

# Database Management System: Assignment 3

Total Marks : 20

July 10, 2024

## Question 1

*Marks: 2 MSQ*

Identify the cases below in which a trigger is not preferred to use.

- a) Loading data from a backup copy.
- b) Maintaining summary data.
- c) Replicating updates at a remote site.
- d) Enforcing database integrity.

**Answer:** a), c)

**Explanation:** Databases provide better built-in support for replication, and risk of unintended execution of triggers, can be possible at the time of loading data from a backup copy. Hence, options a) and c) are the answer.

## Question 2

Marks: 2 MCQ

Identify the correct Embedded SQL queries for the following:

*Find the names of all students whose marks are between min\_marks and max\_marks*

where min\_marks and max\_marks are declared in the host language.

- a) EXEC SQL  
    DECLARE c CURSOR FOR  
    SELECT name  
    FROM students  
    WHERE marks BETWEEN :min\_marks AND :max\_marks  
END\_EXEC
- b) EXEC SQL  
    DECLARE c CURSOR FOR  
    SELECT name  
    FROM students  
    WHERE :marks BETWEEN min\_marks AND max\_marks  
END\_EXEC
- c) EXEC SQL  
    DECLARE c CURSOR FOR  
    SELECT name  
    FROM students  
    WHERE marks > :min\_marks AND marks < :max\_marks  
END\_EXEC
- d) EXEC SQL  
    DECLARE c CURSOR FOR  
    SELECT name  
    FROM students  
    WHERE marks BETWEEN min\_marks AND max\_marks  
END\_EXEC

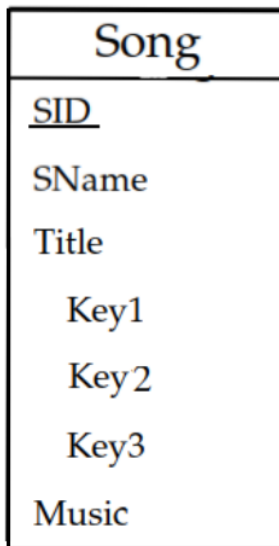
**Answer:** a)

**Explanation:** min\_marks and max\_marks are the variables of the Embedded SQL host language which contains the values of the minimum and maximum marks. We use these variables to find the names of the `students` whose marks are between the range with the help of between construct. Variables of the host language must be preceded by a colon (:) to distinguish from SQL variables. Hence, option (a) is correct.

### Question 3

Marks: 2 MCQ

Consider the following Entity Relationship Diagram:



Which of the following schema is equivalent to the entity **Song**?

- a) Song(SID, SName, Key1, Key2, Key3, Music)
- b) Song(SID, SName, Title, Key1, Key2, Key3, Music)
- c) Song(SID, Title, SName, Key1, Key2, Key3, Music)
- d) Song(SID, SName, Title, Music)

**Answer:** a)

**Explanation:** As per the syntax and semantics of ER diagram, composite attributes are flattened out by creating a separate attribute for each component attribute. Hence, option a) is correct.

## Question 4

Marks: 2 MCQ

Consider the following instance of the relation FlowerShop(Name, Location, OpensAt, ClosesAt, KnownFor)

FlowerShop				
Name	Location	OpensAt	ClosesAt	KnownFor
Bageecha	Delhi	10am	6pm	Orchids
FloralParadise	Delhi	10am	7.30pm	Sunflower
TreeLand	Mumbai	1pm	10pm	Anthuriums
TreeLand	Mumbai	1pm	10pm	Hyacinths
FloralParadise	Pune	8am	11pm	Celosia

Suppose,  $R_1$  and  $R_2$  are defined as follows:

$R_1 = \Pi_{X,Y}(\sigma_{\text{OpensAt}='10\text{am}'}(\text{FlowerShop}))$

$R_2 = \Pi_{M,N}(\sigma_{\text{Location}='Pune'}(\text{FlowerShop}))$

What attributes should replace X, Y, M, N such that  $R_1 \bowtie R_2$  produces the following tuple as output?

FloralParadise	Delhi	Celosia
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- a) X=Name, Y=Location, M=Location, N=KnownFor
- b) X=Name, Y=Location, M=Name, N=KnownFor
- c) X=Name, Y=KnownFor, M=Location, N=KnownFor
- d) X=Name, Y=KnownFor, M=Name, N=Location

**Answer:** b)

**Explanation:** Options (a) and (c) are incorrect as the common attributes for the Natural Join do not have a common value for any tuple produced by  $R_1$  and  $R_2$ . Option (d) is incorrect as it produces the tuple 

FloralParadise	Sunflower	Pune
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Hence, option (b) is correct.

## Question 5

Marks: 2 MCQ

Consider the following scenario:

*An Environmental resource management company keeps record of different forests, identified by their names. A forest is associated with its location that contains the country and area in which the forest is present. In each forest, there are different types of trees that are also recorded by the company.*

Which of the following schema correctly represents the **Forest** entity set?

- a) Forest (Name, Location, Trees)
- b) Forest (Name, Location, Country, Area, Trees)
- c) Forest (Name, Location), Forest\_location (Location, Country, Area)
- d) Forest (Name, Country, Area), Forest\_trees (Name, Trees)

**Answer:** d)

**Explanation:** In the schema of option (a), the **location** is not properly explained.

In the schema of option (b), if the attribute **Name** will be the primary key, only one **Tree** type can be stored in the **Forest** relation.

In the schema of option (c), types of **Trees** are not reflected in the **Forest** relation.

The schema in option (d) specifies the location correctly and captures the tree information in a forest as well.

Hence, option (d) is correct. Refer to slide 14.23 for details.

