

**IV B.Tech I Semester Regular Examinations, November 2005**  
**DATA BASE MANAGEMENT SYSTEMS**  
**( Common to Electronics & Instrumentation Engineering and Electronics & Control Engineering)**

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

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

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1. (a) Define the following with suitable examples:
  - i. Relation
  - ii. Cardinality of a relation
  - iii. Super-key
  - iv. Candidate key. [2+2+2+3](b) Explain the structure of relational model. [7]
2. (a) Explain with an example about Aggregate functions and grouping in SQL. [5+3=8]  
(b) Assume the following relations:  
STUDENT (Stname, Stnum, Totalmarks, Semester)  
HOSTEL (Stnum, Roomnum)  
Represent the following queries in SQL.
  - i. Get the details of 6th semester students
  - ii. Obtain the room number allotted to Girish
  - iii. Obtain the names of students staying in room number 24.
  - iv. Get the name and marks of student whose number is 24046 [2+2+2+2]
3. Describe a hashed file and show how insertion and deletion of a file record can be performed on it. [16]
4. Let relations  $r_1(A,B,C)$  and  $r_2(C,D,E)$  have the following properties:  $r_1$  has 20000 tuples,  $r_2$  has 45000 tuples, 25 tuples of  $r_1$  fit on one block, and 30 tuples of  $r_2$  fit on one block. Estimate the number of accesses required, using each of the following join strategies for  $r_1 \bowtie r_2$ :
  - (a) nested-loop join
  - (b) block nested-loop join
  - (c) merge-join
  - (d) hash-join [4+4+4+4]
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) Design a generalization-specialization hierarchy for a motor-vehicle sales company. The company sells motor-cycles, passenger cars, vans and busses. Justify your placement of attributes at each level of hierarchy. Explain why they (attributes) should not be placed at higher or lower level? Convert the E-R diagram so made to 3NF relational scheme.
- (b) Normalize the relation  $R(A,B,C,D,E,F,G,H)$  into the third normal form using the following set of FDs:  
AB-  $\rightarrow$  C  
BC-  $\rightarrow$  D  
CDE-  $\rightarrow$  ABH  
BH-  $\rightarrow$  A  
D-  $\rightarrow$  EF  
Is the decomposition dependency preserving? [8+8]
7. Write short notes on
- (a) dead lock.
  - (b) exclusive lock.
  - (c) binary lock.
  - (d) live lock. [4+4+4+4]
8. (a) What are different Recovery Techniques used in Transaction Failures?
- (b) Explain how System Crash and Media Failure occurs? [10+6]

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1. (a) What is a Data model ? List the important data models [8]  
(b) Explain
  - i. DDL
  - ii. DML
  - iii. Data sublanguage
  - iv. Host language [2+2+2+2]
2. (a) what are the various salient features of the QBE ? [7]  
(b) Explain the following :
  - i. Relational database query.
  - ii. Query language
  - iii. SQL
  - iv. Embedded SQL. [2+2+2+3]
3. (a) Explain the limitations of static hashing. Explain how this is overcome in dynamic hashing.  
(b) Write a note on indexed sequential files. [10+6]
4. Discuss the merits and demerits of hash join, sort-merge join and block nested loops join. [16]
5. (a) Discuss the reasons for converting SQL queries into relational algebra queries before optimization is done.  
(b) What is meant by query execution plan? Explain its significance. [10+6]
6. (a) Explain the difference between weak entity and strong entity set? How to represent the strong entity and weak 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 [8+8]
7. (a) What information does the dirty page table and transaction table contain?

- (b) Give a short notes on recovery from deadlock. [6+10]
8. Describe the shadow paging recovery technique. Under what circumstances does it not require a log. [16]

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1. (a) Explain the following with examples.
  - i. relational schema
  - ii. relational database schema
  - iii. domain
  - iv. cardinality of a relation
  - v. degree of a relation. [2+2+2+2+2]
 (b) What is a domain constraint? Explain with the help of an example. [6]
2. Explain the various types of aggregate functions with suitable examples in SQL. [16]
3. What are differences among primary, secondary and clustering indices? How do these differences affect the implementation of indices? Which of the indexes are dense and which are not. [16]
4. (a) Define the term most selective path for a query.  
 (b) Explain the importance of conjunctive form in the context of relational query evaluation. [7+9]
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) 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) 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) Explain the database Recovery Technique based on Deferred Update  
 (b) What are the roles of Analysis, Redo and Undo phases in ARIES? [7+9]

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1. (a) Distinguish between DDL and DML  
(b) Explain various integrity constraints. [6+10]
2. (a) What is the role of SQL in a database architecture.  
(b) What are the notations used in SQL commands. [8+8]
3. Explain clustering indices. Compare with unclustered indices. [16]
4. Let relations  $r_1(A,B,C)$  and  $r_2(C,D,E)$  have the following properties:  $r_1$  has 20000 tuples,  $r_2$  has 45000 tuples, 25 tuples of  $r_1$  fit on one block, and 30 tuples of  $r_2$  fit on one block. Estimate the number of accesses required, using each of the following join strategies for  $r_1 \bowtie r_2$ :  
(a) nested-loop join  
(b) block nested-loop join  
(c) merge-join  
(d) hash-join [4+4+4+4]
5. (a) What is indexing ? Explain with an example.  
(b) Explain about query processing. [8+8]
6. (a) Explain the following terms  
    i. Relationship instance  
    ii. Composite attribute  
    iii. Multivalued attribute  
    iv. Derived attribute [2+2+2+3]  
(b) Construct an E-R diagram for a car insurance company with a set of customers, each of whom owns a number of cars. Each car has a number of recorded accidents associated with it. Determine the entities and relationships that exist between the entities. Also construct the tabular representation of the entities and relationships. [7]
7. (a) Discuss various properties of a transaction.  
(b) The DBMS does not guarantee that the semantic meaning of the transaction truly represent the real world event. What are the possible consequences of this limitation? Give an example. [8+8]

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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