Paper / Subject Code: 80704 / Database Management System

30|10|18

(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. What is the role of DBMS? What are its advantages over file system?
  b. Explain storage system and query processor components of database structure.
  c. What is a business rule? What is its purpose in data modeling?
  d. Write comparison between hierarchical, network & relational model.
  e. List and explain Codd's rules in detail.
  f. Explain ER diagram and its components. Give the distinction between disjoint, overlapping, total and partial constraints. Draw E-R diagram for the following situations that correctly models this domain and its constraints.
   A small racing league want a database to keep track of teams, drivers, races and scores in the league. The league is run for teams, which are identified by their names. Each team has one or more drivers signed up, and each driver is registered with the league and has a unique league licence number. First and last names of the drivers should also be included. A driver may only participate for a single team throughout the season. Races are identified simply by the dates when they are run. For each race, the league also wants to store the venue where it took place. Drivers participate in races, and for each participating driver the database should store the total race time for that driver, and the league score they got from that race.

2. Attempt *any three* of the following: 15
  a. Why are entity integrity and referential integrity important in a database? Explain in detail.
  b. Explain why normalization is necessary in database system & also explain database anomalies in detail.
   You are given the following set of functional dependencies for a relation R(A,B,C,D,E,F),
   $F = \{AB \rightarrow C, DC \rightarrow AE, E \rightarrow F\}$
   a. What are the keys of this relation?
   b. Is this relation in BCNF? If not, explain why by showing one violation.
   c. Is the decomposition (A, B, C, D) (B, C, D, E, F) a dependency preserving decomposition? If not, explain briefly.
  c. Write short note on Cartesian product with its syntax and example.
  d. Explain SET operators in relational algebra with example.
  e. Explain formal definitions with safety of expressions of tuples relational calculus.
  f. State the difference between relational algebra and calculus.

3. Attempt *any three* of the following: 15
  a. What are constraints? What are the different types of constraints? Explain.
  b. When can a view be updated? Explain the syntax of updating a view. Also state the difference between views and table.

[TURN OVER]

c   Consider the relations :
Worker
(WORKER_ID,FIRST_NAME,LAST_NAME,SALARY,JOINING_DATE,DEPARTME
NT)
Write the SQL queries for the following:

   a.   Write An SQL Query To Print The FIRST_NAME And LAST_NAME From
Worker Table Into A Single Column COMPLETE_NAME. A Space Char Should
Separate Them.
   b.   Write An SQL Query That Fetches The Unique Values Of DEPARTMENT From
Worker Table And Prints Its Length.
   c.   Write An SQL Query To Print First Three Characters Of FIRST_NAME From
Worker Table.
   d.   Write An SQL Query To Fetch Worker Names With Salaries >= 50000 And <=
100000.
   e.   Write An SQL Query To Fetch The No. Of Workers for Each Department in the
Descending Order.

d   Write in brief about SQL with its advantages and also explain NULL value concept. How
NULL values are different from EMPTY values?

e   Define Join and List its type and explain any two in details. Consider the following relation
and solve the below query:
Sample table: departments
(DEPARTMENT_ID,DEPARTMENT_NAME ,MANAGER_ID , LOCATION_ID)
Sample table: employees
(EMPLOYEE_ID , FIRST_NAME , LAST_NAME , EMAIL , PHONE_NUMBER
,HIRE_DATE , JOB_ID , SALARY , COMMISSION_PCT , MANAGER_ID ,
DEPARTMENT_ID)

i) Write a query in SQL to display the first name, last name, department number, and
department name for each employee.

f   Differentiate between ANY and ALL operators with example & also explain hierarchical
query.

4.   Attempt *any three* of the following:
   a.   List the ACID properties. Explain the usefulness of each.
   b.   Explain the concept of serializability and explain in detail view serializability.
   c.   What are concurrent transaction? Explain in detail the main features of concurrent
execution.
   d.   What are the disadvantages of time stamping methods for concurrency control? Eplain
timestamp ordering protocol.
   e.   What benefit does rigorous two-phase locking provide? How does it compare with other
forms of two-phase locking?
   f.   If deadlock is avoided by deadlock-avoidance schemes, is starvation still possible? Explain
your answer.

15

5. **Attempt _any three_ of the following:**
a. What is the use of % TYPE attributes and how it is beneficial while declaring the variable?
b. Illustrate the attributes of implicit cursor with examples.
c. Explain the function Raise_Application_Error () with example.
d. List & explain the various features of PL/SQL & also differentiate between anonymous blocks and subprograms.
e. What are packages in PL/SQL? List and explain the various advantages of packages. Create a package to display the employee name and salary.
f. What are triggers? Explain the syntax for creating a trigger in PL/SQL. List the benefits of creating trigger in PL/SQL.