Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/MCA/SEM-2/MCA-204/2010

2010

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

i) What is the cardinality of a table with 1000 rows & 10 columns ?

a) 10 b) 100

c) 1000 d) None of these.

ii) A table can have only one

a) primary key b) alternate key

c) candidate key d) none of these.

iii) If two relations have 5 & 10 rows respectively, then what will be the no. of tuples in Cartesian product ?

a) 5 b) 10

c) 15 d) 50.

iv) A candidate key which is not a primary key is known as a/an

a) Alternate key b) Foreign key

c) Super key d) Non-prime attribute.

v) 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.

vi) Which one is not a traditional set operator defined on relational algebra ?

a) Union b) Intersection

c) Set Difference d) Join.

vii) R = (J, K, L), F = { JK → L, L → K }, the candidate keys are

a) J and K b) JK

c) Only J d) JK and JL.

viii) In SQL, Truncate is

a) DDL command

b) DML command

c) DCL command

d) Not at all SQL command.

ix) In the relational model, the columns of the table are known as

a) Domains b) Tuples

c) Attributes d) Schema.

x) What operator performs pattern matching is SQL ?

a) Except b) Intersect

c) Like d) All of these.

GROUP – B

(Short Answer Type Questions)

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

2. Consider the relation schema emp_dept (ename, eno, dob, address, dnumber, dname, dmgreno) and the following set G of functional dependencies on emp_dept :

   G = { eno → { ename, dob, address, dnumber }, dnumber → { dname, dmgreno } }. Calculate the closure { eno }$^+$ and { dnumber }$^+$ with respect to G. 5

3. Consider a relation R (A, B, C, D, E) with the following dependencies : AB → C, CD → E, DE → B. Is AB a candidate key of this relation ? If not, is ABD ? Explain your answer. 1 + 1 + 3

4. What restrictions apply to the use of the aggregate functions within the SELECT statement ? How do nulls affect the aggregate functions ? 3 + 2

5. Consider a PL/SQL code to display the employee number and name of top 5 highest paid employees with CURSOR FOR LOOP statement. 5

6. Define query optimization. Compare static and dynamic query optimization techniques. 2 + 3

GROUP – C

(Long Answer Type Questions)

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

7. 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 }. What is the key for R ? Decompose R into 2NF and then 3NF relations. What is the difference between function and procedure ? $4 + 4 + 4 + 3$

8. Consider the following relations : sailors (*sid*, sname, rating, age) Reserve (*sid*, bid, day) Boats (*bid*, bname, color) where sid is sailor id and it is primary key, bid is boat id and is primary key.

   Answer the relational algebra (RA), tuple relational calculus and domain relational form of the following query problems :

   $10 \times 1\frac{1}{2} = 15$

   a) Find the names of sailors who have reserved boat 103.

   b) Find the names of sailors who have reserved a red boat.

   c) Find the colors of boats reserved by Lubber.

   d) Find the names of sailors who have reserved at least one boat.

   e) Find the names of sailors who have reserved a red or a green boat.

f) Find the names of sailors who have reserved a red and a green boat.

g) Find the names of sailors who have reserved at least two boats.

h) Fing the sids of sailors with age over 20 who have not reserved a red boat.

i) Find the names of sailors who have reserved all boats.

j) Find the names of sailors who have reserved all boats called Interlake.

9. Draw an E-R diagram for the following :

An exhibiting organization keeps information about paintings and sculptures. Each painting has a PAINTING-NAME, PAINTER-NAME and PAINTING-DESCRIPTION. Each sculpture has a SCULPTOR-NAME SCULPTUR-NAME and SCULPTURE-DES.Paintings and sculptures may appear in the same gallery. For the purpose of keeping track of the location of items, each painting and sculpture is given a unique identifier, ART-NO.

Each gallery has an identifier, GALLERY-NO, and a size. Each gallery can store any number of art objects. Each art object appears in one gallery only. The DATEPLACED-IN-GALLERY is kept for both paintings and sculptures.

Note that PAINTING-NAME is unique within PAINTER-NAME and SCULPTURE-NAME is unique within SCULPTOR-NAME.

Explain generalization and specialization. 8 + 7

10. a) Find out closure of attribute set (AG) i.e., (AG)$^+$ in the relational schema R.

Set of functional dependencies F as given below :

R = (A, B, C, G, H, I)

F = { A → B, A → C, CG → H, CG → I, B → H }

Is (AG) a super key of R ?

b) What are the differences between Embedded SQL and Dynamic SQL ?

c) Define : Super key, candidate key and primary key.

d) Compare between 3NF and BCNF with example.

5 + 2 + 3 + 5

11. a) What are dense indexing and sparse indexing ? Explain with an example.

b) Create B$^+$ tree for the following key :

Order = 3, Key : 8, 5, 1, 7, 3, 12, 9, 6.

c) What is a view ?

6 + 7 + 2