

Date: 4th May 2023

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ASSIGNMENT - 2

A.

1. Which of the following keys is generally used to represent the relationships between the tables?
Foreign key
2. Which one of the following keyword is used to find out the number of values in a column?
COUNT
3. Which one of the following commands is used to modify a column inside a Table?
ALTER
4. In the relation model, the relation are generally termed as
Tables
5. What is the relation calculus?
It is a non-procedural language
6. Which of the following is used to denote the selection operation in relational algebra?
Sigma Pi (Greek)
7. For select operation the _____ appear in subscript and the _____ argument appears in the parenthesis after the sigma.
Predicates, relation
8. The _____ operation, denoted by -, allows us to find tuples that are in one relation but are not in another
Set-difference

9. If E_1 and E_2 are relational algebra expressions, then which of the following is NOT a relational algebra expression?
 E_1 / E_2

10. Which of the following is not valid unary operation in the relational algebra?
 \min

[B]

1. Write a short note on Tuple Relational Calculus and Domain Relational Calculus?

Tuple Relational Calculus :

TRC is a declarative language that allows users to specify what they want to retrieve from a database without specifying how to retrieve it. In TRC, users define a set of tuples that satisfy certain conditions or predicates.

Domain Relational Calculus :

DRC is also a declarative language, but instead of operating on tuples, it operates on individual values within the tuples. In DRC, users define a set of values that satisfy certain conditions or predicates.

TRC is more widely used than DRC, as it is more intuitive and easier to use. However DRC is more powerful than TRC.

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[A]

1. Procedural language among the following is Relational Algebra
2. The logical design and the snapshot of the data at given instant in time is known Schema and Instance
3. Which of the following is fundamental operation in relational algebra?
None of the mentioned
4. Which of the following is used to denote the Selection operation in relational algebra?
Sigma (Greek)
5. For select operation the _____ appear in the subscript and the _____ appear in argument
Predicts, Relation
6. Which of the following represent a query in the tuple relational calculus?
 $\{t \mid P(t)\}$
7. CREATE TABLE employee (name var VARCHAR, id INTEGER) what type of statement is that
DDL

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8. The basic data type `char(n)` is a _____ length character string and `varchar(n)` is _____ length characters Fixed, Variable
9. The result which operation contains all pairs of tuples from the two relations, regardless of whether their attribute values match.
Cartesian Product
10. The _____ operator takes the result of two queries and returns only rows that appear in both result sets.
Intersect

[B]

1. Explain the basic structure of SQL.
SQL is programming language designed for managing and manipulating data stored in relational databases. It consists of statement that can be used to create, modify and query databases.
2. What is relational algebra?
Relational algebra is a theoretical framework for reasoning about relational database. It provides a set of operation that can be used to manipulate and transform relation

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in a database and forms the SQL and other relational database language.

3. What do you understand by relational Calculus?
- Relational Calculus is a declarative language used to describe queries on relational databases. It allows users to describe what they want to retrieve from the database without specifying how to retrieve it and is used as theoretical foundation for query language like SQL.

4. Define Data Dictionary.

A data dictionary is a centralized repository of metadata that describe the structure, format and meaning of data within a database or system.

C

1. Explain different types of Integrity constraints.

These are several types of integrity constraints commonly used in relational databases:

- i) Entity Integrity Constraints : These constraints ensure that each row in a table represents a unique entity by specifying a primary key. A primary key is a unique identifier for a row in a table and can consists of one or more columns.

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ii. Referential Integrity Constraints :

These constraints establish relationships b/w table by defining foreign keys.
A foreign key is a column in a table that refers to the primary key for another table.

iii. Domain Integrity Constraints :

These constraints define the allowed values of datatypes for columns in a table.

iv. Check Constraints :

These constraints specify whether a column can have a null value, which represents the absence of a value.

v. Unique Constraints :

These constraints ensure that the value in a column or combination of columns, are unique with the table.

vi. Null Constraints :

Null Constraints ensure that columns that are required that a value are not left empty, which allowing for optional data.

vii. Multi table Constraints :

These constraints involve multiple tables and define relationships and dependencies b/w them.

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2. Explain Union, set difference and set intersection operations in relational algebra. Union, set differences and set intersection are 3 fundamental set operations in relational algebra, which is a mathematical query used to manipulate and retrieve data from relational databases.

i Union (\cup) : The union operation combines the rows of two and more tables or relational into a single result set.

$R \cup S$, where R and S are two relations.

ii. Set difference : The set difference operation also known as minus or except, return the rows that are present in one table but not in another.

It is denoted by symbol " $-$ "

$R - S$, where R and S are two relations.

iii. Set intersection (\cap) : The set intersection operation return the common rows that are present in both table and rows.

$R \cap S$, where R and S are two relations.

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D

1. Differentiate between Cartesian Product and Natural Join operations with example.
- Cartesian product and natural join are two operations in relational algebra that involve combining tables or relations in a database.

