

**III B.Tech II Semester Regular Examinations, Apr/May 2006**  
**DATA BASE MANAGEMENT SYSTEMS**  
**(Electronics & Computer Engineering)**

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

**Answer any FIVE Questions**  
**All Questions carry equal marks**

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1. (a) Explain
  - i. Database
  - ii. DBMS
  - iii. Entity
  - iv. Relationships [2+2+2+2](b) Explain the historical perspective of DBMS [8]
2. (a) 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.
  - i. Find the names and ages of all sailors.
  - ii. Find the all sailors with a rating above 5
  - iii. Find the names of sailors who have reserved boat number 110.
  - iv. Find the sailor-ids of sailors who have reserved a blue boat
  - v. Find the names of sailors who have reserved a green boat
  - vi. Find the colors of boats reserved by sailor Smith [1+1+2+2+2+3](b) What is a nested query ? Give an example. [5]
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. [6+4+6]
4. What is
  - (a) query – evaluation plan
  - (b) query – execution engine

- (c) catalog information about relations and indices [6+6+4]
5. Show that the following equivalences hold and explain how they can be applied to improve the efficiency of certain updates.
- (a)  $(r1 \cup r2) \cup r3 = r1 \cup (r2 \cup r3)$
- (b)  $r1 \cup r2 = r2 = r2 \cup r3$
- (c)  $\sigma_p(r1 - r2) = \sigma_p(r1) - \sigma_p(r2)$  [5+4+7]
6. (a) What is Normalization? Discuss the first, second and third normal forms with examples.
- (b) Explain with an example why 4NF is more desirable normal form than BCNF. [8+8]
7. (a) State and justify "Thomas write rule."
- (b) Explain multiversion concurrency control protocol.
- (c) Explain blind write. [6+6+4]
8. (a) Write short notes on
- i. Write-Ahead log protocol
- ii. Check pointing [4+4]
- (b) Explain how a System Crash can be recovered using ARIES algorithm? [8]

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1. (a) With a neat diagram, explain Three-Schema-Architecture of DBMS [8]  
(b) Explain
  - i. Logical data independence
  - ii. Physical data independence [4+4]
2. Explain the various types of aggregate functions with suitable examples in SQL. [16]
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. [6+4+6]
4. (a) Discuss about cost based optimization.  
(b) Give a detailed account of heuristic optimization. [8+8]
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? [8+8]
6. (a) Explain the functional dependencies and multi valued dependencies with examples.  
(b) What is normalization? Discuss the 1NF,2NF, and 3NF Normal forms with examples. [8+8]
7. (a) State and justify "Thomas write rule."  
(b) Explain multiversion concurrency control protocol.  
(c) Explain blind write. [6+6+4]

8. Answer the following briefly:

- (a) How is check pointing done in ARIES?
- (b) Can a second end check point record be encountered during analysis phase?
- (c) Why is the use of CLRS important for the use of UNDO actions that are not the physical inverse of the original update? [5+5+6]

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1. (a) What is DBMS? Explain the advantages of DBMS [2+5=7]  
(b) What is a data model? Explain the relational data model [3+6=9]
2. (a) Explain the three set-manipulation constructs available in SQL with examples.  
(b) What is a subquery? Explain with examples. [9+7]
3. Explain clustering indices. Compare with unclustered indices. [16]
4. (a) Explain what role do statistics gathered from the database play in query optimization?  
(b) What are the important design decisions that must be made in optimizing the relational queries? [6+10]
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)  $\sigma_p(r1 - r2) = \sigma_p(r1) - \sigma_p(r2)$  [8+8]
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. [6+10]
7. (a) Explain Two phase locking with algorithms.  
(b) What is Transaction? In what ways is it different from an ordinary program (Like 'C'). [10+6]
8. (a) If a system fails repeatedly during recovery, what is the maximum number of log records that can be written (as a function of number of update and other log records written before crash) before restart completes successfully.  
(b) What is the oldest log record that we need to retain?  
(c) If a bounded amount of stable storage is needed for the log, how can we ensure that there is always enough stable storage to hold all log records written during restart? [5+5+6]

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1. (a) Explain
  - i. Database
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  - iv. Relationships [2+2+2+2](b) Explain the historical perspective of DBMS [8]
2. (a) Explain with an example in SQL
  - i. Unspecified where-clause and use of Asterisk
  - ii. Exist and not exists
  - iii. Explicit sets and NULLS
  - iv. Renaming attributes and joined tables. [2+2+2+2](b) Consider the following scheme for the COMPANY database. The primary keys are underlined.  
Employee (SSN, Fname, Lname, Birthdate, Address, Salary, Dnumber)  
Department (Dnumber, Dname, Dlocation)  
Perform the following operations using SQL. Assume the data:
  - i. Insert a record into employee table
  - ii. Delete an employee with SSN equal to 10.
  - iii. Update the Dnumber of the employee tuple having salary greater than Rs 10,000.
  - iv. Retrieve the name and address of all employees who work for the "XYZ" department. [2+2+2+2]
3. (a) Write a note on secondary indexes.  
(b) Write a note on sparse and dense indexes. [8+8]
4. Consider the three basic techniques selection, iteration and partitioning, and the relational algebra operators selection, projection and join. For each technique operator pair, describe an algorithm based on the technique for evaluating the operator. [16]
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. [8+8]

6. (a) What is super key and candidate key. Explain with examples.  
(b) Explain with an entity– relation ship model diagram an airline reservation system. Identify the entities, attributes and relation ship exist among entities. [6+10]
7. Write short notes on  
(a) dead lock.  
(b) exclusive lock.  
(c) binary lock.  
(d) live lock. [4+4+4+4]
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? [7+5+4]

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