Code: CS33 **Subject: DATABASE MANAGEMENT SYSTEMS**
Time: 3 Hours **Max. Marks: 100**

MARCH 2011

NOTE:

- **Question 1 is compulsory and carries 28 marks. Answer any FOUR questions from the rest. Marks are indicated against each question.**
- **Parts of a question should be answered at the same place.**

Q.1

a. What is DBMS? What are the advantages and disadvantages offered by such systems as compared to file processing systems? Explain.

b. Explain the various levels of abstraction in a DBMS with the help of a diagram. Why do we need mappings between different schema levels?

c. Differentiate between DBMS and RDBMS.

d. Explain the distinctions among the terms primary key, candidate key, and superkey. Give suitable examples.

e. (i) Define with examples, the Relation and Relation Schema.
(ii) Explain general syntax of SELECT command.

f. What are the properties of a transaction that are enforced by the concurrency control and recovery methods of the DBMS?

g. Given the following set of functional dependencies on schema R (A,B,C,D,E,F,G)
A → B,
ABCD → E,
EF → G,
Determine if ACDF → G holds on R. **(7 × 4)**

Q.2 a. A bank has many branches, and a large number of customers. A customer can open many different kinds of accounts with the bank. The bank keeps track of the customer with his SSN, name, address, and phone number. Age is a factor to check whether he is a major. There are different types of loans, each identified by a loan number. Customer can take out more than one type of loan, and all branches can give loans. Loans have a duration and interest rate. The account holder can enquire about the balance in his account. Draw an ER Diagram for the bank. **(6)**

b. Explain the underlying concept of:

(i) Specialization and Generalization
(ii) Attribute inheritance **(6)**

c. Differentiate between:

(i) Disjoint and overlapping constraints
(ii) Total and partial constraints **(6)**

Q.3 a. How does SQL implement the entity integrity and referential integrity constraints of the relational model? Explain with example. **(5)**

b. What is meant by a safe expression in relational calculus? **(3)**

c. Consider the schema given below:-
EMPLOYEE (**E-NAME**, STREET, CITY)
WORKS-FOR (**E-NAME**, COMPANY-NAME, SALARY)
COMPANY (**COMPANY-NAME**, CITY)
MANAGES (**E-NAME**, MANAGER-NAME)

Express the following queries in Relational algebra:

(i) Find the names of employees working for Infosys.
(ii) Find the names and cities of residence of employees working for TCS.
(iii) Find the name, street and city of residence of employees working for Infosys and earning more than 20,000.
(iv) Find the names of employees, who are not working for WIPRO. **(10)**

Q.4 a. What is normalization? "BCNF is a stronger normal form than 3 NF". Justify your answer. **(5)**

b. What are trivial functional dependencies? Given the following set of functional dependencies on schema R (V,W,X,Y,Z)
{ Z → V, W → Y, XY → Z and V → WX}
State whether the following decompositions are loss-less-join decomposition or not.

(i) R_1 = (V,W,X)
R_2 = (V,Y,Z)
(ii) R_1=(V,W,X)
R_2= (X,Y,Z) **(8)**

c. Given a relation R = {A, B, C, D, E, H} and having the following FDs
F = {{A → BC}, {C, D → E}, {E → C}, {D → A, E, H},
{A, B, H → B, D}, {D, H → B, C}}.
Find the key for relation R with FDs F. **(5)**

Q.5 a. Explain the purpose of the checkpoint mechanism. How often should checkpoints be performed? How does the frequency of checkpoints affect

(i) System performance when no failure occurs.
(ii) The time it takes to recover from a system crash.

(iii) The time it takes to recover from a disk crash. **(7)**

b. What is cascading rollback? Why is it to be avoided? **(4)**

c. Explain recovery using deferred update technique in both single user and multi-user environment. **(7)**

Q.6 a. Discuss the various control measures that are used to provide security of data in databases. **(4)**

b. Explain how do the following differ: fragmentation transparency, replication transparency and location transparency. **(5)**

c. Discuss the various concurrency control measures used in DDBS. **(4)**

d. Distinguish between OLTP and OLAP. Also briefly explain the need for incorporating the data cleaning unit in a data warehouse. **(5)**

Q.7 Write Short notes on any **THREE** of the following:-

(i) Data Mining
(ii) OLAP Servers
(iii) Conflict serializability
(iv) Multi-valued dependency **(6+6+6)**