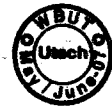**ENGINEERING & MANAGEMENT EXAMINATIONS, JUNE – 2007**

DATABASE MANAGEMENT SYSTEM - I

SEMESTER – 2

Time : 3 Hours]   [Full Marks : 70

Group – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following :   10 × 1 = 10

    i) A data model is a collection of conceptual tools for describing

         a)   data and data relationships

         b)   data semantics and consistency constraints

         c)   data, data relationship, data semantics and consistency constraints. ☐

    ii) The primary key indexing techniques do not allow

         a)   Duplicate data   b)   Multiple attributes

         c)   Sets of relations   d)   Many to many relation. ☐

    iii) The column of a table is referred to as

         a)   tuple   b)   attribute

         c)   entity   d)   degree. ☐

    iv) Relations produced from an E-R model will always be in

         a)   1 NF   b)   2 NF

         c)   3 NF   d)   4 NF. ☐

    v) In an entity set, Y is the dominant entity and X is the subordinate entity. Which of the following is / are correct ?

         a)   Operationally, if Y is deleted, so is X

         b) X is existence dependent on Y

         c)   Operationally, if X is deleted, so is Y

         d)   Operationally, if X is deleted, Y remains same. ☐

vi) What is the cardinality of a table with 1000 rows & 10 columns ?

   a) 10   b) 100

   c) 1000   d) none of these.

vii) The maximum height of a $B+$ tree of order n with k key values is

   a) $(n + k) / 2$ b) $\log nk$

   c) $\log n / 2 (k / 2 + 1)$ d) $\log k / 2n.$

viii) If two relations have 5 & 10 rows respectively, then what will be the no. of tuples in Cartesian product ?

   a) 5   b) 10

   c) 15   d) 50.

ix) The operation of a certain relation X, produces Y such that Y contains only selected attributes of X, such an operation is

   a) Projection   b) Selection

   c) Union   d) Difference.

x) If a set of attributes K, in relation schema $R1$ is a foreign key for $R1$ then

   a) Every tuple of $R1$ has a distinct value for K

   b) K is a key for some other relation

   c) K cannot have a null value for tuples in $R1$

   d) K is a primary key for $R1$.

xi) SQL is relationally

   a) Complete language   b) Incomplete language

   c) Cannot handle certain relations   d) Sound language.

xii) The overall logical structure of a database can be expressed graphically by

   a) Data flow diagram   b) Flow chart

   c) Directed graph   d) – R Diagram.

Group - B

(Short Answer Type Questions)

Answer any *three* questions. $3 \times 5 = 15$

2. Define the following : 5×1

   i)   Derived attribute

   ii)   Domain

   iii)   1 to Many relationship

   iv)   Projection

   v)   Union compatibility.

3. What is the difference between logical data independence and physcial data independence ? Define Super Key, Candidate Key and Primary Key. $2 + 3$

4. a)   What is E-R diagram ?

   b)   Discuss about relationship cardinality. $2 + 3$

5. What are the typical phases of query decomposition ? What is the difference between conjunctive and disjunctive normal forms ? $3 + 2$

6. What is a View ? View does not take any memory space. Justify. How do you create an Insertable and Updateable View ? $1 + 2 + 2$

Group - C

(Long Answer Type Questions)

Answer any *three* questions. $3 \times 15 = 45$

7. a)   Consider the following relational schema of Library.

   book (book_id, Title)

   book-author (book-id, authorname)

   book-copies (book_id, branch_id,no_of_copy)

   Library-branch(branch_id,branch_name)

   book loan(book_id,branch_id,cardno)

   borrower(name,city,cardno)

22251-(IV)-A

Write the query expressions for each of the following queries in specified language.

    i)   List the names of books borrowed by the student who belongs to "Kolkata". (Tuple Relational Calculus)

    ii)   Retrieve the name of student / borrowed by the student who does not borrow any book. (Domain Relational Calculus)

    iii)   Retrieve the name of library branch which has maximum number of books. (Relational Algebra)

    iv)   Retrieve the name of borrower who has borrowed at least 3 books and not more than 10 books. (Relational Algebra)

b)   It is strictly necessary to declare Primary Key and Foreign Key during database creation. If you do not do that then what problem can arise ?   (4 × 3) + 3

8.   a)   What is DBMS ?

    b)   What are the advantages of using DBMS over file processing systems ?

    c)   Describe different levels of Data Abstraction in database system.

    d)   What do you mean by Instances and Schemas ?

    e)   What is physical data independence and logical data independence ?   2 + 6 + 3 + 2 + 2

9.   a)   Define 'Functional dependency' and give examples.

    b)   Why is a relation that is 3NF generally considered good ?

    c)   Consider the following relation :

Emp_project (SSN, Ename, City, Status, Pno, P_name, Hour)

    i)   Write all the functional dependencies that exist in this relation.

    ii)   Consider the relation (above) is in 1NF. Make it up to 3NF.

    d)   What are the differences among primary, secondary and clustering indexes ?   2 + 3 + 6 + 4

10. a) Write SQL Query to perform the following operations on a Relation.

     i)   Add a constraint to an attribute

     ii)   Remove a constraint from an attribute

     iii)   Remove an attribute

     iv)   Grant DBA authority to user

     v)   Revoke authorities on a relation from any user

     vi)   Find second max sal of a salary attribute in a relation

     vii)   Insert a Date

     viii)   Insert system date

     ix)   Finding grouped average and filtering some groups out of all groups

     x)   Deleting duplicate tuples in a relation.

   b) Describe the actors in DBMS.   (10 × 1) + 5

11. a) Write short notes on the following :

     i)   Specialization and Generalization

     ii)   Aggregation

     iii)   3-tier architecture

     iv)   Relational Database Management System

   b) Compare and contrast between 3NF and BCNF.   (4 × 3) + 3