ABV- Indian Institute of Information Technology & Management, Gwalior

Database Systems (IT205)

Major Examination (Session 2024–25)

Maximum Time: 3 Hours   **Max Marks: 60**

Note: Attempt all questions. Marks are indicated against each question.

1. (a) Explain the architecture of a Database Management System with neat diagram.
   (b) Discuss different types of data models with examples.   (10 Marks)

2. Consider the following schema: **Student**(<u>RollNo</u>, Name, Branch, CGPA) **Course**(<u>CID</u>, Title, Credits) **Enrolled**(<u>RollNo</u>, <u>CID</u>, Grade)

   Write SQL queries for: (i) List names of students enrolled in "DBMS" course. (ii) Find students with CGPA > 8.5. (iii) Display the course titles taken by "CSE" students. (iv) Find the average CGPA branch-wise.   (10 Marks)

3. (a) Explain functional dependency with suitable examples. (b) Normalize the following relation into 3NF: **Sales**(<u>OrderID</u>, CustName, CustCity, ProductID, ProductName, Price).   (10 Marks)

4. (a) Discuss transaction properties (ACID). (b) What are transaction schedules? Explain Serializability with example. (c) Differentiate between Deadlock prevention and Deadlock detection techniques.   (10 Marks)

5. Write short notes on (any three): (i) Indexing and Hashing (ii) Query Processing steps (iii) NoSQL Databases and types (iv) Database Recovery techniques   (10 Marks)

6. Case Study: A university wants to design a database for managing hostel allocations. Each hostel has multiple rooms, and each room can accommodate one student. The database should also maintain details of mess fees and payment status.

   (i) Draw the ER diagram for this system. (ii) Convert it into relational schema. (iii) Write SQL queries for: - Find students who have not paid mess fees. - Count number of students per hostel.   (10 Marks)