*Name* : .....

*Roll No.* : .....

*Invigilator's Signature* : .....

**CS/B.Tech/(ICE-NEW)/SEM-6/IC-604B/2013**

**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 any *ten* of the following : $10 \times 1 = 10$

i) The entity integrity constraint states that

a) no primary key value can be null

b) a part of the key may be null

c) duplicate object values are allowed

d) none of these.

ii) In a relational data model, the columns of a table are called

a) relation b) tuple

c) degree d) attribute.

iii) BCNF is in

a) 1NF b) 2NF

c) 3NF d) 4NF.

iv) Overall logical structure of a database can be expressed graphically by

a) ER diagram b) Records

c) Relations d) Hierarchy.

v) What is the cardinality of a table with 100 rows and 10 columns ?

a) 1000 b) 100

c) 10 d) None of these.

vi) A table can have only one

a) candidate key b) primary key

c) alternate key d) super key.

vii) DDL stands for

a) Data dictionary language

b) Data defined language

c) Dictionary definition language

d) Data definition language.

viii) A person who has central control over the database system is called

a) Data selector

b) Data analyst

c) Database administrator

d) Database user.

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

a) Selection b) Union

c) Projection d) Set difference.

x) View is a

a) Virtual table b) Dynamic table

c) Permanent table d) Temporary table.

xi) Which of the following is not a DDL statement ?

a) Drop b) Create

c) Select d) Alter.

xii) Serializability of concurrent transactions is ensured by

a) Locking and unlocking

b) Time-stamping

c) both of these

d) none of these.

## GROUP – B
## ( Short Answer Type Questions )

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

2. Describe three-schema architecture of DBMS. Define Physical Data Independence and Logical Data Independence. 3 + 2

3. Define Super key, Candidate key, Primary Key, Foreign key and Alternate key.

4. What is the difference between Database and Table ? What are the roles of a Database Administrator ? 2 + 3

5. What is deadlock prevention ? Explain wait-die and would-wait protocols for deadlock prevention. 2 + 3

6. Describe the concept of generalization and specialization in the context of ER diagram.

**GROUP – C**
**( Long Answer Type Questions )**
Answer any *three* of the following. 3 × 15 = 45

7. Consider the following relational schema, where the primary keys are underlined.

employee ( *person_name*, street, city )

works ( *person_name*, company_name, salary )

company ( *person_name*, city )

manager ( *person_name*, manager_name )

a) Give an expression in SQL to express each of the following queries :

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

ii) Find the names of all employees in this database who live in the same city as the company for which they work.

iii) Give all employees of First Bank Corporation a 10 per cent salary raise.

b) Give an expression in Relational Algebra to express each of the following queries :

i) Find the names, street address and cities of residence of all employees who work for First Bank Corporation.

ii) Delete all tuples in the works relation for employees of Small Bank Corporation.

iii) Find the names of all employees who earn more than every employee of Small Bank Corporation.

$\left(2\frac{1}{2}+2\frac{1}{2}+2\frac{1}{2}\right)+\left(2\frac{1}{2}+2\frac{1}{2}+2\frac{1}{2}\right)$

8. a) Write down the difference between traditional file processing and DBMS.

b) Describe ACID properties of transactions.

c) Give an example of derived attribute.

d) Explain the difference between weak entity set and strong entity set. 4 + 5 + 2 + 4

9. a) Discuss insertion anomalies with an example. Suggest a method to overcome from it.

b) Give a relational schema supply ( sno, city, status, pno, qty ) with FD set

$F = \{ \text{sno} \rightarrow \text{city}, \text{city} \rightarrow \text{status}, \{ \text{sno}, \text{pno} \} \rightarrow \text{qty} \}$

Find the key of the schema.

Also reduce it into 3NF.

c) Define MVD with suitable example.

d) Explain partial dependency and transitive dependency with examples. 3 + 6 + 3 + 3

10. a) Explain two-phase locking protocol.

b) Consider the following two transactions :

T1: Read(A)

Read(B)

If A = 0 then B = B + 1

Write(B)

T2: Read(B)

Read(A)

If B = 0 then A = A + 1

Write(A)

Add lock and unlock instructions to transactions T1 and T2, so that they observe the two-phase locking protocol. Can the execution of these transactions result in a deadlock ?

c) Briefly explain serial schedule and serializable schedule with suitable example. 4 + 6 + 5

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

a) Deferred Database modification

b) B-tree organization

c) Define view and state its advantages and limitations

d) Query optimization technique

e) DBMS architecture.