(3 Hours) **[Total Marks: 80]**

N.B.:- (1) Question No. **1** is **Compulsory**.
(2) Solve any **three** questions from the remaining **five** questions.
(3) **Figures** to the **right** indicate **full** marks.
(4) Make **suitable** assumptions wherever **necessary** and state them **clearly**.

1. (a) Define generalization and specialization. **5**
   (b) Explain different keys in DBMS. **5**
   (c) Explain role of DBA. **5**
   (d) Compare traditional file system with DBMS. **5**

2. (a) List the functional dependencies which satisfy the relation: **10**

X	y	z
X1	Y1	Z1
X1	Y2	Z1
X2	Y2	Z1
X2	Y2	Z1

   (b) Suppose you are given the following requirements for a simple database of the National Cricket Trophy (NCT): **10**
   - the NCT has many teams,
   - each team has a name, a city, a coach, a captain, and a set of players,
   - each player belongs to only one team,
   - each player has a name, a position (such as left wing or goalie), a skill level,
   - and a set of injury records,
   - a team captain is also a player,
   - a game is played between two teams (referred to as host team and guest team) and has a date (such as May 11th, 1999) and a score (such as 4to 2).

   Construct ER diagram for the NCT database.

3. (a) Explain different types of operations in relational algebra. **10**
   (b) Explain Joins and types of Joins with suitable example. **10**

4. (a) Define Normalization. Explain 1NF,2NF and 3NF with suitable example. **10**
   (b) **10**

   Consider the following schema for College Library.

   Student (Roll_no, Name, Branch)

   Book (ISBN, Title, Author, Publisher)

   Issue (Roll_no, ISBN, Date_of_ Issue)

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Write SQL queries for the following statements:

i. List Roll Number and Name of all students of the branch IT.
ii. Find the name of students who have issued a book published by 'XYZ' publisher.
iii. List title of all books and their author issued by student 'Alice'
iv. List title of all books issued on or before 31st DEC, 2019

5. (a) Explain Event Condition Action (ECA) model with suitable example. **10**
   (b) Explain types of Integrity Constraints with example. **10**

6. Write note on (**any four**): **20**
   (a) DDL commands.
   (b) Hashing Techniques.
   (c) Data Independence.
   (d) Types of attributes.
   (e) Aggregate function in SQL.

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