2013

DATABASE MANAGEMENT SYSTEM

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 the following : $10 \times 1 = 10$

   i) In the relational modes, cardinality is termed as

      a) number of tuples

      b) number of attributes

      c) number of tables

      d) number of constraints.

   ii) Relational calculus is a

      a) procedural language

      b) non-procedural language

      c) data definition language

      d) high level language.

iii) Cartesian product in relational algebra is

a) a unary operator b) a binary operator

c) a ternary operator d) not defined.

iv) DML is provided for

a) description of logical structure of database

b) addition of new structures in the database system

c) manipulation & processing of database

d) definition of physical structure of database system.

v) In a relational model, relations are termed as

a) Tuples b) Attributes

c) Tables d) Rows.

vi) In case of entity integrity, the primary key may be

a) not Null b) Null

c) both Null & not Null d) any value.

vii) In an E-R diagram an entity set is represented by a

a) rectangle b) ellipse

c) diamond box d) circle.

viii) Which of the following operations is used if we are interested in only cetain columns of a table ?

a) PROJECTION b) SELECTION

c) UNION d) JOIN.

ix) Which of the following is a comparison operator in SQL ?

a) = b) LIKE

c) BETWEEN d) All of these.

x) Using relational algebra the query that finds customers. who have a balance of over 1000 is

a) ∏Customer_name(σ balance > 1000 (Deposit))

b) σCustomer_name(∏ balance > 1000 (Deposit))

c) ∏Customer_name(σ balance > 1000 (Borrow))

d) σCustomer_name(∏ balance > 1000 (Borrow))

GROUP – B
(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. Explain in brief 3-schema architecture of DBMS.

3. Explain with example super key, candidate key and primary key.

4. What is cardinality ratio ? What is the difference between procedural and non-procedural DML ? What is disjointness constraint ? 1 + 2 + 2

5. Describe three layer architecture of DBMS.

6. Indicate the advantage of DBMS over conventional file system.

GROUP – C
(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) What do you mean by integrity constraint ?

   b) What is lossless decompostion ?

   c) What do you mean by closure ?

   d) Suppose that we decompose the schema,

   $R = (A, B, C, D)$ into (A, B, C) and (A, D, E).

   Show that this decomposition is lossless decomposition, if the following set F of FDs holds —

   $A \rightarrow BC$, $CD \rightarrow E$, $B \rightarrow D$, $E \rightarrow A$. 2 + 2 + 2 + 9

8. a) State two-phase commit protocol and discuss the implications of a failure on the part of

   i) the coordinator

   ii) a participant, during each of the two phases.

   b) Describe the wait-die and wound-wait protocols for deadlock prevention.

   c) Define three concurrency problems : dirty read, non-repeatable read, phantoms.

   d) Let T1, T2 and T3 be transactions that operate on the same data items *A*, *B* and *C*. Let r1(A) mean that T1 reads A w1(A) means that T1 writes A and so on for T2 and T3.

   Consider the following schedule :

   S1 : r2(c), r2(B), w2(b), r3(B), r3(C), r1(A), w1(A), w3(B), w3(C), r2(A), r1(B), w1(B), w2(A)

   Is the schedule serializable ?

   e) What are the roles of Analysis, Redo and Undo phases in the recovery algorithm 'ARIES' ? 4 + 2 + 3 + 3 + 3

9. a) When do we call a relation is in 3NF ?

   b) Consider the relation assignment (worker_id, building_id, startdate, name skilltype) and FDs are (worker_id->name, (worker_id, building_id)->startdate).

   Is the relation in 2NF ? If not, then make it in 2NF.

   c) Describe Boyce-Codd normal form with example.

   d) What is Query Tree ? Why we need query tree ? Consider the query "SELECT EMP_NAME FROM EMPLOYEE, WORK_ON, PROJECT WHERE PROJECT_NAME='ASSEMBLY' AND PRJ_NO='P1'AND JPOIN_DATE='21-12-12'. Construct a query tree for this query. 1 + 4 + 3 + (1 + 2 + 4)

10. a) What is trnasacton ?

    b) What is ACID property ?

    c) Explain with example serial and serializable schedule.

    d) What are the problems of concurrent execution of transaction ?

    e) Explain with the help of precedence graph the conflict and non-conflict serializability. 1 + 3 + 4 + 3 + 4

11. Write short notes on any *three* of the following : 3 × 5

    a) Functional dependency

    b) Dead lock

    c) Transaction state diagram

    d) B-tree

    e) Data Dictionary.