T.E. (Comp.) (Semester – V) (RC) Examination, May/June 2012
DATABASE MANAGEMENT SYSTEMS

Duration : 3 Hours | Total Marks : 100

***Instruction** : Attempt **5** questions, at least **1** from **each** Moodule.*

MODULE – 1

1. a) Discuss in detail the advantages of a database management system over file systems. **8**

   b) How is a weak entity different from a strong entity ? How is it represented in an ER diagram ? Illustrate with an example. **5**

   c) Explain the concepts of total participation and partial participation with respect to relationships in database management systems. **4**

   d) What is meant by a recursive relationship type ? Give an example. **3**

2. a) What do you understand by degree of a relationship type ? Give an example each of a binary and ternary relationship type. **6**

   b) Differentiate between specialization and generalization with an example. **5**

   c) Describe the three schema architecture. Why do we need mappings between schema levels ? How do different schema definition languages support this architecture ? **9**

MODULE – 2

3. a) Give a TRC expression for the relational algebraic operation of : **3**

      i) Selection $\sigma_{<\text{condition}>}(P)$

      ii) The projection of relation P on the attribute X.

   b) Explain the distinctions among primary key, candidate key, super key. Give one example each. **5**

   c) Consider the following relational schema :

      Pieces (<u>code</u>, Name)

      Provider (<u>code</u>, Name)

      Provides (<u>Piece Code</u>, <u>Provider Code</u>, Price)

Write SQL statements for the following.

1) Obtain the names of providers who supply a piece with code = '001'. 3

2) Obtain the names of pieces provided by provider with code = 'HAL'. 3

3) Add an entry to the database to indicate that 'skellingtom suppliers' (code = 'TNBC') will provide sprockets (code = '002') for 7 cents each. 2

4) Increase the price of all pieces by 2 cents. 2

5) Update the database to reflect that 'Susan Calvin Corp' (Code = 'RBT') will not supply bolts. 2

4. a) What are nested queries ? Explain with examples. 5

b) How does SQL allow implementation of the entity and referential integrity constraint ? Illustrate with suitable example. 7

c) What is meant by closure of a set of functional dependencies ? 4

d) What is union compatibility ? Why do the UNION, INTERSECTION and DIFFERENCE operations require that the relations on which they are applied be union compatible. 4

MODULE – 3

5. a) Why do we need to normalize tables ? Explain. 5

b) Consider the following relation. 8

CAR_SALE (car #, Date_sold, Salesman #, Commission %, Discount_Amt)

Assume that a car may be sold by multiple salesmen and hence { car # , salesman #} is the primary key. Suppose the following dependencies hold :

Date_sold $\rightarrow$ Discount_Amt

Salesman # $\rightarrow$ Commission %

Is this relation in 1 NF, 2 NF or 3 NF ? Why or why not ? How could you successively normalize it upto 3 NF ?

c) Why should null values in a relation be avoided as far as possible ? Discuss the problem of spurious tuples and how we may prevent it. 7

6. a) What is a query evaluation plan ? Explain. 6

   b) What are the measures of cost of a query. 4

   c) What is external sorting ? Explain with an example the external sort merge algorithm. 10

MODULE – 4

7. a) With the help of an example explain ACID properties of a transaction. 8

   b) Differentiate between exclusive lock and shared lock. 6

   c) Discuss the wait-die and wound-wait protocols for deadlock prevention. 6

8. a) Explain : (2×3=6)

      i) Binary locks

      ii) Read/write locks.

   b) Discuss Basic Timestamp algorithm. Explain with procedures how it implements write and read operations. 6

   c) What is two phase locking ? How does it guarantee serializability ? Discuss any two variations of two phase locking. 8