First Semester M.Tech. Degree Examination, June-July 2009
Database Management Systems

Time: 3 hrs.   Max. Marks:100

Note : *Answer any FIVE full questions.*

1 a. Define the following terms : DBMS, Meta – data, DBA and User view.   (04 Marks)
   b. Give the component modules of a DBMS. Explain the role of each component. (16 Marks)

2 A company database needs to store information about employees (identified by SSN, with salary and phone as attributes), departments (identified by dno with dname and budget as attributes) and children of employees (with name, data of birth and age as attributes). Employees work in departments, each department is managed by an employee ; a child must be identified uniquely by name when the parent is known. Design an ER schema for this application and draw an ER diagram for the schema. Specify key attributes of each entity type. Note any unspecified requirements and make appropriate assumptions to make the specification complete.   (20 Marks)

3 a. Justify the following statements : i) Handling null values is difficult   ii) Relation must have a key.   (06 Marks)
   b. Consider the schema designed in question 2, give the relational operators expression for the following queries.
      i)   Retrieve the names of all employees in department 5.
      ii) List the names of all employees who have a dependent.
      iii) Retrieve the average salary of all employees.
      iv) List all the children whose age is greater than 18.
      v)   List all the departments whose budget is greater than or equal to Rs 10 lakhs.
                                                                        (14 Marks)

4 a. Give the ER – to - Relational mapping algorithm.   (10 Marks)
   b. Give the complete CREATE TABLE command in SQL with an example.   (10 Marks)

5 a. What are the basic data types available for attributes in SQL?   (08 Marks)
   b. Give the SQL syntax for the following queries :
      i)   Retrieve all employees in dept 5 whose salary is between Rs 15,000 and Rs 40,000.
      ii) Retrieve a list of employees working in depts. X and within each dept, ordered alphabetically by name.
      iii) Find all children who were born during the 1980s.   (12 Marks)

6 a. Discuss insertion, deletion and modification anomalies. Why are they considered bad? Illustrate with examples.   (12 Marks)
   b. Define 2NF, 3NF and BCNF.   (08 Marks)

7 a. What are the anomalies due to concurrent execution of database transactions? Give informal examples.   (10 Marks)
   b. What is a locking protocol? Describe the strict Two – phase Locking (strict 2PL) protocol.   (10 Marks)

8 a. Describe the wait – die and wound – wait protocols for deadlock prevention. (06 Marks)
   b. Explain Timestamp – Based concurrency control.   (08 Marks)
   c. Describe Redo and Undo phase crash recovery techniques.   (06 Marks)

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