Roll No. .....

12587

M. Tech. 1st Semester (Regular/Re-appear/Improvement/Mercy Chance) Examination – December, 2025

ADVANCED OPERATING SYSTEM (CSE New)

Paper : MCSE-102

Time : Three Hours] ***[Maximum Marks : 100***

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Question No. **1** is ***compulsory***. Attempt any ***four*** questions from the rest taking ***one*** question from each Unit. Each question carries equal marks.

1. Answer all parts : $8 \times 2.5 = 20$

   (a) Explain the term critical section with a simple example.

   (b) What are the main objectives of an operating system ?

   (c) Discuss two-phase commit and non-blocking commit.

   (d) How do concurrency and inter-process dependencies affect the recovery process ?

   (e) What is the difference between token-based and non-token-based mutual exclusion algorithms ?

   (f) What is distributed scheduling and why is it important ?

   (g) What is checkpointing ?

   (h) What is the main function of a multiprocessor operating system ?

UNIT – I

2. (a) What is a process deadlock ? Explain the models of deadlocks and the role of resources. 10

   (b) Compare monolithic, layered, microkernel, and modular design approaches with suitable examples and their advantages and disadvantages. 10

3. (a) Explain semaphores and monitors. Discuss common synchronization problems with their solutions. 10

(b) How processes are created, managed, and executed. Discuss the concept of concurrent processes and their significance in modern operating systems. 10

UNIT – II

4. (a) Explain the inherent limitations of distributed communication and discuss the concepts of Lamport's logical clock, vector clock, and causal ordering with suitable examples. 10

(b) Discuss the concept of distributed mutual exclusion. Explain Lamport's Algorithm and Suzuki-Kasami's Broadcast Algorithm in detail. 10

5. (a) Explain centralized deadlock detection algorithms and distributed deadlock detection algorithms, highlighting their advantages and disadvantages. 10

(b) Discuss the mechanisms, design issues, and protocols used to manage distributed files efficiently and ensure reliability, transparency, and fault tolerance. 10

UNIT – III

6. (a) Explain the basic concepts of failure recovery and fault tolerance in distributed systems. 10

(b) Compare backward recovery and forward recovery, highlighting their mechanisms, advantages, and limitations. 10

7. (a) Explain the difference between synchronous and asynchronous checkpointing and their roles in recovery. Discuss their advantages and disadvantages in distributed systems. 10

(b) Discuss voting and dynamic voting protocols. Explain their working principles and compare their efficiency and reliability. 10

UNIT – IV

8. Describe various memory management techniques used in multiprocessor operating systems. How do these techniques differ from those used in uniprocessor systems ? Discuss their role in improving system performance and reliability. 20

9. Explain the concept of concurrency control in distributed database systems. Describe different concurrency control algorithms highlighting their advantages and limitations. 20
