14/12/2013 E

COMP 5 – 5 (RC)

T.E. (Computer) (Semester – V) Examination, Nov./Dec. 2013
DATABASE MANAGEMENT SYSTEMS (RC)

Duration : 3 Hours Total Marks : 100

Instruction : *Answer **any five** questions, choosing **at least one** from **each** Module.*

MODULE – 1

1. a) With the help of a neat diagram, explain the main phases of database design. 10

   b) Construct an E-R diagram for movie screening in a theater. The ER diagram should have the following entities :

      i) Movie : title, director, date of release

      ii) Screen : no. of seats, width

      iii) Theater : name, address, phone no.

      iv) Actor : name, bio, photograph

      For each entity, depict the primary key and relationship cardinalities. 10

2. a) What are the differences between a file processing system and a database management system ? 5

   b) What are the functions of a database administrator in a DBMS system ? 4

   c) Design a generalization-specialization hierarchy for a bank. The bank provides savings account and current accounts. Explain the attributes at each level of the hierarchy. 6

   d) Construct an ER diagram that depicts redundancy of entities. Is redundancy a bad practice ? Justify. 5

MODULE – 2

3. a) Explain the closure of set of dependencies. 4

   b) List and explain the various pitfalls in relational database design. 5

   c) List the step by step procedure of converting an E-R diagram into a relational schema. Explain using examples. 8

P.T.O.

d) Consider the following relational schema :

Employee (Employee_Name, Street, City)

Works (Employee_name, Company_Name, Salary)

Company (Company_name, City)

Give relational algebra expressions for each of the following :

i) Give all employees of Wipro Company a 15% raise in salary

ii) Mr. Smith has joined Infosys with 80,000 as salary. Modify the database, assuming data wherever necessary. 3

4. a) Construct the closure of the following set F of FD's for Relational Schema : 6

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

$F = \{A \rightarrow BC$

$CD \rightarrow E$

$B \rightarrow D$

$E \rightarrow A$

$\}$

List the candidate key for R.

b) Differentiate between relational algebra and relational calculus with the help of examples. 6

c) Consider the following relational schema :

Employee (Employee_Name, Street, City)

Works (Employee_name, Company_Name, Salary)

Company (Company_name, City)

Managers (Employee_Name, Manager_Name)

Write SQL queries for each of the following :

i) Update the database such that all employees whose salary is greater than 20,000 are shifted to Margao.

ii) Delete all records for employees from the works table who work for TCS.

iii) Give all employees of TCS in Bangalore a 10% raise in salary.

iv) Display the number of employees from Delhi. 8

MODULE – 3

5. a) Explain with examples the conditions that are necessary for a relation to be in 1NF, 2NF and 3NF. 6

   b) Explain the process of heuristic optimization of a query tree with examples. 8

   c) Explain the following terms :
      i) Domain Key Normal Form
      ii) Multivalued Dependencies
      iii) Query Graph. 6

6. a) What is the need of converting SQL queries into relational algebra before optimization ? Explain the conversion process with example. 10

   b) What do you mean by external sorting ? Explain the sort-merge join algorithm. A file of 4096 blocks is to be sorted with an available buffer space of 64 blocks. How many passes will be needed in the merge phase of the external sort-merge algorithm ? 10

MODULE – 4

7. a) Consider two transactions

```
T1 :    Read (A);
        If A = 0, B = B – 1;
        Write (B);
T2 :    Read (B);
        Read (A);
        If B = 0, then A = A + 1;
        Write (A);
```

   Add LOCK and UNLOCK instruction to the two transactions T1 and T2 so that they observe the 2PL protocol. Justify your answer. 6

   b) What is a schedule ? Explain concepts of recoverable, cascadeless and strict schedules and provide a comparison between them. 10

   c) What are provisions made by database systems for authorization ? 4

8. a) Explain deferred update recovery technique in a single user system. 10

   b) What is the difference between constrained write and unconstrained write assumption ? 4

   c) Discuss any two protocols for deadlock prevention. 6