## Question 6

Marks: 2 MCQ

Consider the following instance of the relation **Gardens**(Name, Location, OpensAt, ClosesAt, KnownFor)

Gardens				
Name	Location	OpensAt	ClosesAt	KnownFor
Bageecha	Delhi	10am	6pm	Orchids
FloralParadise	Delhi	10am	7.30pm	Sunflower
TreeLand	Mumbai	1pm	10pm	Anthuriums
TreeLand	Mumbai	1pm	10pm	Hyacinths
FloralParadise	Pune	8am	11pm	Celosia

What is the result of the following Tuple Relational Calculus?

$\{t \mid \exists p \in \text{Gardens} \ (t[\text{KnownFor}] = p[\text{KnownFor}] \wedge p[\text{Location}] = \text{'Mumbai'})\}$

- a) 

TreeLand
----------
- b) 

Mumbai	Anthuriums
Mumbai	Hyacinths
- c) 

TreeLand	Mumbai	1pm	10pm	Anthuriums
TreeLand	Mumbai	1pm	10pm	Hyacinths
- d) 

Anthuriums
Hyacinths

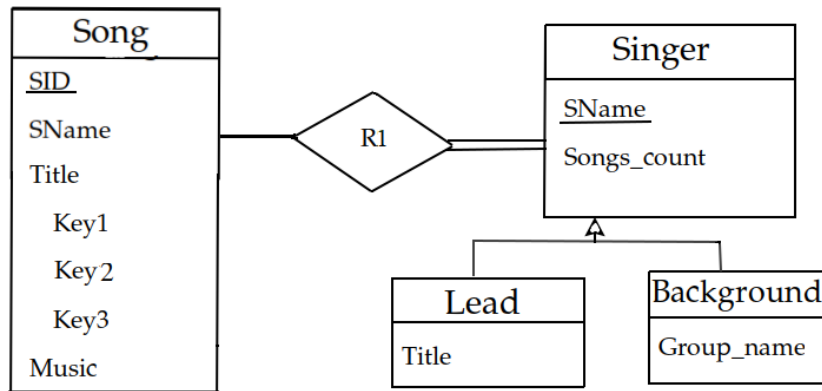
**Answer:** d)

**Explanation:** According to the syntax and semantics of Tuple Relational Calculus, option (d) is correct.

## Question 7

Marks: 2 MSQ

Consider the following Entity Relationship Diagram:



Which of the following statements is (are) correct?

- a) Participation of **Song** in **R1** is total.
- b) Participation of **Singer** in **R1** is total.
- c) **Lead** and **Background** entity sets are disjoint specializations of **Singer** entity set.
- d) **Lead** and **Background** entity sets are Overlapping specializations of **Singer** entity set.

**Answer:** b), c)

**Explanation:** In an ER diagram, double lines between entity and relation represent total relationship.

Entities connected by one arrowhead to another entity represents disjoint specialization.

Thus, options (b) and (c) are correct.

## Question 8

*Marks: 2 MCQ*

An entity in **CUSTOMER** entity set is associated with at most one entity in **LOAN** set. An entity in **LOAN**, however, can be associated with any number (zero or more) of entities in **CUSTOMER**. What is the cardinality of the relation between **LOAN** and **CUSTOMER**?

- a) One-to-many
- b) One-to-one
- c) Many-to-many
- d) Many-to-one

**Answer:** a)

**Explanation:** Here one entity in **LOAN** set is related to more than one entity in **CUSTOMER** set. Hence, it is a one-to-many relationship.



## Question 9

Marks: 2 MSQ

Consider the instance of the relational schema `DOCTORS(DrID, Name, Specialization)`:

DOCTORS		
DrID	Name	Specialization
A12	J.Ray	Heart
A187	J.Ray	Child
B3	KatieP	Kidney
H23	L.Houston	Heart

Which of the following Relational Algebra expressions produce(s) exactly the same tuples as present in this instance of `DOCTORS`?

- a)  $\Pi_{\text{DrID, Name}}(\text{DOCTORS}) \bowtie \Pi_{\text{DrID, Specialization}}(\text{DOCTORS})$
- b)  $\Pi_{\text{DrID, Name}}(\text{DOCTORS}) \bowtie \Pi_{\text{Name, Specialization}}(\text{DOCTORS})$
- c)  $\Pi_{\text{DrID, Specialization}}(\text{DOCTORS}) \bowtie \Pi_{\text{DrID, Specialization}}(\text{DOCTORS})$
- d)  $\Pi_{\text{DrID, Specialization, Name}}(\text{DOCTORS}) \bowtie \Pi_{\text{Specialization}}(\text{DOCTORS})$

**Answer:** a), d)

**Explanation:** Option (b) is incorrect as it produces 2 extra tuples due to the redundant value J. Ray in the common attribute.

Option (c) is incorrect as `Name` will not be present in the output.

Options (a) and (d) are correct.

## Question 10

Marks: 2 MCQ

Consider the relation `Tender(Tno, Price)`. Assume that there is a tuple (2, 20000) in the given relation. Identify the final value of `n` after the execution of the following loop:

```
DECLARE
n NUMBER:= 0;
BEGIN
FOR r IN 1..5 LOOP
SELECT Price INTO n FROM Tender WHERE Tno=2;
n:= n+(r*2);
END LOOP;
END;
```

- a) 20000
- b) 20010
- c) 20030
- d) 100030

**Answer:** b)

**Explanation:** In each iteration, the value of `n` is reset due to the `SELECT` statement but the value of `r` gets incremented.

In the last iteration, `n` = 20000, `r` = 5.

So, the final value of `n` = 20010.

Thus, option (b) is correct.