

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

PAPER ID : 0111

Roll No.

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### 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.