Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

MCA- IInd SEMESTER–EXAMINATION –JUNE - 2012

Subject code: 2620003 Date: 11/06/2012

Subject Name: Database Management System (DBMS)

Time: 10:30 am – 01:00 pm Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Answer the Following (4 + 3 = 7 Marks) **07**

1. List the ACID properties. Explain the usefulness of each with suitable example.
2. A transaction during its execution passes through several states. List all possible sequences of states through which a transaction may pass. Explain why each state transition may occur.

(b) Answer the Following (2 + 5 = 7 Marks) **07**

1. Explain the difference between the terms serial schedule and serializable schedule.
2. Consider the following two transactions

*T*1: read(*A*);
read(*B*);
if *A* = 0then *B* := *B* + 1;
write(*B*).
*T*2: read(*B*);
read(*A*);
if *B* = 0then *A* := *A* + 1;
write(*A*).

Let the consistency requirement be $A = 0$, $B = 0$, with $A = B = 0$ the initial values.

I. Show that every serial execution involving these two transactions preserves the consistency of the database.

II. Show a concurrent execution of *T*1 and *T*2 that produces a non serializable schedule.

III. iii. Is there a concurrent execution of *T*1 and *T*2 that produces a serializable schedule?

Q.2 **(a)** Explain the phantom phenomenon. Why may this phenomenon lead to an incorrect concurrent execution despite the use of the two-phase locking protocol? Discuss a better Solution for the problem of Phantom Phenomenon **07**

(b) Explain Deferred Database Modification and Immediate Database Modification Techniques of log based recovery systems. State the disadvantages of the deferred modification scheme. **07**

OR

(b) Answer the Following(3 + 4 = 7 Marks) **07**

1. Explain the difference between the three storage types—volatile, nonvolatile, and stable—in terms of I/O cost
2. Explain why Stable storage cannot be implemented. Discuss how database systems deal with this problem

Q.3 **(a)** Consider the Following Database Schema where the primary keys are underlined and write the Relational Algebra Expression for the quires given below. **07**

person (driver-id, name, address)
car (license, year, model)
accident (report-number, location, date)
owns (driver-id, license)
participated (report-number driver-id, license, damage-amount)
employee (person-name, street, city)
works (person-name, company-name, salary)
company (company-name, city)
manages (person-name, manager-name)

1. Find the names of all employees who work for First Bank Corporation. (1Marks)
2. Find the names of all employees who live in the same city and on the same street as do their manager (3 Marks)
3. Find the names of all employees in this database who do not work for ABC Corporation (3Mark)

(b) Explain Following Relational Algebra operations (3.5 +3.5 = 7 Marks) **07**

1. Set Intersection Operation,
2. Assignment Operation.

OR

Q.3 **(a)** Explain Project & Union Operation With Appropriate example. **07**

(b) Answer the Following (4 + 3 = 7 Marks) **07**

1. Design a relational database for a university registrar's office. The office maintains data about each class, including the instructor, the number of students enrolled, and the time and place of the class meetings. For each student–class pair, a grade is recorded.
2. Describe the differences in meaning between the terms relation and relation schema. Illustrate your answer by referring to your solution to the above question.

Q.4 **(a)** Use the definition of functional dependency to argue that each of Armstrong's axioms (reflexivity, augmentation, and transitivity) is sound **07**

(b) Explain BCNF **07**

OR

Q.4 **(a)** Compute the closure of the following set F of functional dependencies for relation schema $R = (A, B, C, D, E)$. **07**

$$A \rightarrow BC$$
$$CD \rightarrow E$$
$$B \rightarrow D$$
$$E \rightarrow A$$

List the candidate keys for R.

Q.4 **(b)** Explain 1 NF, 2 NF 3NF **07**

Q.5 **(a)** Explain the difference between a weak and a strong entity set . We can convert any weak entity set to a strong entity set by simply adding appropriate attributes. Why, then, do we have weak entity sets? **07**

(b) Write a Short note on Storage Manager & The Query Processor. **07**

OR

Q.5 **(a)** Explain Aggregation & Specialization With Suitable ER Diagram. **07**

(b) Describe Data Abstraction and explain the difference between physical and logical data independence. **07**

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