(Time: 2½ hours)

Total Marks: 75

N. B.: (1) **All** questions are **compulsory**.
   (2) Make **suitable assumptions** wherever necessary and **state the assumptions** made.
   (3) Answers to the same question must be **written together**.
   (4) Numbers to the **right** indicate **marks**.
   (5) Draw **neat labeled diagrams** wherever **necessary**.
   (6) Use of **Non-programmable** calculators is **allowed**.

1. **Attempt _any three_ of the following:**   15
   a. Write the disadvantages of file processing system.
   b. Discuss any two applications where database management system can be used.
   c. Write a short note on business rules.
   d. What is the importance of data model?
   e. Explain the concept of weak entity set.
   f. Write various symbols and their meaning used to draw ER diagram.

2. **Attempt _any three_ of the following:**   15
   a. What do you mean by decomposition? Write the desirable properties of decomposition.
   b. Compare BCNF and 3NF.
   c. List aggregate functions of relational algebra. Explain with example.
   d. Explain the following relational algebra operations.
         1. Rename   2. Cartesian product
   e. Write a formal definition of domain relational calculus. Explain with example.
   f. Write a short note on tuple relational calculus.

3. **Attempt _any three_ of the following:**   15
   a. Write a short note on views.
   b. Discuss the importance of triggers in SQL.
   c. What do you mean by integrity constraint? Explain with example.
   d. List various set operations of SQL. Explain any two with example.
   e. Consider the schema where the primary keys are underlined.
      employees (E_id, name, address,hire_date,birth_date)
      department (dept_id, name, year_of_establishment)
      emp_dept (E_id, dept_id, from_date,to_date)
      salaries (E_id, salary,month,year)
      Construct the following SQL queries for this relational database.
      1. List all the employees of IT department.
      2. Delete employee whose name is 'ABC'.
      3. List all departments in which at least one employee gets salary > 50000.
      4. List all the departments that established in the year 2000.
      5. Update the salary of employee to 20000 whose id is 'E001' for April 2018.
   f. Write SQL DDL corresponding to the schema in Q.3 e. Make any reasonable
      assumptions about data types, and be sure to declare primary and foreign keys.

[TURN OVER]

4. **Attempt _any three_ of the following:**   15
a. Discuss ACID properties.
b. Draw state diagram of transaction. Explain in short.
c. Explain the timestamp-ordering protocol.
d. Write a note on conflict serializability.
e. What is deadlock? Explain deadlock prevention.
f. What do you mean by concurrent execution? Write the advantages of the same.

5. **Attempt _any three_ of the following:**   15
a. What is implicit cursor? Write implicit cursor attribute.
b. With example explain the conditional control in PL/SQL.
c. Write a PL/SQL function that returns the factorial of a number.
d. What is package in PL/SQL? Explain with example.
e. What is a procedure/function? Differentiate between procedure and function.
f. What is exception? Explain exception handling in PL/SQL.

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