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

24BDE616

SCHOOL OF COMPUTER SCIENCE ENGINEERING AND INFORMATION SYSTEMS

CAT-I

FALL SEMESTER 2026-2027

SLOT: A1 + TA1

Programme Name & Branch	**: B.Tech. CSE (Artificial Intelligence and Data Engineering)**
Course Code and Course Name	**: BCSE303L and Operating Systems**
Faculty Name(s)	**: Dr.S.Porkodi, Dr.M. Balasubramani & Dr.S.Karpagam**
Class Number(s)	**: VL2026270103586, VL2026270102580, VL2026270102576**
Date of Examination	**: 09-08-2026**
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)

CO1: Interpret the evolution of OS functionality, structures, layers and apply various types of system calls of various process states.

CO2: Design scheduling algorithms to compute and compare various scheduling criteria.

Q. No	Question	M	CO	BL
1.	A company is developing a smart autonomous drone that performs real-time surveillance, obstacle detection, secure communication, and live video streaming. The drone has limited memory and requires high reliability with the ability to update hardware drivers without restarting the system. a) Recommend the most suitable OS structure for the drone. Justify your choice. b) Identify and explain the Operating System design issues that should be considered while developing the operating system for the above application.	10	1	4
2.	A software company is developing a mobile banking application. The application must securely access files, communicate over the network, and efficiently utilize system resources while preventing unauthorized access to sensitive customer data. a) Explain the role of abstractions in supporting the above application. b) The application handles confidential financial transactions. Explain the influence of security on Operating System design.	10	1	2
3.	A university is developing an Online Examination System. When a student uploads an answer sheet, the application validates the file, stores it securely on the server, updates the database, and sends a confirmation message. During this process, the operating system switches between user mode and kernel mode while responding to hardware and software events. a) Demonstrate the sequence of system calls involved in the above operation and illustrate the transition between user mode and kernel mode. b) Explain the role of interrupts during this operation and identify the possible interrupts that may occur.	10	1	3
4.	A UNIX-based file manager allows a user to compress a selected folder. When the user clicks "Compress", the file manager creates a new process to execute the compression utility. The file manager waits until the compression is completed before displaying the message "Compression Successful." a) Illustrate UNIX process creation and management using exec(), wait(), and exit() in the above scenario.	10	1	3

	b) Analyze the role of the Process Control Block (PCB) during the execution of the above application and discuss the information stored in the PCB.			
5.	A hospital's emergency management system schedules medical tasks based on their priority. Critical patient monitoring tasks should immediately pre-empt lower-priority administrative tasks whenever they arrive. Consider the following processes (lower number indicates higher priority):	10	2	3

Process	Arrival Time (AT)	Burst Time (BT)	Priority
P1	0 ms	7 ms	3
P2	1 ms	6 ms	2
P3	2 ms	5 ms	1
P4	5 ms	3 ms	2
P5	8 ms	4 ms	1

a) Draw the Gantt Chart using Preemptive Priority Scheduling. (3 Marks)

b) Calculate the Completion Time (CT), Turnaround Time (TAT), and Waiting Time (WT) for each process. (5 Marks)

c) Compute the Average Turnaround Time and Average Waiting Time. (2 Marks)

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