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Total Number of Pages: 02

B.Tech/  
Integrated Dual Degree (B.Tech and M.Tech)  
RCS5C002

5th Semester Regular/Back Examination: 2024-25  
Database Management Systems  
CST, CSEAI, CSEDS, CSE, CSIT, CSEAIME, IT, CSE  
Time: 3 Hour  
Max Marks: 100  
Q. Code: R125

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.

The figures in the right hand margin indicate marks.

Part-I

- Q1 Answer the following questions: (2 x 10)
- Define the purpose of a database management system (DBMS).
  - What is the difference between schema and instance in a relational model?
  - Name the types of indices used in DBMS.
  - What are the advantages of using an ER diagram in database design?
  - Define functional dependency.
  - What is the significance of ACID properties in transaction processing?
  - Differentiate between primary and foreign keys.
  - What are the motivations for using database systems over traditional file systems?
  - Define 1NF with an example.
  - What are Armstrong's axioms for functional dependencies?

Part-II

- Q2 Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve) (6 x 8)
- Explain the three-schema architecture of DBMS with a diagram.
  - Describe the concept of referential integrity with an example.
  - Give an example of a weak entity set and explain why is it weak?
  - Illustrate the use of SELECT and GROUP BY clauses in SQL with examples.
  - Describe the closure of a set of functional dependencies with an example.
  - Discuss the significance of BCNF and its role in database design.
  - Explain the process of logging and recovery in transaction management.
  - Differentiate between static and dynamic hashing techniques.
  - Describe the structure of a B+ tree and its use in indexing.
  - Explain the relational algebra operations UNION, INTERSECTION, and DIFFERENCE with examples.

- k) Consider the following relation R(A,B,C,D,E,F) with a set of functional dependencies:  
 $F = \{A \rightarrow BC, B \rightarrow CD, D \rightarrow EF, BC \rightarrow AG, ABG \rightarrow DF\}$   
 i. Find the closure of each determinant.  
 ii. Find the candidate key.
- l) Given R(A, B, C, D, E, F) with FDs  
 $\{A \rightarrow C, B \rightarrow E, AB \rightarrow C, C \rightarrow D, E \rightarrow F\}$ .  
 Normalize R up to BCNF. Is it preserving dependency?

### Part-III

#### Only Long Answer Type Questions (Answer Any Two out of Four)

- Q3** Consider the following relations: **(4+4+4+4)**  
 PERSON( P\_id, F\_name, L\_name, Occupation, Salary, City)  
 ORDER(O\_id, P\_id, Item, Quantity, Price, Order\_date)
- The Primary Keys are P\_id and O\_id respectively.  
 Express the following queries in SQL.
- Find the person's name and city whose name starts with S.
  - Find the name of the person who has ordered in the same date.
  - Find the name of the person who hasn't ordered any item.
  - Find the highest ordered item.
- Q4** Design a complete database for a university system, including ER diagrams, schema, and SQL queries for student registration, course management, and grade calculation. **(16)**
- Q5** What is conflict and view serializability. Consider the following non serial schedule: **(16)**  
 $R1(X), R2(Y), W3(Z), W2(Y), W2(X), R1(Z), W3(Y), W2(X)$
- Check for conflict and view serializability.
- Q6** Why do we require 2PL over lock-based protocol? How a deadlock is possible in 2PL. Explain different deadlock detection and prevention techniques. **(2+4+10)**