

Database Management System: Assignment 1

Total Marks : 20

June 24, 2024

Question 1

Marks: 2 MCQ

Consider the SQL statement(s) below:

S1:

```
CREATE table students(  
student_id number(5),  
student_name varchar2(20),  
address varchar2(20),  
emailid varchar2(20)) ;
```

S2:

```
DELETE FROM students WHERE student_id = 10005;
```

Identify the correct statement.

- a) Both **S1** and **S2** are Data Definition (DDL) Queries
- b) Both **S1** and **S2** are Data Manipulation (DML) Queries
- c) **S1** is a Data Definition (DDL) Query and **S2** is a Data Manipulation Query (DML)
- d) **S1** is a Data Control Query and **S2** is a Data Manipulation (DML) Query

Answer: c)

Explanation: As per the Syntax of the language option (c) is the correct answer. DDL(Data Definition Language) includes CREATE, DROP, ALTER, TRUNCATE, RENAME; DML(Data Manipulation Language) includes INSERT, UPDATE, DELETE. For more details refer Module 2.

Question 2

Marks: 2 MCQ

Identify the valid primary key for the relation **students**.

students			
student_id	students_name	address	dept_name
10001	ROHAN	PUNJAB	BENGALI
10002	KARTIKA	BIHAR	PHYSICS
10003	ANINDITA	MUMBAI	HISTORY
10004	ROHAN	PUNJAB	CHEMISTRY
10001	PANKAJ	ASSAM	CHEMISTRY
10004	SUHANA	KERALA	GEOGRAPHY

- a) student_id
- b) student_name
- c) student_name, address
- d) student_id, dept_name

Answer: d)

Explanation: A primary key needs to identify each record in a table uniquely. So, option d) is the correct option. Other options are incorrect as these attributes do not identify each tuple uniquely.

Question 3

Marks: 2 MSQ

Identify the correct statement/s.

- a) **Logical schema** defines the overall logical structure of the database.
- b) **Logical schema** defines the overall physical structure of the database.
- c) **Physical schema** defines the overall logical structure of the database.
- d) **View schema** defines the interaction between end-user and database.

Answer: a), d)

Explanation: **Logical schema** define the overall logical structure of the database.

Physical schema define the overall physical structure of the database.

View schema define the interaction between end-user and database.

Hence, options (a) and (d) are correct.

Question 4

Marks: 2 MCQ

Consider a relation `MountainDetails(MountainName, Altitude, StateName)` where the superkeys are as follows: `{MountainName}`, `{MountainName, Altitude}`, `{MountainName, StateName}`, `{MountainName, Altitude, StateName}`.

Select the possible candidate key(s).

- a) `{MountainName, Altitude, StateName}`
- b) `{MountainName, StateName}`
- c) `{MountainName, Altitude}`
- d) `{MountainName}`

Answer: d)

Explanation: Minimal superkeys are candidate keys. Here, `MountainName` alone is a superkey, hence, any superset of `MountainName` will also be a superkey. But only `MountainName` can be a candidate key.

Hence, (d) is the correct option.

Question 5

Marks: 2 MCQ

Let `students(student_id, student_name, address, emailid)` and `enrolment(student_id, dept_name, enrolment_date)` be two relations in a schema.

The primary keys are shown underlined.

Let `student_id` be a foreign key in `enrolment` relation referring to `students` relation. Suppose, there is no violation of the above referential integrity constraint in the corresponding relation instances of `students` and `enrolment`.

Which one of the following relational algebra expressions would necessarily produce an empty relation?

- a) $\prod_{\text{student_id}}(\text{enrolment}) - \prod_{\text{student_id}}(\text{students})$
- b) $\prod_{\text{student_id}}(\text{students}) - \prod_{\text{student_id}}(\text{enrolment})$
- c) $\prod_{\text{student_id}}(\text{enrolment} \bowtie \text{students})$
- d) $\prod_{\text{student_id}}(\text{enrolment} \bowtie \text{students})$

Answer: a)

Explanation: According to the foreign key concept:

$$\prod_{\text{student_id}}(\text{students}) \geq \prod_{\text{student_id}}(\text{enrolment}).$$

So, $\prod_{\text{student_id}}(\text{enrolment}) - \prod_{\text{student_id}}(\text{students}) = \phi$.

Hence, option (a) is the correct answer.

Question 6

Marks: 2 MSQ

Which of the following statements is (are) correct?

- a) View level abstraction describes how a record is stored.
- b) View level abstraction hides details of data types and focuses on the interaction with the end-users.
- c) Logical level abstraction describes what data is stored in a database and their relationships.
- d) Physical level abstraction describes what data is stored in a database and their relationships.