Q Cartesian product: The Cartesian product of two tables, denoted by symbol 'X' or by using CROSS JOIN operation in relational algebra, returns a new table that contains all possible combinations of rows from the two original tables.

Eg: Consider two tables A and B

Table A →

A ₁	A ₂
1	X
2	Y

Table B →

B ₁	B ₂
10	P
20	Q

A × B

A ₁	A ₂	B ₁	B ₂
1	X	10	P
1	X	20	Q
2	Y	10	P
2	Y	20	Q

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ii. Natural Join : The natural join operation, denoted by the symbol ' \bowtie ' or by using the JOIN operation in relational algebra, is a type of join that combines two tables based on their common attributes without explicitly specifying the join operation.

Ex: Consider two tables A and B

table A \rightarrow table B \rightarrow

A ₁	A ₂	A ₃		A ₁	B ₁	B ₂
1	X	100			10	P
2	Y	200			20	Q

A \bowtie B :

A ₁	A ₂	A ₃	B ₁	B ₂
1	X	100	10	P
2	Y	200	20	Q

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2. Consider the following relations for a database that keeps track of student enrollment in courses and the books adopted for each course:

STUDENT (SSN, Name, Bdate)

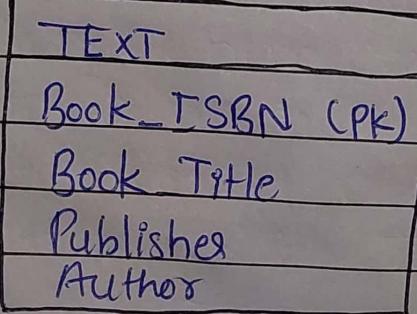
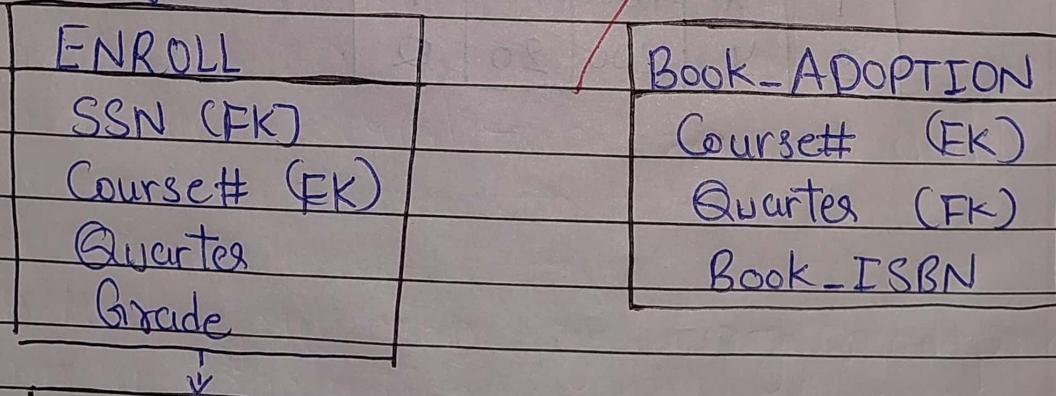
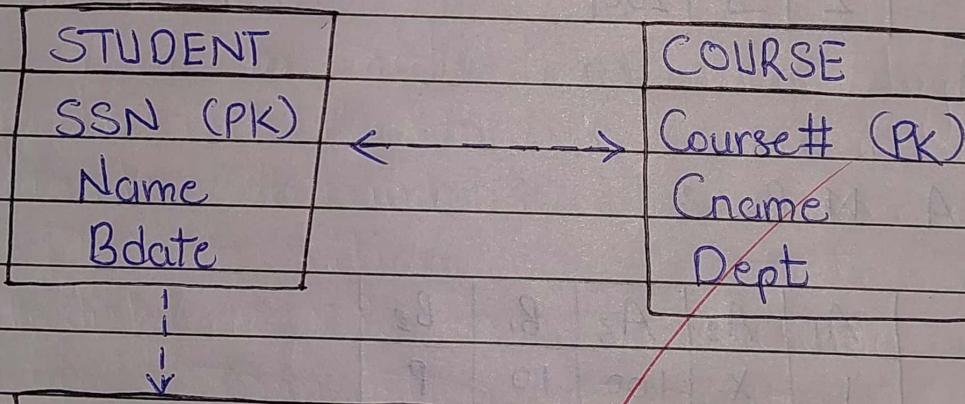
COURSE (Course#, Cname, Dept)

ENROLL (SSN, Course#, Quarter, Grade)

BOOK ADOPTION (Course#, Quarter, Book_ISBN)

TEXT (Book_ISBN, Book Title, Publisher, Author)

Draw a relational schema diagram specifying the foreign keys for this schema.



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Primary Key (PK) columns are underlined

Foreign Key (FK) columns are indicated with an arrow pointing towards the ref. primary key.

The STUDENT table has a primary key column SSN.