COMP 5-5 (RC)

T.E. (Comp.) (Semester – V) (RC) Examination, Nov./Dec. 2010
DATABASE MANAGEMENT SYSTEMS

Duration : 3 Hours Total Marks : 100

*Instructions : 1) Answer **any five** questions, atleast **one** from **each** Module.*
*2) Assume suitable data, **if necessary**.*

MODULE – I

1. a) Discuss in detail the advantages of DBMS over conventional file systems. **8**

   b) Draw an ER diagram which stores information about interviews of job applicants in various companies. Store the name and address of the company, job applicants number, name, address and phone number. Some of the interviews conducted result in a job offered. For every interview conducted store the name of the person conducting the interview and the phone number. Store the type of job offered for job applicants who have successfully answered the interview. **6**

   c) How is a weak entity different from a strong entity ? How is it represented in an ER diagram. **4**

   d) List the various types of attributes used in ER models. **2**

2. a) A rail transport company wishes to hold details of trains services, stations and operators. **10**

   Use the following business rules and construct an ER diagram

   Trains : A train has a unique id code, a collection of days it runs (Monday, Sunday, etc...) on and the number of carriages it has. Each train must have a number of drivers who can drive it and a driver may drive a number of trains. The train driver has a unique pay roll number and a name. A train is designated as either an intercity or district train. Each train must have one operator who has a name and phone number for complaints. The operator can operate many trains (or none at all!)

P.T.O.

Stations : A station has a name and the number of platforms. All stations are either main or district.

Timetable : A train has a number of stops at a station during its journey. It never visits the same station twice during the same journey. At each stop the arrival and departure time is recorded. A station has many trains passing through it, often arriving at the same time and a train visits many stations.

b) Differentiate between specialization and generalization with an example. 6

c) Discuss the functions of a database administrator. 4

MODULE – II

3. a) What is a foreign key ? Explain the concept of referential integrity with an example. 6

b) What do you understand by canonical cover of F ? For R = {A, B, C, D, E, F, G, H} compute the canonical cover for set F

$F = \{A \rightarrow B, ABCD \rightarrow E, ACDF \rightarrow EG, EF \rightarrow GH\}$. 8

c) Consider the following relational schema :

sailors (sid, sname, rating, age)

boats (bid, bname, colour)

reserves (sid, bid, day)

Answer the following w.r.t. the schema above

i) Write the DDL for all the tables. 3

ii) Give SQL formations for the following : 3

- insert a record into the reserves table
- change the rating of all the sailors

Whose age is greater than 30 and set the value to 10.

4. a) Consider the following relational schema :

employee (empno, name, office, age)

book (isbn, tittle, authors, publisher)

loan (empno, isbn, date).

Write relational algebra statements for the following :

i) Find the names of employees who have borrowed one or more books published by "TMH". 2

ii) Find the employee number of employees who have never borrowed a book written by "Galvin". 3

iii) Find the average age of employees who have borrowed books written by "PS Gill". 3

b) List and explain the various pitfalls in relational database design. 6

c) Explain the concept of views in SQL. Illustrate with an example. Discuss the problem that may arise when one attempts to update a view. 6

MODULE – III

5. a) Consider the following relation for published books :

book (book_title, AuthorName, book_type, ListPrice, author_affiliation, publisher)

book_title and AuthorName are the keys

Suppose the following dependencies exist :

book_title → publisher, book-type

book_type → ListPrice

AuthorName → author_affiliation

Decompose the relation into 2NF and 3NF. 8

b) Explain with a diagram the processing of a high level query. 8

c) Why do we need to normalize tables ? Explain. 4

6. a) Define multivalued dependencies. Give a suitable example. 4

   b) Explain the concept of heuristic optimization of query trees. Give an example. 8

   c) What is external sorting ? Explain with an example. 8

MODULE – IV

7. a) In context of concurrent access in a multiuser database system describe the following terms : 6

      i) transaction

      ii) commit

      iii) rollback

   b) Differentiate between exclusive lock and shared lock. 6

   c) Discuss the basic time stamp algorithm. Explain with procedures how are write and read operations implemented. 8

8. a) What is concurrency control ? What are its objectives ? 4

   b) Explain multiversion 2PL using certified locks. 8

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