

**MASTER OF COMPUTER
APPLICATIONS**

(MCA) (REVISED)

Term-End Examination

December, 2025

**MCS-043 : ADVANCED DATABASE
MANAGEMENT SYSTEM**

Time : 3 Hours

Maximum Marks : 100

Note : *Question No. 1 is compulsory. Attempt any **three** questions from the rest.*

1. (a) Explain the key features of a good database design. 5
- (b) What are Functional Dependencies ? Explain with the help of an example. How do they assist in normalization ? 5
- (c) Discuss the role of UML in database modeling. 5

- (d) Describe the purpose and use of triggers and stored procedures in SQL. 5
 - (e) What is a Data Dictionary ? How is cataloging managed in RDBMS ? 5
 - (f) Differentiate between centralized and distributed database systems. 5
 - (g) Explain how access control mechanisms contribute to database security. 5
 - (h) Write a short note on Multimedia Database. 5
2. (a) Design an Enhanced Entity-Relationship (EER) diagram for a university database system including entities like student, faculty, courses and departments. Convert the diagram into relational tables. 8
- (b) Explain the two-phase locking protocol with an example. How does it help in maintaining consistency during concurrent transactions ? 7

- (c) List and explain various types of normal forms beyond 3NF. Give *one* example of 4NF and 5NF. 5
3. (a) Write a detailed note on the distributed deadlock detection and resolution techniques. How does the distributed 2-phase commit protocol work ? 10
- (b) Discuss query optimization techniques. How is the cost of a query evaluated and minimized ? 7
- (c) What is an assertion in SQL ? Provide an example. 3
4. (a) Explain the architecture of the PostgreSQL database system. Highlight its key features in handling transactions and indexing. 7
- (b) What is the role of mobile database in modern applications ? Discuss their advantages and limitations. 5
- (c) Describe how JDBC and ODBC support web-based database applications. 4

(d) What is statistical database ? How do they differ from conventional database ?

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5. Write short notes on any *four* of the following : 4×5=20

- (a) System Catalogue
- (b) Timestamp-based Concurrency Control
- (c) Concept of replication server in distributed DBMS
- (d) Knowledge databases
- (e) Digital Libraries integration with DBMS

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