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Paper Code : CS-601

DATA BASE 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) The information about data in a database is called

a) Metadata

b) Teradata

c) Hyperdata

d) none of these.

ii) What is the highest normal form for the relational schema Bank ?

a) First b) Second

c) Third d) Boyce code.

iii) Which operator performs pattern matching in SQL ?

a) Except b) Intersect

c) Like d) All of these.

iv) Select operation in SQL is a

a) Data query language

b) Data definition language

c) DML

d) DCL.

v) Serializability of concurrent transactions are ensured by

a) Locking

b) Drop

c) Both of these

d) None of these.

vi) Which index is specified on the non-ordering fields of a file ?

a) Primary

b) Clustering

c) Secondary

d) None of these.

vii) One of the shortcomings of the file system is

a) Data availability

b) Fixed records

c) Sequential records

d) Lack of security.

viii) In the E-R diagram the term 'Cardinality' is synonymous to

a) Attribute b) Degree

c) Entities d) Cartesian.

ix) The employee salary should not be greater than Rs. 20,000. This is

a) integrity constraint

b) referential constraint

c) over-defined constraint

d) feasible constraint.

x) What is the name of a trigger that triggers itself ?

a) Triggering trigger

b) Cascading trigger

c) Mutating trigger

d) None of these.

GROUP – B

(Short Answer Type Questions)

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

2. Discuss the ACID properties of transactions.

3. a) Distinguish between file management system and database management system.

   b) Discuss the role of DBA.

4. What is Cardinality ratio ? What is the difference between procedural and non-procedural DML ? Describe different types of attribute.

5. What is closure and minimal cover ? What is inclusion dependency ?

6. What is 2-phase locking protocol ? How does it guarantee serializability ?

GROUP – C

(Long Answer Type Questions)

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

7. a) Find out the closure of attribute set (AD) *i.e.* $(AD)^+$ in the R . Set of FD's F are as given below :

   $R = \{A, B, C, D, E\}$,

   $FD = \{B \rightarrow CD, D \rightarrow E, B \rightarrow A, E \rightarrow C, AD \rightarrow B\}$.

   b) Find out the candidate keys for R.

c) Consider the following two sets of *FD*s :

$F = \{ A \rightarrow C, AC \rightarrow D, E \rightarrow AD, E \rightarrow H \}$

$G = \{ A \rightarrow CD, E \rightarrow AH \}$.

Check whether they are equivalent. Justify your answer. 5 + 5 + 5

8. Consider the relational database :

Employee (person-name, street, city)

Works (person-name, company name, salary)

Company (company name, city)

Manages (person-name, manager-name)

Write down appropriate SQL statement for the following queries :

a) Find the name of all employees who work for 'SBI bank'.

b) Find name, street address, cities of residence of all employees who work for 'UBI Bank' and earn more than Rs. 5,00,000 per annum.

c) Find the second highest salary for employees in 'SBI bank'.

d) Find the names of all employees who live in the same city and on the same street as do their manager.

e) Find the company that has the most employees.

9. a) What are the various states of a transaction ? Explain with a state diagram.

b) 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 ?

c) What is cascadeless schedule ? Why is cascadeless of schedule desired ?

d) Explain log based recovery. 5 + 5 + 3 + 2

10. a) If $R = (A, B, C, D)$ and the *FD*s are

$\{ AB \rightarrow CE, E \rightarrow AB, C \rightarrow D \}$. Why R is in 2 NF, but not in 3 NF ? Explain.

b) Show that if a relation schema is in BCNF, then it is in 3 NF but if a relation schema is in 3 NF then it is not necessary in BCNF. Give examples.

c) What are metadata and data dictionary ?

d) Explain the terms candidate key, primary key, foreign key and super key. 5 + 3 + 2 + 5

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

a) Armstrong's axioms

b) Time stamp based protocol for concurrency protocol

c) Log based recovery

d) Ordered Index

e) Deadlock.