

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

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Define the following with suitable examples:
 - i. Relation
 - ii. Cardinality of a relation
 - iii. Super-key
 - iv. Candidate key.(b) Explain the structure of relational model.
2. (a) Consider the following schema:
Suppliers (sid: integer, sname: string, address: string)
Parts (Pid: integer, pname; string, color: string)
Catalog (Sid: integer, pid: integer, cost: real)
Write the following queries in SQL.
 - i. Find the names of suppliers who supply red part.
 - ii. Find the sids of suppliers who supply all parts.
 - iii. Find the pids of parts that are supplied by at least two different suppliers.
 - iv. Find the pids of the most expensive parts supplied by the suppliers named TATA.(b) Why are null values not preferable in a relation.
3. (a) Explain what the buffer manager must do to process a read request for a page . what happens if the requested page is in the pool but not pinned.
(b) Explain what happens if there is a page request when all pages in the buffer pool are dirty.
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.
5. (a) What is indexing ? Explain with an example.
(b) Explain about query processing.
6. (a) List the three design goals for relational database and explain why they are desirable.
(b) Consider the relation scheme Emp_Dept(Ename, SSN, Bdate, Address, Dnumber, Dname, DMGRSSN) and the following set of FDs

$F = \{ \text{SSN} \rightarrow \text{Ename}, \text{Bdate}, \text{Address}, \text{Dnumber} \}$

$\text{Dnumber} \rightarrow \text{Dname}, \text{DMGRSSN} \}$

Calculate the closer $\{\text{SSN}\}^+$ and $\{\text{Dnumber}\}^+$ with respect to F.

7. What is two phase locking protocol? How does it guarantee serializability?
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?

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1. (a) Explain about referential integrity constraints with suitable examples.
(b) Distinguish between tuple relational calculus and relational calculus.
2. (a) Explain the three set-manipulation constructs available in SQL with examples.
(b) What is a subquery? Explain with examples.
3. (a) Write a note on dense and sparse indexing.
(b) Write a note on fixed and variable length records.
4. (a) Give the implementation algorithms for union and set-difference based on sorting and hashing.
(b) Discuss about demand driven pipeline and producer driven pipeline
5. Discuss various cost estimation methods of access based on indexing principle for relation operators.
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.
7. (a) Explain Two phase locking with algorithms.
(b) What is Transaction? In what ways is it different from an ordinary program (Like 'C').
8. (a) Explain optimistic concurrency control under time-stamp.
(b) Explain the use of transaction log in database recovery.

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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 “Re-search” 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) Explain with an example about Aggregate functions and grouping in SQL.
- (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
3. (a) Write a note on dense and sparse indexing.
- (b) Write a note on fixed and variable length records.
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.
- 5. (a) Discuss the role of relational algebra equivalences in query optimization.
(b) Explain various steps involved in the query processing.
- 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. Explain the role of concurrency control in databases. Also describe the basic tree protocol that ensures serializability of concurrent transactions.
- 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?

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1. (a) Consider the following scheme 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 Relational algebra
 - i. Find the names of sailors who have reserved a red and a green boat
 - ii. Find the names of sailors who have reserved at least two boats
 - iii. Find the sailor-ids of sailors with age over 22 and who have not reserved a green boat.
 - iv. Find the names of sailors who have reserved all boats
 - v. Find the names of sailors who have reserved all boats called BlueMoon.
- (b) Given two relations R1 and R2 , where R1 contains N1 tuples, R2 contains N2 tuples, and $N2 > N1 > 0$, give the minimum and maximum possible sizes (in tuples) for the result relation produced by each of the following relational algebra expressions. In each case, state any assumptions about the schemas for R1 and R2 that are needed to make the expression meaningful.
 - i. $R1 \cup R2$
 - ii. $R1 \cap R2$
 - iii. $R1 - R2$
2. Explain the various types of aggregate functions with suitable examples in SQL.
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) How does hybrid hash join improve upon the basic hash join algorithm.
- (b) Give an example of how buffer replacement policies can affect the performance of a join algorithm.
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) What is multivalued dependencies? What type of constraint does it specify ? When does it arise?
(b) Explain the join dependencies and 5NF
- 7. (a) Describe the two phase locking protocol with the help of an example ;
(b) What are the basic properties of a transaction? Explain these properties with the help of an example?
- 8. Explain WAL Protocol, UNDO algorithm, Check pointing and Media Recovery?
