

## MSc Sem.-1 Examination

404

## Computer Science

February-2025

Time : 2-30 Hours]

[Max. Marks : 70

- Q1(A) Define a transaction. Explain its key properties (ACID). (7)
- Q1(B) What is serializability in transactions? Why is it important? (7)
- OR
- Q1(A) Explain the difference between conflict serializability and view serializability with examples. (7)
- Q1(B) Describe a method for testing the serializability of a given schedule. (7)
- Q2(A) What is the Two-Phase Commit Protocol? Discuss its significance in distributed systems. (7)
- Q2(B) Explain the process of system recovery in the event of a transaction failure. (7)
- OR
- Q2(A) Discuss the role of recovery and atomicity in transaction management with suitable examples. (7)
- Q2(B) What is log-based recovery? Explain the concept of deferred update and immediate update. (7)
- Q3(A) Discuss the problems that may arise during the concurrent execution of transactions. (7)
- Q3(B) Describe the advantages and challenges of concurrent execution of transactions in database systems. (7)
- OR
- Q3(A) What is a locking mechanism? Explain the types of locks used in concurrency control. (7)
- Q3(B) Discuss the concept of strict two-phase locking (2PL) and its importance in ensuring serializability. (7)
- Q4(A) Explain how multiple granularity locking can help improve system performance. (7)
- Q4(B) Discuss deadlock in concurrency control. What are the common causes of deadlock? (7)
- OR
- Q4(A) Explain how deadlocks can be prevented or avoided in database systems. (7)
- Q4(B) Describe a method for detecting and resolving deadlocks in a database. (7)
- Q5 True/False Attempt any seven out of twelve.(2 Marks each) (14)**
- 1) A transaction must satisfy the ACID properties to maintain database consistency.
  - 2) View serializability implies conflict serializability in all cases.
  - 3) The Two-Phase Commit protocol ensures atomicity in distributed transactions.
  - 4) Deferred update in log-based recovery writes changes to the database immediately after the transaction begins.

E1466-2

- 5) A schedule is said to be serializable if it is equivalent to some serial schedule.
- 6) Recovery and atomicity are unrelated to each other in transaction management.
- 7) Concurrent execution of transactions can lead to problems such as lost updates and dirty reads.
- 8) Cascading rollbacks occur when the failure of one transaction causes multiple other transactions to roll back.
- 9) Log-based recovery depends solely on the undo operations to restore the database.
- 10) Deadlocks occur only in single-user systems and not in multi-user database systems.
- 11) In a locking mechanism, a read lock allows multiple transactions to read the same data concurrently.
- 12) Strict Two-Phase Locking (2PL) ensures deadlock prevention in all cases.

**BEST OF LUCK**