Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/MCA/SEM-2/MCA-204/2012

2012

DATABASE MANAGEMENT SYSTEM-I

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 answer for the following : $10 \times 1 = 10$

   i) Which of the following is true for Data Sub-Language ?

   a) DSL = DDL + DML

   b) DSL = DDL – DML

   c) DSL = DDL + SDL

   d) None of these.

   ii) The relation R = (A, B, C) and set of FDs are

   $F = \{A \rightarrow B, B \rightarrow C\}$, R is decomposed in two different ways

   R1 = (A, B), R2 = (B, C). This is

   a) Lossless join decomposition

   b) Dependency preserving

   c) Both (a) and (b)

   d) None of these.

iii) GRANT and REVOKE are

a) DDL b) DML

c) DCL d) VDL .

iv) System catalog is a system created database that describes

a) database objects

b) data dictionary information

c) user access information

d) all of these.

v) To select a tuple from a relational database table, the symbol used in relational algebra is

a) sigma b) pie

c) lambda d) project.

vi) A relation is considered to be in second normal form if it is in first normal form and it has no ..... dependencies.

a) referential b) functional

c) partial key d) transitive.

vii) Which of the following schema defines a view or views of the database for particular users ?

a) External b) Conceptual

c) Internal d) None of these.

viii) A distributed database is a

a) database that is distributed among a network of geographically separated locations

b) collection of locations, each of which is operated as a local database system while accessing data at several locations

c) user program which interacts with the DDBMSs.

d) process which cooperates in completing transactions

e) software that manages the collection of storage locations and data structures.

ix) A trigger in DBMS is a

a) technique for specifying certain types of active rules for active database

b) utility which can be used to reorganise a database file into a different file organisation to improve performance

c) rule for structuring relations which eliminates anomalies

d) rule that restricts the null values in a database,

e) set of attributes in one relation that constitutes a key in some other relation.

x) What is the expansion of ISAM ?

a) Indexed Sequential Access Method

b) Internal Storage Access Mechanism

c) Integrated Storage and Management

d) None of these.

GROUP – B

(Short Answer Type Questions)

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

2. Consider the universal relation

R = {A, B, C. D, E, F, G, H, I, J } and the set of Functional Dependencies F = { { A,B } → { C }, { A } → { D, E }, { B } → { F },

{ F } → { G, H }, { D } → { I, J } }

a) What is the key for R ?

b) Decompose R into 2NF and 3NF relations.

3. a) Describe the 3-layer architecture of DBMS.

b) What is the difference between Procedural DML and Non-procedural DML ? 3 + 2

4. Write down the functions of a DBA.

5. What is meant by query optimization ? Explain briefly.

6. Discuss the differences between the candidate key and the primary key of a relation. Explain what is meant by a foreign key. 3 + 2

7. What is extraneous attribute ? How to test an extraneous attribute ? Explain with an example. 1 + 2 + 2

GROUP – C

(Long Answer Type Questions)

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

8. Consider the following relations :

Employee (emp_name, street, city)

Works (emp_name, co_name, salary)

Company (co_name, city)

Managers (emp_name, manager_name)

Write the following queries in terms of Relational Algebraic expressions :

(i) Find the names of the employees who live in the same city of the company for which they work for

(ii) Find the name of the city where employee X works.

Write the following queries in terms of SQL :

(i) Find the names and cities for all employees who work for the company XYZ

(ii) Find the names of employees who earns Rs. 25,000, Rs. 23,000, or Rs. 21,000 as salary

(iii) Find the names of the employees whose names are exactly 7 character length and the third letter is "S".

Write the following queries in terms of Tuple Relational Calculus expressions :

(i) Find the names of all employees who work for IBM

(ii) Find the names of all employees who earn more than every employee of TCS .

2 + 2 + 2 + 2 + 2 + 2 + 3

9. a) Create a B tree of order 5, with the following data :

13, 2, 5, 63, 23, 11, 74

b) Now insert the nodes in the B tree carrying the following data one by one :

(i) 12

(ii) 32

(iii) 3 .

Display the final tree structure.

c) Delete the nodes carrying the following data, one after another :

(i) 11

(ii) 2

(iii) 32 .

Display the final tree structure. 5 + 5 + 5

10. a) Define E-R model. 2

b) What do you mean by multivalued attribute ? 2

c) From the following information identify the entities, relationships and draw the E-R diagram. 6

A large university has a number of colleges in its jurisdiction. Each college has students and teachers. Teachers have certain qualifications and may have taught in other colleges. Some teachers have joint appointments and can teach in more than one college, however a student can attend only one college.

d) Differentiate between E-R model and network model. 5

11. Define the structure of a (well-formed) formula in both the tuple relational calculus and domain relational calculus. Explain how a relational calculus expression can be unsafe. Illustrate your answer with an example. Discuss how to ensure that a relational calculus expression is safe.

9 + 2 + 2 + 2

12. What are the typical phases of query decomposition ? What is the difference between conjunctive and disjunctive normal form ? What are database privileges ? What is meant by integrity of data ? How does DBMS help to maintain integrity of data ? 4 + 2 + 2 + 2 + 5