

## First Semester MCA Degree Examination, June/July 2025

## Database Management Systems (DBMS)

Time: 3 hrs.

Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.

2. M : Marks, L: Bloom's level, C: Course outcomes.

## Module – 1

|     |                                                                                         | M  | L  | C   |
|-----|-----------------------------------------------------------------------------------------|----|----|-----|
| Q.1 | a. Describe the three schema architecture for database system.                          | 10 | L2 | CO1 |
|     | b. Illustrate the characteristics of database approach.                                 | 5  | L2 | CO1 |
|     | c. Explain any 5 various symbols and its representation used in ER Models with diagram. | 5  | L2 | CO1 |

## OR

|     |                                                                                                            |    |    |     |
|-----|------------------------------------------------------------------------------------------------------------|----|----|-----|
| Q.2 | a. Define the following terms, with an example for each :<br>i) key Attribute      ii) Composite Attribute | 10 | L2 | CO1 |
|     | b. Differentiate between Strong entity and Weak entity with an example.                                    | 5  | L2 | CO1 |
|     | c. Construct ER Diagram for college database Management System.                                            | 5  | L3 | CO1 |

## Module – 2

|     |                                                                                       |    |    |     |
|-----|---------------------------------------------------------------------------------------|----|----|-----|
| Q.3 | a. Explain selection and projection set operations.                                   | 5  | L2 | CO2 |
|     | b. With a suitable example, explain join and division operation in relational algebra | 5  | L2 | CO2 |
|     | c. Explain Tuple Relational Calculus and Domain Relational Calculus.                  | 10 | L2 | CO2 |

## OR

|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |    |    |     |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|-----|
| Q.4 | a. Explain DDL, DML with examples.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 5  | L2 | CO2 |
|     | b. Define Views in SQL? Explain how to create a view.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 5  | L2 | CO2 |
|     | c. Create the following tables with properly specifying primary keys, foreign keys, and solve the following queries.<br>BRANCH (Branch_id, Branch_name, HOD)<br>STUDENT (USN, Name, Address, Branch_id, Sem)<br>BOOK (Book_id, Book_name, Author_id, Publisher, Branch_id)<br>BOOK (Book_id, Book_name, Author_id, Publisher, Branch_id)<br>AUTHOR (Author_id, Author_name, Country, Age)<br>BORROW (USN, Book-id, Borrowed_date)<br><b>Execute the following queries:</b><br>1. List the details of All students who are all studying in II sem MCA.<br>2. List the students who are not borrowed any books.<br>3. Display the USN, Student_name, Branch_name, Book_name, Author_name, Books_borrowed_date of II sem MCA Students who borrowed books.<br>4. Display the student details who borrowed more than two books.<br>5. Display the student details who borrowed books from more than one author. | 10 | L3 | CO2 |

| Module – 3 |    |                                                                                |    |    |     |
|------------|----|--------------------------------------------------------------------------------|----|----|-----|
| Q.5        | a. | Define Normalization. Explain about 1NF, 2NF with examples.                    | 12 | L2 | CO3 |
|            | b. | Discuss Multi-Valued dependencies and Join dependencies.                       | 08 | L2 | CO3 |
| OR         |    |                                                                                |    |    |     |
| Q.6        | a. | Discuss Non Loss decomposition and functional dependencies.                    | 10 | L2 | CO3 |
|            | b. | Explain 4NF and 5NF with examples.                                             | 10 | L2 | CO3 |
| Module – 4 |    |                                                                                |    |    |     |
| Q.7        | a. | Briefly explain ACID Properties with examples.                                 | 8  | L2 | CO3 |
|            | b. | Discuss Recoverability in detail with an example.                              | 6  | L2 | CO3 |
|            | d. | Illustrate Validation based protocols with example.                            | 6  | L3 | CO3 |
| OR         |    |                                                                                |    |    |     |
| Q.8        | a. | Discuss Concurrent executions with example.                                    | 8  | L2 | CO3 |
|            | b. | Define Serializability. Discusses Test for Serializability.                    | 6  | L2 | CO3 |
|            | c. | Illustrate Timestamp based protocols with example.                             | 6  | L3 | CO3 |
| Module – 5 |    |                                                                                |    |    |     |
| Q.9        | a. | Discuss Log Based Recovery with a neat diagram.                                | 8  | L2 | CO3 |
|            | b. | Define Check point. Explain different types of Checkpoints with examples.      | 6  | L2 | CO3 |
|            | c. | Illustrate Timestamp Based Protocol with an example.                           | 6  | L3 | CO3 |
| OR         |    |                                                                                |    |    |     |
| Q.10       | a. | Discuss a lock-based concurrency control issue in DBMS transaction processing. | 8  | L2 | CO3 |
|            | b. | Define Buffer Management. Explain methods of Buffer Management with examples.  | 6  | L2 | CO3 |
|            | c. | Illustrate the concept of the Failure with loss of nonvolatile storage         | 6  | L3 | CO3 |

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