(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 0111 Roll No. | | | | | | | | | | |

B. Tech.

(SEM. IV) THEORY EXAMINATION 2010-11

DATABASE MANAGEMENT SYSTEMS

Time : 3 Hours *Total Marks : 100*

Note :— (1) There are **five** questions in the paper. Attempt **ALL** questions.

(2) Attempt all questions at one place.

(3) Make necessary assumption, if required.

1. Attempt any **four** parts :— **(4×5=20)**

(A) What is database management system ? List any three major advantages of database management system over traditional file processing systems.

(B) What is data manipulation language ? What are differences between data manipulation language and data definition language ?

(C) What do you mean by data independence ? Explain the differences between physical and logical data independence.

(D) What do you mean by a Key to the relation ? Explain the differences between super key, candidate key and primary key.

(E) What are E-R diagrams ? Explain the concepts in specialization and generalization between entity sets.

(F) Construct an E-R diagram for your Institute with a set of teachers and set of students. Teachers offer various subjects to different classes.

2. Attempt any **two** parts :— **(2×10=20)**

(A) Consider the following schema for institute library :

Student (RollNo, Name, Father-Name, Branch)

Book (ISBN, Title, Author, Publisher)

Issue (RollNo, ISBN, Date-of-Issue)

Write the following queries in relational algebra :

(i) List Roll Number and Name of all students of the branch 'CSE'.

(ii) Find the name of students who have issued a book published by 'ABC' publisher.

(iii) List title of all books and their authors issued by a student 'XYZ'.

(iv) List title of all books issued on or before Jan 1, 2011.

(v) List all books published by publisher 'ABC'.

(B) Answer following questions :

(i) What do you mean by referential integrity ? Explain the concept of Foreign Key with a suitable example.

(ii) What are differences in Cartesian-Product and Natural-Join operations ? Explain with a suitable example.

(C) Consider the following schema for student database of an institute :

Teacher (TeacherId, TName, Department)

Student (RollNo, SName, Branch)

Teaches (TeacherId, RollNo, Subject)

Write the following queries in SQL :

(i) Write SQL statements to create above database.

(ii) Write SQL statement to insert one record to each table. The data can suitably be assumed.

(iii) List the name and branch of students registered for the subject 'DBMS'.

(iv) List the name of teachers and their concerned department who are offering either 'DBMS' or 'Operating System'.

(v) List the name of students who are being taught by teachers of 'CSE'department.

3. Attempt any **two** parts :— **(2×10=20)**

(A) Define functional dependency ? What do you mean by Loss-Less Decomposition. Explain with a suitable example how function dependencies can be used to show that decompositions are loss-less.

(B) What do you mean by closure of an attribute set ? Consider a relational schema R = (ABCD) and following set of functional dependencies :

$F = (A \rightarrow BC, AC \rightarrow D, D \rightarrow B, AB \rightarrow D)$.

Determine if the attribute set {A}, {BD}, {D} and {AC} are super key for this Relation.

(C) Define Normal Forms. List the definitions of First, Second and Third normal forms. Explain BCNF with a suitable example.

4. Attempt any **two** parts :— **(2×10=20)**

(A) What is Transaction ? Draw a state diagram of a transaction showing its states. Explain ACID properties of a transaction with suitable examples.

(B) What are schedules ? What are differences between conflict serializability and view serializability ? Explain with suitable example what are cascadeless and recoverable schedules.

(C) What are Distributed Databases ? List advantages and disadvantages of Data Replication and Data Fragmentation. Explain with a suitable example, what are differences in Replication and Fragmentation transparency.

5. Attempt any **two** parts :— **(2×10=20)**

(A) What is two phase locking protocol ? List the salient features of strict two phase locking protocol. Explain with a suitable example how cascading rollbacks can be avoided using strict two phase locking.

(B) What are deadlocks ? What are Transaction wait for graphs ? Define Phantom deadlocks and discuss a protocol for detection of a deadlock and explain how detection of phantom deadlocks may be avoided.

(C) Write short notes on following :—

(i) Time Stamp based protocols

(ii) Checkpoints.