Code No: NR420402 **Set No.1**

IV B.Tech. II Semester Regular Examinations, April/May -2005
DATA BASE MANAGEMENT SYSTEMS
(Electronics & Communication Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain the operations select, project Cartesian product and join with suitable examples.
   (b) Compare the two relational calculi.

2. (a) Consider the following schema
   Employee (employee-name, street, city)
   Works (employee-name, company-name, salary)
   Company (Company-name, city)
   Managers (employee-name, manager-name)
   Write the following queries in SQL .
      i. Find the names and cities of residence of all employees who work for first bank corporation.
      ii. Find the names, Street address, and cities of residence of all employees who work for first Bank corporation and earn more than $\$10,000$.
      iii. Find all employees in the database who live in the same cities and on the same streets as do their managers.
      iv. Find all employees in the database who do not work for first Bank corporation.
   (b) Describe about embedded SQL in examples.

3. (a) Which of the three basic file organizations would you choose for a file where the most frequent operations are as follows,
      i. Search for records based on a range of field values.
      ii. Perform insert and scans where the order of records does not matter.
      iii. Search for a record based on a particular field value.
   (b) Define dense index.
   (c) How does multi level indexing improve the performance of searching an index file .

4. (a) Explain external sort - merge algorithm.
   (b) Discuss about estimation of the size of joins.

5. (a) Discuss about cost of sort-merge join.
   (b) Describe conjunctive normal form and explain why it is important in the context of relational query evaluation.

6. (a) Explain the difference between week entity and strong entity set? How to represent the strong entity and week entity set through ER-diagrams
   (b) The State Bank of India offers the five different types of accounts : loan, checking, recurring deposits, locker accounts and fixed deposit. . The Bank has a number of branches and a client of the bank can open many accounts. A account can be joint and more than one client may operate an account. Identify the entities , attributes what relationships exist among these entities and Tables. Draw the corresponding E-R diagram
7. (a) Explain the concept of log based recovery.
   (b) Briefly explain why recovery is needed.
8. Explain in detail the ARIES recovery method.

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1. (a) Explain the following terms
   i. Tuple relational calculus
   ii. Domain relational calculus
   iii. Atomic formula
   iv. Well formed formula

   (b) Consider the following schema given. The primary keys are underlined.
   Sailors(sailor-id, sailor-rating, sailor-age)
   Boats(boat-id, boat-name, boat-color)
   Reserves(sailor-id, boat-id, day)
   Write the queries in tuple relational calculus for the following
   i. Find all sailors with a rating above 10
   ii. Find all boats with color blue
   iii. Find the names of sailors who have reserved all boats
   iv. Find the names of sailors who have reserved a green boat

2. (a) What is an SQL ? Explain the various aspects of SQL.

   (b) Consider the following schema . The primary keys are underlined.
   Sailors(sailor-id, sailor-name, sailor-rating, sailor-age)
   Boats(boat-id, boat-name, boat-color)
   Reserves(sailor-id, boat-id, day)

   Write the queries in SQL for the following
   i. Find the names of sailors who have reserved at least one boat.
   ii. Find the ages of sailors whose names begin and end with C and has atleast four characters.
   iii. Find the names of sailors who have reserved a blue or a yellow boat.
   iv. Find the names of sailors who have reserved both a blue and a yellow boat.
   v. Find the names of all sailors who have reserved blue boats but not yellow boats.

3. (a) Discuss the mechanism used to read data from or write data into the disk.

   (b) Explain how the double buffering improves the block access time

4. What is

(a) query evaluation plan

(b) query execution engine

(c) catalog information about relations and indices

5. Show that the following equivalences hold and explain how they can be applied to improve the efficiency of certain updates.

   (a) $\sigma_p(r1 \cup r2) = \sigma_p(r1) \cup \sigma_p(r2)$

   (b) $\sigma_p(r1 - r2) = \sigma_{p(r1)} - \sigma_p(r2)$

6. (a) When are two sets of functional dependencies are equivalent? How can we determine their equivalence?

   (b) Define BCNF ? How does BCNF differ from 3NF. Explain with an example.

7. Describe each of the following locking protocols.

   (a) 2PL.

   (b) Strict 2PL.

   (c) Conservative 2PL.

8. (a) What is the difference between

      i. Stable storage and disk.

      ii. System crash and a media failure.

      iii. Check points and fuzzy dumps.

   (b) Give a short note on crash recovery.

