narayana K, Satyajit Mohanty, Hiteshwar Kumar Azad, Saraswathi Priyadharshini A, Suresh P, Anusha N, Konatham Sumalatha, Sridevi S, Berlin M A, Priyadharsini M, Naga Priyadarsini R, Bhawana Tyagi, Karthika M S, Raghul J, Saraswathi U, Sivakumar T
Class Number(s)	: VL2025260501488, 1571, 1564, 1565, 1633, 1581, 1584, 1568, 1569, 1626, 1585, 1588, 1641, 1563, 1590, 1592, 1594, 1600, 1614
Date of Examination	: 02.02.2026
Exam Duration	: 90 minutes
	Maximum Marks: 50

General instruction(s):

- Answer All Questions
- M - Max mark; CO – Course Outcome; BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)
- Course Outcomes:
  CO1. Understand the structure, functionalities, and foundational concepts of operating systems
  CO2. Apply process scheduling algorithms and analyze thread models and deadlock-handling methods

Q. No	Question	Module	Marks	CO	BL
1.	A software company is developing a next-generation operating system for a smart healthcare and industrial automation platform. The OS is expected to run on heterogeneous hardware, ranging from embedded medical devices to high-performance monitoring servers. The design team must ensure reliability, security, scalability, and ease of maintenance, while also supporting fast boot time and efficient hardware interaction. Explain Monolithic, Layered, Microkernel, and Modular OS structures with neat sketch, Pros and Cons, and justify the most suitable structure for this system. Also, identify the essential operating system services required for this platform.	1	10	CO1	BL2
2.	a) Consider a system running a single program that issues an output request to a printer. The OS uses interrupt-driven I/O. Explain the interrupt timeline and discuss the role of the interrupt service routine (ISR) in completing the output operation.	1	5	CO1	BL4
	b) Analyse the various methods of system call parameter passing. With the help of a neat diagram, explain how parameters are passed from user space to kernel space during a system call invocation.	1	5		
3.	a) Explain the process creation mechanism in an operating system. Examine the role of the Process Control Block (PCB) in maintaining process context and analyse how the parent–child relationship influences resource sharing and handles address space allocation.	2	5	CO2	BL4
	b) Analyse how multithreading improves application performance and resource utilization in multi-core systems. Also, explain how data parallelism and task parallelism are implemented in multithreaded applications with suitable diagrams.	2	5		

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4.	Consider the following processes, each arriving for execution at the time indicated. **Process / Priority / Burst Time (ms) / Arrival Time (ms)** P1 / 5 / 13 / 6 P2 / 10 / 15 / 10 P3 / 30 / 40 / 15 P4 / 3 / 12 / 12 P5 / 2 / 4 / 0 P6 / 6 / 4 / 5 Each process is assigned a numeric priority, where a lower value indicates a higher priority level. Apply the following scheduling algorithms to draw Gantt chart and compute the average waiting time and average turnaround time. i) Pre-emptive Priority (3 marks) ii) Non pre-emptive SJF (3 marks) iii) Round Robin (Time Quantum = 10 ms) (4 marks)	2	10	CO2	BL3
5.	Consider a system that uses Multilevel Queue Scheduling with following criteria. • System has three queues (Q1, Q2 and Q3) and priority decreases from Q1 to Q3 • Q1: Priority Scheduling (Non pre-emptive, lower number = higher priority) • Q2: Round Robin (time quantum = 4) • Q3: FCFS • Higher-priority queues can preempt lower-priority queues • CPU remains idle if no process is ready **Process / Priority / Burst Time (ms) / Arrival Time (ms) / Queue** P1 / 3 / 6 / 0 / Q3 P2 / 2 / 4 / 1 / Q1 P3 / 1 / 3 / 2 / Q2 P4 / 6 / 2 / 15 / Q1 P5 / 8 / 5 / 16 / Q3 P6 / 2 / 7 / 17 / Q2 P7 / 1 / 3 / 20 / Q1 Draw the Gantt chart and calculate the average turnaround time, average waiting time, and average response time.	2	10	CO2	BL3

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