

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

MCA (Two Years) S2 (R,S) Degree Examination May 2025

**Course Code: 20MCA102****Course Name: ADVANCED DATABASE MANAGEMENT SYSTEMS**

Max. Marks: 60

Duration: 3 Hours

**PART A***Answer all questions, each carries 3 marks.*

Marks

- |    |  |     |
|----|--|-----|
| 1  | Explain the levels of data abstraction with figure.  | (3) |
| 2  | Explain any two database architecture with figures.  | (3) |
| 3  | Define Fifth Normal Form (5NF). Give an example of a relation that not in 5 NF.                  | (3) |
| 4  | Define the following in relational model:<br>(i) Domain (ii) Tuples (iii) Cardinality            | (3) |
| 5  | Explain uncommitted data problem with example.   | (3) |
| 6  | Discuss about deadlock. Explain how we can deal with deadlock.                                   | (3) |
| 7  | Explain the structure of B+ tree nodes.  | (3) |
| 8  | Explain variable length file organization with the help of a diagram.                            | (3) |
| 9  | Explain MongoDB replication with figure.   | (3) |
| 10 | How can arrays and multisets be used to model real world applications in object based databases? | (3) |

**PART B***Answer any one question from each module. Each question carries 6 marks.***Module I**

- 11 Assume we have the following application that models soccer teams, the games they play, and the players in each team. In the design, we want to capture the following: (6)

- We have a set of teams, each team has an ID (unique identifier), name, main stadium, and to which city this team belongs.
- Each team has many players, and each player belongs to one team. Each player has a number (unique identifier), name, DoB, start year, and shirt number that he uses.
- Teams play matches, in each match there is a host team and a guest team. The match takes place in the stadium of the host team.
- For each match we need to keep track of the following:
  - The date on which the game is played
  - The final result of the match
  - The players participated in the match. For each player, how many goals he scored, whether or not he took a yellow card, and whether or not he took a red card.
  - During the match, one player may substitute another player. We want to capture this substitution and the time at which it took place.
- Each match has exactly three referees. For each referee we have an ID (unique identifier), name, DoB, years of experience. One referee is the main referee and the other two are assistant referees.

Design an ER diagram to capture the above requirements

- 12 Explain any four operations in relational algebra with example. (6)

#### Module II

- 13 Define 3NF. Demonstrate how a relation which is not in 3NF can be converted into 3NF. (6)

OR

- 14 Define 4 NF. Demonstrate how a relation which is not in 4NF can be converted to 4NF. (6)

**Module III**

- 15 Define lock granularity and explain different levels of locking methods for concurrency control. (6)

OR

- 16 What do you understand by the term Time Stamp? What are the different types of time stamps? How it is used to control concurrent execution of transactions. (6)

**Module IV**

- 17 Discuss query cost of the following: (6)

- (i) Primary B+ tree index (equality on key)
- (ii) Primary B+ tree index(equality on non-key)
- (iii) Secondary B+ tree index( equality on non-key)

OR

- 18 Explain RAID levels with suitable diagrams. (6)

**Module V**

- 19 Explain about DTD in XML with examples. (6)

OR

- 20 Explain Hbase architecture with figure. (6)

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