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INSTITUTE OF AERONAUTICAL ENGINEERING (Autonomous)

Four Year B.Tech III Semester End Examinations (Supplementary) - July, 2018

Regulation: IARE – R16

Database Management Systems

Time: 3 Hours

(IT)

Max Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

UNIT – I

1. (a) With a neat diagram explain the various components of a database system and their connections. [7M]
- (b) Explain the differences between physical and logical data independence. [7M]
2. (a) Explain the following terms briefly: entity, relationship, entity set, relationship set, one-to-many relationship, many-to-many relationship, participation constraint, overlap constraint, covering constraint and role indicator. [7M]
- (b) Construct an E-R diagram for a car insurance company whose customers own one or more cars each. Each car has associated with it zero to any number of recorded accidents. [7M]

UNIT – II

3. (a) Given two relations R1,R2 with N1,N2 tuples respectively state the assumptions in the resultant about the schemas needed to make the expression meaningful and the number of tuples for the following $R1 \cap R2$, $R1 \cup R2$, $R1 - R2$, $R1 \times R2$ with examples. [7M]
- (b) Consider the set of schema: Suppliers (sid, sname, address), Parts (pid, pname, color) Catalog (sid, pid, cost)
 - i. Find the names of the suppliers who supply some red part
 - ii. Find the sids of suppliers who supply every part
 - iii. Find the sids of suppliers who supply every red or green part
 Write the above queries in relational algebra, relational calculus. [7M]
4. (a) Consider the following relational database [7M]

```

author(author_id,firstname,last_name)
authorpub(author_id,pubid,author_position)
book(book_id,booktitle,month,year,editor)
pub(pub_id,title,book_id)

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 Give a relational algebra expression for each of the following queries:
 - Find the names of all authors who are not book editors
 - Find the names of all authors who have at least one publication in the database.
 - Which Query does the following relational algebra expression answer?
 $author \bowtie (authorpub \bowtie (month='July'(book) \bowtie pub))$
 - Find the names of all authors who are book editors.

- (b) Consider a relation $R(A, B)$ that contains r tuples, and a relation $S(B, C)$ that contains s tuples; assume $r > 0$ and $s > 0$. Make no assumptions about keys. For each of the following relational algebra expressions, state in terms of r and s the minimum and maximum number of tuples that could be in the result of the expression. [7M]
- $R \cup \rho_{s(A,B)}S$
 - $\pi_{A,C}(R \bowtie S)$
 - $\pi_B R - (\pi_B R - \pi_B S)$
 - $\sigma_{A>B}R \cup \sigma_{A<B}R$

UNIT – III

5. (a) Consider the following relational database: - [7M]
 Employee (employee-name, street, city) Works(employee-name, company-name, salary) Company (company-name, city) Manages (employee-name, manager-name)
 Give an SQL DDL definition of this database. Identify referential – integrity constraints that should hold, and include them in the DDL definition.
- (b) Suppose there are two relations r and s , such that the foreign key B of r references the primary key A of s . Describe how the trigger mechanism can be used to implement the on delete cascade option, when a tuple is deleted from s . [7M]
6. (a) Let $R = (A, B, C)$, and let r_1 and r_2 both be relations on schema R . Give an expression in SQL that is equivalent to each of the following queries. [7M]
- $r_1 \cup r_2$
 - $r_1 \cap r_2$
 - $r_1 - r_2$
 - $\pi_{AB}(r_1) \bowtie \pi_{BC}(r_2)$
- (b) SQL allows a foreign-key dependency to refer to the same relation, as in the following example: create table manager (employee-name char(20), manager-name char(20), primary key employee-name, foreign key (manager-name) references manager on delete cascade)
 Here, employee-name is a key to the table manager, meaning that each employee has at most one manager. The foreign-key clause requires that every manager also be an employee. Explain exactly what happens when a tuple in the relation manager is deleted. [7M]

UNIT – IV

7. (a) Explain View serializability and conflict serializability. [7M]
 (b) In Time stamp-based concurrency control transactions are assigned time stamp at the startup. How it is used to ensure serializability? How does Thomas Write Rule improve concurrency [7M]
8. (a) Explain the structure of Log records and compensation log records. [7M]
 (b) Explain in detail all the activities that occurs in ARIES crash recovery algorithm by taking a suitable log record with crash. [7M]

UNIT – V

9. (a) Discuss the structures of Fixed length and variable length records. [7M]
(b) Explain the Insertion, deletion of nodes in B+ tree with examples. [7M]
10. (a) List an advantage and a disadvantage of each of the following strategies for storing a relational database: [7M]
 • Store each table in a separate file,
 • Store multiple tables (or even the entire database) in a single file.
- (b) Discuss clustered indexing, Hash based indexing and tree based indexing. [7M]

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