

**II B.Tech II Semester Supplementary Examinations,
November/December 2005****DATA BASE MANAGEMENT SYSTEMS****(Common to Computer Science & Engineering, Information Technology
and Computer Science & Systems Engineering)****Time: 3 hours****Max Marks: 80****Answer any FIVE Questions
All Questions carry equal marks**

1. (a) What is DDL? Explain the commands used for creating, deleting and modifying the tables.
(b) What is the difference between a candidate key and a primary key for a given relation? What is a super key ? [8+8]
2. (a) Explain advantages of QBE over other Data Manipulation languages. [5]
(b) Consider the following relational schema.
Employee(Empid, Empname, Salary)
Department(Deptid, Deptname, mangerid, floornum)
Works(Empid, Deptid)
An employee can work in more than one department. Write the following queries in QBE. Be sure to underline the variables to distinguish them from the constants.
 - i. Print the names of all employees who work on 8th floor.
 - ii. Print the names of all employees who work on 10th floor and earns less than Rs 10,000
 - iii. Give the names of employees who work in the toy department.
 - iv. Print the names of employees who earn either less than Rs 10,000 or more than Rs 50,000.
 - v. Remove an employee by name John [2+2+2+3+2]
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) Consider the following SQL query for a bank database
Select T.branch-name
From branch T, branch S
where T.Assets > S.assets and S.branch-city="HYDERABAD"
Write an efficient relational algebra expression that is equivalent to the query.

- (b) Define query optimization and at what point during query processing does optimization occur? [8+8]
5. Write short notes on the following.
- (a) SQL query translation process.
- (b) Equivalences of relational algebra. [6+10]
6. (a) List all the functional dependencies satisfied by the following relation
- | A | B | C | D |
|----|----|----|----|
| a1 | b1 | c1 | d1 |
| a1 | b2 | c1 | d2 |
| a2 | b2 | c2 | d2 |
| a2 | b3 | c2 | d3 |
| a3 | b3 | c2 | d4 |
- (b) i. what are the advantages of normalized relations over the unnormalized relations.
- ii. Why is 4NF preferable to BCNF [4+6+6]
7. Describe each of the following locking protocols.
- (a) 2PL.
- (b) Strict 2PL.
- (c) Conservative 2PL. [5+5+6]
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. Write about the following operations with suitable examples.
 - (a) Select operation
 - (b) Project operation
 - (c) Rename operation
 - (d) Natural join operation. [3+3+4+6]

2. (a) Explain advantages of QBE over other Data Manipulation languages. [5]
 - (b) Consider the following relational schema.
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3. Give algorithms for inserting a new key into a B-tree [16]

4. Discuss in detail about duplicate elimination, projection, set operators outer join and aggregation. [16]

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 functional dependencies and multivalued dependencies with examples.

(b) Consider the relation $R(A,B,C,D,E,F)$ and FDs

$A \rightarrow BC \quad F \rightarrow A$

$C \rightarrow A$

$D \rightarrow E \quad E \rightarrow D$

is the decomposition of R into $R_1(A,C,D)$, $R_2(B,C,D)$ and $R_3(E,F,D)$ loss less? Explain the requirement of loss less decomposition. [8+8]

7. (a) State and justify Thomas write rule.

(b) Explain multiversion concurrency control protocol.

(c) Explain blind write.

[6+6+4]

8. Explain in detail the ARIES recovery method.

[16]

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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) 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) Discuss the techniques for allowing a hash file to expand and shrink dynamically.
 (b) What are the advantages and disadvantages of each of above techniques. [8+8]
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) Decompose the relation R(A,B,C,D,E,F) with the following set of FDs into a BCNF relation. FDs of the relation are
 ABC → DE
 AB → D
 DE → ABCE
 E → C
 Is the decomposition lossless and dependency preserving.
 (b) "A decomposition in BCNF may be lossless and dependency preserving" is the above statement correct? Explain with the help of an example to justify your answer. How can BCNF be compared to 4NF? [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) Explain the purpose of the check(D)point mechanism. [5]
(b) How does the frequency of check point affects the following:
i. System performance when no failure occurs.
ii. The time it takes to recovery from a system crash.
iii. The time it takes to recover from a disk crash. [3+4+4]

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1. (a) What is a Domain key constraint ? why are such constraints important ? [9]
(b) Explain the following
 - i. Relational Cardinality
 - ii. Relational degree
 - iii. Domain [2+2+3]
2. (a) Is QBE based upon relational algebra, tuple relational calculus, or domain relational calculus ? Explain.
(b) Is QBE relationally complete ? Explain.
(c) What restrictions does QBE pose on update commands? Explain with example. [4+5+7]
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. (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 do you understand by the mapping cardinalities?

- (b) For the following relation scheme, tell whether it is in 3 NF or not. Employee (E_code,E_name,Dname,salary,projectno,Termination_dataof _project) Where each project no has unique termination_dateof_project. Justify your answer, if it is not 3NF bring it into 3NF through normalization. [6+10]
7. (a) Define these terms atomicity, consistency, isolation, durability, schedule, blind write.
- (b) Write a note on the properties of transactions. [12+4]
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. [3+3+4]
- (b) Give a short note on crash recovery. [6]
