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Paper Code : BCA-401

DATABASE MANAGEMENT SYSTEMS

Time Allotted : 3 Hours | *Full Marks* : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$

   i) Functional Dependencies are the types of constraints that are based on
   - a) Key
   - b) Key revisited
   - c) Superset key
   - d) none of these.

   ii) Which data type can store unstructured data ?
   - a) Raw
   - b) Char
   - c) Numeric
   - d) Varchar.

   iii) Which of the following is not a DDL statement ?
   - a) SELECT
   - b) DROP
   - c) CREATE
   - d) none of these.

   iv) If every functional dependency in set E is also in closure of F then this is classified as
   - a) F is covered by E
   - b) E is covered by F
   - c) $F+$ is covered by E
   - d) none of these.

v) Which of the following is not an aggregate function ?

a) SUM b) MIN

c) MAX d) DISTINCT.

vi) A normal form in which every non-prime attribute is fully dependent on prime attribute is

a) 1NF b) 2NF

c) 3NF d) BCNF.

vii) The operation of a certain relation *X*, produces *Y* such that *Y* contains only selected attributes of *X*. Such an operation is

a) Projection b) Selection

c) Union d) Difference.

viii) The main goal of indexing is to

a) search an item faster from a table

b) insert an item faster into a table

c) delete an item faster from a table

d) none of these.

ix) Which command returns the number of rows deleted ?

a) Truncate b) Delete

c) Drop d) None of these.

x) ON DELETE and ON UPDATE statements are associated with

a) Primary key b) Foreign key

c) Alternate key d) none of these.

xi) Database ..... , which is the logical design of the database, and the database ..... , which is a snapshot of the data in the database at a given instant in time.

a) Instance, Schema b) Relation, Schema

c) Relation, Domain d) Schema, Instance.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. a) Define super key, candidate key and primary key.
   b) R (A,B,C,D) and $A \rightarrow BC$, $B \rightarrow E$, $CE \rightarrow D$ in R. Find the candidate key for R. 3 + 2
3. Describe the three schema architecture in DBMS.
4. Explain two-phase locking protocol.
5. Consider the relation $R = \{ A,B,C,D,E,F,G,H,I,J \}$ and the set of functional dependencies :
   $F = \{ AB \rightarrow C, A \rightarrow DE, B \rightarrow F, F \rightarrow GH, D \rightarrow IJ \}$
   Decompose R into 3NF.
6. How to represent a weak entity set in ER diagram ? Quote suitable example. What is NULL ? What is its importance ? 3 + 1 + 1

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) Design an ER-diagram for traditional "Library Management System".
   b) Draw a schematic diagram of DBMS.
   c) Consider the following schema :
   Employee_Salary (EmpNo, EName, Dept, DOB, Salary)
   Write SQL to perform the following :
   - Display the number of employees in each department.
   - Display the total and average salaries of employees in "Computer Science" department.
   - Display the sum of salaries for all departments.
   - Display the highest and lowest salary for "Computer Science" department.
   - Display the names of those employees whose name starts with "A". 5 + 5 + 5

8. a) Define 2NF and 3NF.
   b) What do you mean by "loss decomposition" and "lossless decomposition" ?
   c) Consider the following relation schema R given by
      R = { Ssn, Ename, Pnumber, Pname, Plocation, Hours }
      R is decomposed into three sub-schemas, namely, R1, R2, R3
      R1 = { Ssn, Ename }
      R2 = { Pnumber, Pname, Plocation }
      R3 = { Ssn, Pnumber, Hours }
      Explain with justification, whether or not, the above decomposition is lossless.
   d) Differentiate between 3NF and BCNF. 3 + 4 + 5 + 3

9. Consider the relation.
   Bank (customer_name, account_no, account_type, balance and branch)
   a) Retrieves the name of the customer who has an account in 'Dunlop' branch and balance less than 10,000.
   b) Lists the information of all the customers of saving branch.
   c) Displays the balance of those customers whose name starts with 'A'.
   d) Retrieves the total balance amount for individual branch.
   e) Who have the minimum balance among all the customers ? 5 × 3

10. a) What do you mean by transaction ? Explain the transaction states.
    b) Explain log based recovery and checkpoints.
    c) What do you mean by shadow paging ?
    d) What do you mean by deadlock handling ? Explain in detail. 6 + 4 + 2 + 3

11. Write short notes on any *three* of the following : 3 × 5
    a) File indexing
    b) B-tree
    c) Query optimization technique
    d) Armstrong's axioms
    e) Network data model.