II B.Tech II Semester Examinations,APRIL 2011
DATA BASE MANAGEMENT SYSTEMS
Common to ME, IT, MECT, AME, CSE, ECE

Time: 3 hours   Max Marks: 75

Answer any FIVE Questions
All Questions carry equal marks
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1. (a) Briefly explain the Database Design process.

   (b) Define these terms: Entity, Entity set, Attribute, Key.   [7+8]

2. Explain schema refinement in Database Design?   [15]

3. (a) Write a note on DBMS? Explain Database System Applications.

   (b) What is a Data Model? Explain ER data model.   [7+8]

4. During its execution, a transaction passes through several states, until it finally commits or aborts. List all possible sequences of states through which a transaction may pass. Explain why each state transition may occur?   [15]

5. (a) How is Data organized in Tree based index?

   (b) When would users use a Tree based index?   [7+8]

6. Explain ARIES.   [15]

7. (a) Consider the following Relations
      Student (snum: integer, sname: string, major: string, level: string, age: integer)
      Class (name: string, meets_at: time, room: string, fid: integer)
      Enrolled (snum: integer, cname: string)
      Faculty (fid: integer, fname: string, deptid: integer)
      Write the following queries in SQL.

      i. Find the names of students not enrolled in any class.
      ii. Find the names of students enrolled in the maximum number of classes.
      iii. Print the level and the average age of students for that level, for each level.
      iv. Print the level and the average age of the students for that level, for all levels except JR.

   (b) Explain following in brief

      i. Triggers
      ii. Assertions   [11+4]

8. Consider the following Schema:
   Suppliers (*sid : integer*, sname: string, address: string)
   Parts (*pid : integer*, pname: string, color: string)

Catalog ($\underline{sid:integer, pid:integer}$, cost: real)
The key fields are underlined. The catalog relation lists the price changes for parts by supplies. Write the following Queries in Relational Algebra and tuple relational calculus.

(a) Find the sids of suppliees who supply some red part and some green part

(b) Find the sids of suppliees who supply every part

(c) Find the sids of suppliees who supply every red or green part

(d) Find the pids of parts supplied by at least two different suppliees. [15]

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1. (a) Explain how to differentiate attributes in Entity set?

    (b) Explain all the functional dependencies in Entity sets?   [7+8]

2. (a) Discuss about DDL and DML.

    (b) What are five main functions of Database Administrator? Explain   [8+7]

3. (a) Construct an ER diagram for a bank Database. Bank maintains data about customers, their loans, their deposits, lockers. Determine the entities and relationships.

    (b) Define the terms: Entity Set, Role, Relationship set, Aggregation.   [7+8]

4. (a) Explain dynamic Data structure?

    (b) Explain overflow of pages?   [7+8]

5. (a) Explain about the basic form of a SQL queries.

    (b) Write the following queries in SQL for the following schema.
    Sailors (sid: integer, sname: string, rating: integer, age: real)
    Boats (bid: integer, bname: string, color: string)
    Reserves (sid: integer, bid: integer, day: date)

     i. Compute increments for the ratings of persons who have sailed two different boats on the same day.
     ii. Find the ages of sailors whose names begins and ends with B and has at least three characters.
     iii. Find the colors of boats reserved by Raghu.
     iv. Find the sids of all sailors who have reserved red boats but not green boats.   [7+8]

6. (a) Define the divisible operation in terms of the basic relational algebra operations. Describe a typical query that calls for division. Unlike join, the division operation is not given special treatment in database systems. Explain why.

    (b) Database Systems use some variant of Relational Algebra to represent query evaluation plans. Explain why Algebra is suitable for this purpose.   [7+8]

7. (a) What is Thomas write rule?

    (b) Explain the time-stamp ordering protocol?   [7+8]

8. Explain advanced recovery Techniques?   [15]

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1. (a) Give a note on storage manager component of database system structure.

   (b) Make a comparison between Database system and File system.   [7+8]

2. (a) How the Data is stored in External Storage?

   (b) Explain file organization & indexing?   [7+8]

3. (a) Construct an ER diagram for university registrar's office. The office maintains data about each class, including the instructor, the enrollment and the time and place of the class meetings. For each student class pair a grade is recorded. Determine the entities and relationships.

   (b) What is the composite attribute? How to model it in the ER diagram? Explain with an example.   [7+8]

4. Explain the Difference between three storage types, Volatile, Non-Volatile and Stable in terms of I/O cost.   [15]

5. (a) Discuss about Tuple Relational Calculus in detail.

   (b) Write the following queries in Tuple Relational Calculus for following Schema.
   Sailors (sid: integer, sname: string, rating: integer, age: real)
   Boats (bid: integer, bname: string, color: string)
   Reserves (sid: integer, bid: integer, day: date)

       i. Find the names of sailors who have reserved a red boat
       ii. Find the names of sailors who have reserved at least one boat
       iii. Find the names of sailors who have reserved at least two boats
       iv. Find the names of sailors who have reserved all boats.   [7+8]

6. (a) Explain constraints on an Entity set.

   (b) Explain constraints on a Relationship set.   [7+8]

7. (a) Write the following queries in SQL using Nested queries concept for following Schema.
   Sailors (sid: integer, sname: string, rating: integer, age: real)
   Boats (bid: integer, bname: string, color: string)
   Reserves (sid: integer, bid: integer, day: date)

       i. Find the names of sailors who have reserved both red and green boat
       ii. Find the names of sailors who have reserved all boats

iii. Find the names of sailors who have not reserved red boat

iv. Find sailors whose rating is better than some sailor called raghu.

(b) What is a correlated nested query? Explain with an example.   [11+4]

8. Consider the following two transactions:

T_1:   read(A);
read(B);
if A=0 then B:= B + 1;
write(B).
T_2:   read(B);
read(A);
if B=0 then A:= A + 1;
write(A).

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

(a) Show that every serial execution involving these two transactions preserves the consistency of the Database?

(b) Show a concurrent execution of T_1 and T_2 that produces a non serializable Schedule?

(c) Is there a concurrent execution of T_1 and T_2 that produces a serializable Schedule?   [5+5+5]

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1. (a) Explain covering constraints & overlap constraints.
   (b) Give a detail note on weak entity set.   [7+8]

2. (a) Explain functional dependency with an example?
   (b) Compare Third NF and BCNF, explain with examples?   [11+4]

3. (a) What is the relationship betweens files & indexes?
   (b) What is the search key for an index?
   (c) What is Data entry in an index?   [7+4+4]

4. (a) Explain the Database users and user interfaces.
   (b) Discuss the function of Database Administrator.   [9+6]

5. (a) Discuss about joins in Relational Algebra with examples.
   (b) Explain about set operations in Relational Algebra with examples.   [7+8]

6. Explain shadow-copy technique for Atomicity and Durability?   [15]

7. (a) Consider the following Relations
      Student (snum: integer, sname: string, major: string, level: string, age: integer)
      Class (name: string, meets_at: time, room: string, fid: integer)
      Enrolled (snum: integer, cname: string)
      Faculty (fid: integer, fname: string, deptid: integer)
      Write the following queries in SQL.
      i. Find the names of all juniors (level = JR) who are enrolled in a class taught by I. teach.
      ii. Find the age of the oldest student who is either a History major or enrolled in a course taught by I. teach.
      iii. Find the names of all classes that either meet in a room R128 or have five or more students enrolled.
      iv. Find the number of all students who are enrolled in two classes that meet at the same time.
   (b) What is a trigger and what are its 3 parts. Explain in detail.   [11+4]

8. Stable Storage cant be Implemented, Explain why it can't be?   [15]

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