Name : ....

Roll No. : ....

Invigilator's Signature : ....

CS/B.TECH(CSE)/SEM-5/CS-502/2011-12

2011

DATABASE MANAGEMENT SYSTEMS

Time Allotted : 3 Hours   Full Marks : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following :

$$10 \times 1 = 10$$

   i)   A top-to-bottom relationship among the items in a database is established by a

   a)   hierarchical schema

   b)   relational schema

   c)   network schema

   d)   all of these.

5301   [Turn over

ii)   In relational model, degree of a relation is

    a)   No. of rows   b)   schema

    c)   No. of attributes   d)   No. of key attributes.

iii) Relational calculus is a

    a)   procedural language

    b)   non-procedural language

    c)   query language

    d)   normalization technique.

iv)   Domain can be defined as

    a)   the value of a field   b)   value of a tuple

    c)   value of a table   d)   none of these.

v)   For R = { J, K, L } F = { JK –>L   L –> K }

the candidate keys are

    a)   J and K   b)   JK

    c)   only J   d)   JK and JL.

vi) Additional schema for a relationship set is essential in case of

    a) one-to-many relationship

    b) many-to-one relationship

    c) many-to-many relationship

    d) one of these.

vii) Which of the following is true ?

    a) A super key is always a candidate key

    b) Every 3NF schema is also in BCNF

    c) Generalization is a bottom-up design approach

    d) None of these.

viii) Serializability of concurrent transactions are ensured by

    a) locking   b) time-stamping

    c) both of these   d) none of these.

ix) Which of the following is not a DDL statement ?

    a) ALTER   b) DROP

    c) CREATE   d) SELECT.

x) Which index is specified on the non-ordering fields of a file ?

    a) Primary   b) Clustering

    c) Secondary   d) None of these.

xi) A transaction is said to be atomic, if and only if

   a) transaction is partially completed

   b) transaction is fully completed

   c) transaction does not take place

   d) none of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following.   3 × 5 = 15

2. What is weak entity type ? What will be the schema for representing such entity type in a database table ? $2\frac{1}{2}$ + $2\frac{1}{2}$

3. Consider the following relations for a database that keeps track of business trips of salesperson in a sales office :

   SALESPERSON (<u>SSN</u>, Name, Start_ Year, Dept_No)

   TRIP (SSN, From_City, To_City, Departure_Date, Return_Date, <u>Trip ID</u>)

   EXPENSE (<u>Trip ID</u>, <u>Account#,</u>. Amount)

   Specify the following queries in either relational algebra or in SQL :

   a) Give the details (all attributes of TRIP relation) for trip that exceeded Rs. 2,000 in expenses.

   b) Print SSN of salesman who took trips to 'Andaman'.

$2\frac{1}{2}$ + $2\frac{1}{2}$

4. What is the difference between immediate updation and deferred updation of database ? Write down the utility of check point mechanism in log based recovery. 2 + 3

5. What is functional dependency ? Define foreign key. 2 + 3

6. In joining two relations when will you prefer merge algorithm ? Explain, how secondary indexing can help in join operation. 2 + 3
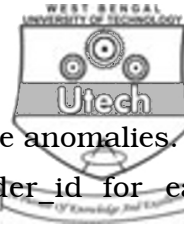
GROUP – C
(Long Answer Type Questions)
Answer any *three* of the following. 3 × 15 = 45

7. Consider the following tables : DEPT (DCODE, DNAME), EMP (ECODE, ENAME, BASIC, DCODE, DT_JN)

Write down the SQL statements for the following :

a) For each department, show DNAME and total basic of the employees in the department.

b) Find out the name of the departments where no person is working.

c) Find out the name of the employees who are working in the department named as 'ABC'.

d) Find out the maximum basic among the employees who has joined after year 2000. 5 + 5 + 3 + 2

8. a) Why is normalization done ? Describe the anomalies.

   b) Consider each order has unique order_id for each order, following information are stored :

   order_id, order_dt, customer name, customer address, salesman name, salesman address and for each requested item store itemcode, itename, quantity and rate.

   Further assume, following functional dependencies :

   salesman name → salesman address

   customer name → customer address

   order_id → order_dt, salesman name, customer name.

   order_id, icode → quantity

   icode → iname, rate

   Normalize the data structure up to 3 μF, showing the steps. Indicate PK & FK also.   6 + 9

9. The IT Training Group (Kolkata) has contacted you to create a conceptual model by using the Entity — Relationship data model for a database that will meet the information needs for its training program. The Company Director has provided the following description of the training group's operating environment. The Company has twelve instructors and can handle up to one hundred trainees per training session. The Company offers five advanced technology courses, each of which is taught by a teaching team of two or more instructors. Each instructor is assigned to a maximum of two teaching teams or may be assigned to do research. Each trainee undertakes one advanced technology course per training session.

   a) Draw an ER diagram for IT Training Group (Kolkata) based on the preceding information.

   b) Distinguish between Single-valued *vs* Multi-valued and Stored *vs* Derived attributes.   10 + 5

10. a) Describe ACID properties of a transaction.

b) In a concurrent schedule, when do two instructions conflict ?

c) Deadlock cannot occur in time stamp based protocol. Why ?

d) What is cascading rollback ?   4 + 4 + 4 + 3

11. Write short notes on the following :

a) Security features in DBMS.

b) Advantages of Database Management system over File processing system.

c) Spurious tuples and Dangling tuples.   5 + 5 + 5

———————