Answer: b), c)

Explanation: As per the lecture notes (Module 02: Introduction to DBMS/1).

Physical level: describes how a record is stored.

Logical level: describes data stored in the database, and the relationships among the data.

View level: application programs hide details of data types.

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

Question 7

Marks: 2 MCQ

Consider the following instance of the **StudentDetails**(StudentID, Student_name) relation:

StudentID	Student_name
101	Priya
102	Shreya

If **StudentID** is the foreign key in the relational schema **ExamResults**(ExamID, CourseName, StudentID), which of the following is a valid instance of **ExamResults**?

a)

ExamID	CourseName	StudentID
E001	Mathematics	101
E002	Physics	106

b)

ExamID	CourseName	StudentID
E001	Mathematics	101
E001	Physics	102

c)

ExamID	CourseName	StudentID
NULL	Mathematics	103
E002	Physics	102

d)

ExamID	CourseName	StudentID
E001	Mathematics	101
E002	Physics	102

Answer: d)

Explanation: Option (a) is incorrect because **StudentID** “106” is not present in the referenced relation **StudentsDetails**.

Option (b) is not correct because it is violating the primary key rules, as two tuples can not have the same **ExamID** values.

Option (c) is not correct because primary key values must be unique and not NULL. But, first tuple of, in **ExamID** values is NULL. That is not allowed.

Hence, option (d) is the correct answer.

Question 8

Marks: 2 MCQ

Consider the following tables:

ChatDetails ₁		
SenderID	ReceiverID	Total_Text
R001	S001	1000
R002	S003	1200
R001	S002	500
R003	S004	700
R004	S005	1400

ChatDetails ₂		
SenderID	ReceiverID	Total_Text
R001	S001	1000
R002	S003	1200
R004	S002	1500
R003	S003	1700
R004	S001	1800

Identify the correct operation(s) which will produce the following output from the above two relations.

SenderID	ReceiverID	Total_Text
R001	S001	1000
R002	S003	1200

- a) $\text{ChatDetails}_1 - \text{ChatDetails}_2$
- b) $\text{ChatDetails}_2 - \text{ChatDetails}_1$
- c) $(\text{ChatDetails}_1 - \text{ChatDetails}_2) \cup (\text{ChatDetails}_2 - \text{ChatDetails}_1)$
- d) $(\text{ChatDetails}_1 \cup \text{ChatDetails}_2) \cap (\text{ChatDetails}_1 \cap \text{ChatDetails}_2)$

Answer: d)

Explanation: As per Relational Operators syntax and semantics, option d) is correct.

Question 9

Marks: 2 MCQ

Consider the following table:

ChatDetails		
SenderID	ReceiverID	Total_Text
R001	S001	1000
R002	S003	1200
R001	S002	500
R003	S004	700
R004	S004	1400

Identify the correct operation(s) which produces the following output from the above relation.

ChatDetails		
SenderID	ReceiverID	Total_Text
R001	S001	1000
R002	S003	1200
R004	S004	1400

- a) $\sigma_{(\text{SenderID} < \text{ReceiverID}) \wedge (\text{Total_Text} \geq 1000)} (\text{ChatDetails})$
- b) $\sigma_{(\text{Total_Text} \geq 1000)} (\text{ChatDetails})$
- c) $\prod_{(\text{SenderID} < \text{ReceiverID}) \wedge (\text{Total_Text} \geq 1000)} (\text{ChatDetails})$
- d) $\prod_{(\text{Total_Text} \leq 1400)} (\text{ChatDetails})$

Answer: b)

Explanation: As per Relational Operators syntax and semantics, option b) is correct.

Question 10

Marks: 2 MCQ

Consider the following table:

ChatDetails		
SenderID	ReceiverID	Total_Text
R001	S001	1000
R002	S003	1200
R001	S002	500
R003	S004	700
R004	S004	1400

Identify the correct operation(s) which produces the following output from the above relation.

ChatDetails	
SenderID	ReceiverID
R002	S003
R004	S004

- a) $\sigma_{(\text{SenderID}, \text{ReceivedID})}(\text{ChatDetails})$
- b) $\sigma_{(\text{Total_Text} > 1000)}(\text{ChatDetails})$
- c) $\Pi_{(\text{SenderID}, \text{ReceivedID})}(\sigma_{(\text{Total_Text} > 1000)}(\text{ChatDetails}))$
- d) $\Pi_{(\text{SenderID}, \text{ReceivedID})}(\text{ChatDetails})$

Answer: c)

Explanation: As per Relational Operators syntax and semantics, option c) is correct.