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Code No: NR420402 **Set No.3**

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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
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1. (a) With a neat diagram, explain Three-Schema-Architecture of DBMS
   (b) Explain
      i. Logical data independence
      ii. Physical data independence

2. (a) What is an SQL ? Explain the various aspects of SQL.
   (b) Consider the following schema . The primary keys are underlined.
   Sailors(sailor-id, sailor-name, sailor-rating, sailor-age)
   Boats(boat-id, boat-name, boat-color)
   Reserves(sailor-id, boat-id, day)

   Write the queries in SQL for the following
      i. Find the names of sailors who have reserved at least one boat.
      ii. Find the ages of sailors whose names begin and end with C and has atleast four characters.
      iii. Find the names of sailors who have reserved a blue or a yellow boat.
      iv. Find the names of sailors who have reserved both a blue and a yellow boat.
      v. Find the names of all sailors who have reserved blue boats but not yellow boats.

3. (a) Write a note on dense and sparse indexing.
   (b) Write a note on fixed and variable length records.

4. (a) Explain about projection based on sorting.
   (b) Explain about projection based on hashing.

5. (a) At what point during query processing does optimization occur
   (b) Consider the following SQL queries for a bank DB
   select T.branch_name
   from branch T,branch S
   where T.assets> S.assets
   and S.branch_city = "Chennai"
   Write an efficient relational-algebra expression that is equivalent to this query. Justify

(c) What is multiple equivalence. How is multiple transformation done by the following query?
Π customer_name (σ branch_city = "Chennai"(branch X (account X depositor)))

6. (a) Construct an E-R diagram for university registrars 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 that exist between the entities. Also construct the tabular representation of the entities and relationships.

   (b) What is an entity type? What is an entityset? Explain the difference between the entity, entity type and entityset?

7. (a) Explain Binary locks, Shared Locks and Exclusive locks ?

   (b) What is the two phase locking protocal? How does is guarantee serializability.

8. (a) How is the Recovery Manager is responsible for transaction atomicity and durability? Explain.

   (b) Explain Stealing Frames and Forcing pages?

   (c) What are difference between update log record and CLRS?

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Code No: NR420402 **Set No.4**

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1. (a) Consider the following schema for a COMPANY database
Employee (Name, SSN, Address, Sex, Salary, Dnumber)
Employee (Name, SSN, Address, Sex, Salary, Dnumber)
Department (Dname, Dnumber, MGRSSN, MGRSTART_date)
Dept-locations (Dnumber, Dlocations)
Project (Pname, Pnumber, Plocation, Dnumber)
Works-on (ESSN, Pnumber, Hours)
Dependent (ESSN, Dependent-name, Sex, Bdate, Relationship)

Write the queries in Relational Algebra to

i. Retrieve all employees who either work in department 4 and make over 25,000 per year or work in department 5 and make over 30,000
ii. Retrieve the Social Security numbers of all employees who either work in department 5 or directly supervise a employee who works in department 5.
iii. Retrieve the name and address of all employees who work for the "Research" department
iv. List all the projects on which employee "Smith" is working.

(b) What is relational completeness? If a query language is relationally complete, can you write any desired query in that language

2. (a) What is an SQL ? Explain the various aspects of SQL.

(b) Consider the following schema . The primary keys are underlined.
Sailors(sailor-id, sailor-name, sailor-rating, sailor-age)
Boats(boat-id, boat-name, boat-color)
Reserves(sailor-id, boat-id, day)

Write the queries in SQL for the following

i. Find the names of sailors who have reserved at least one boat.
ii. Find the ages of sailors whose names begin and end with C and has atleast four characters.
iii. Find the names of sailors who have reserved a blue or a yellow boat.
iv. Find the names of sailors who have reserved both a blue and a yellow boat.

v. Find the names of all sailors who have reserved blue boats but not yellow boats.

3. (a) Explain the limitations of static hashing. Explain how this is overcome in dynamic hashing.
   (b) Write a note on indexed sequential files.

4. Discuss the implementation of a select operation. Explain the processing mechanism by means of an example.

5. (a) Why is it not desirable to force users to make an explicit choice of a query processing strategy? Are there cases in which it is desirable for users to be aware of the costs of competing query processing strategies? Explain.
   (b) What are the advantages and disadvantages of hash indices relative to B+ - tree indices? How the type of index available influences the choice of query processing strategy?

6. (a) Construct an E-R diagram for university registrars 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 that exist between the entities. Also construct the tabular representation of the entities and relationships.
   (b) What is an entity type? What is an entityset? Explain the difference between the entity, entity type and entityset?

7. Discuss shadow paged recovery technique. In what ways this is different from log based recovery?

8. (a) What are different Recovery Techniques used in Transaction Failures?
   (b) Explain how System Crash and Media Failure occurs?

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