**MODULE: 4**

**Introduction to DBMS**

**Introduction to SQL Theory Questions:**

1. **What is SQL, and why is it essential in database management?**

* **SQL** (Structured Query Language) is a language to operate databases; it includes Database Creation, Database Deletion, Fetching Data Rows, Modifying & Deleting Data rows, etc.
* It is a computer language for storing, manipulating and retrieving data stored in a relational database. SQL was developed in the 1970s by IBM Computer Scientists and became a standard of the American National Standards Institute (ANSI) in 1986, and the International Organization for Standardization (ISO) in 1987.
* Though SQL is an ANSI (American National Standards Institute) standard language, but there are many different dialects of the SQL language like MS SQL Server is using T-SQL and Oracle is using PL/SQL.
* It is **essential** in database management because it allows users to efficiently store, retrieve, update, and manipulate data. SQL provides a standardized way to define database structures, perform data analysis, and ensure data consistency, making it critical for applications that rely on organized and accessible data.

1. **Explain the difference between DBMS and RDBMS.**

|  |  |
| --- | --- |
| **DBMS** | **RDBMS** |
| [DBMS](https://www.geeksforgeeks.org/introduction-of-dbms-database-management-system-set-1/) stores data as file. | [RDBMS](https://www.geeksforgeeks.org/rdbms-architecture/) stores data in tabular form. |
| Data elements need to access individually. | Multiple data elements can be accessed at the same time. |
| No relationship between data. | Data is stored in the form of tables which are related to each other. |
| Normalization is not present. | Normalization is present. |
| DBMS does not support distributed database. | RDBMS supports distributed database. |
| It stores data in either a navigational or hierarchical form. | It uses a tabular structure where the headers are the column names, and the rows contain corresponding values. |
| It deals with small quantity of data. | It deals with large amount of data. |
| Data redundancy is common in this model. | Keys and indexes do not allow Data redundancy. |
| It is used for small organization and deal with small data. | It is used to handle large amount of data. |
| Not all Codd rules are satisfied. | All 12 Codd rules are satisfied. |
| Security is less | More security measures provided. |
| Data fetching is slower for the large amount of data. | Data fetching is fast because of relational approach. |
| It supports single user. | It supports multiple users. |
| The data in a DBMS is subject to low security levels with regards to data manipulation. | There exists multiple levels of data security in a RDBMS. |
| Examples:[XML](https://www.geeksforgeeks.org/xml-basics/), Window Registry, Forxpro, dbaseIIIplus etc. | Examples: [MySQL](https://www.geeksforgeeks.org/architecture-of-mysql/), [PostgreSQL](https://www.geeksforgeeks.org/what-is-postgresql-introduction/), [SQL](https://www.geeksforgeeks.org/what-is-sql/) Server, Oracle, Microsoft Access etc. |

1. **Describe the role of SQL in managing relational databases.**

* SQL plays a central role in managing relational databases by providing the tools to define, manipulate, and control data stored in a structured, tabular format. Its primary functions can be categorized into three main types: Data Definition Language (DDL), Data Manipulation Language (DML), and Data Control Language (DCL). Here's a detailed breakdown of SQL's role in relational database management:
* **Defining Database Structures (DDL):-** SQL is used to create and manage the structure of relational databases, including tables, schemas, and relationships between tables.
* Examples of DDL Commands:
  + CREATE TABLE: Defines new tables and their structure.
  + ALTER TABLE: Modifies existing table structures.
  + DROP TABLE: Deletes tables from the database.
  + TRUNCATE: Removes all records from a table without logging individual row deletions.
* Importance:- This ensures the database structure is well-defined, scalable, and capable of handling relationships between entities. (work on structure)
* **Controlling Data Access (DCL):-** SQL ensures secure access to data through permissions and privileges.
* Examples of DCL Commands:
  + GRANT: Gives specific permissions to users.
  + REVOKE: Removes permissions from users.
* Importance:- This role is crucial for database security, ensuring that only authorized users can access or manipulate data.
* **Manipulating Data (DML):-** SQL facilitates efficient manipulation of the data stored in relational databases.
* Examples of DML Commands:
  + INSERT: Adds new data to tables.
  + UPDATE: Modifies existing data.
  + DELETE: Removes data from tables.
  + SELECT: Retrieves data based on specific conditions.
* Importance:- These operations allow users and applications to dynamically interact with data, making it possible to query, update, and maintain data as needed. (work on data)
* **TRANSECTION CONTROL LANGUAGE (TCL):-** TCL commands help maintain the integrity of database transactions.
* Examples of TCL Commands:
* COMMIT – Saves all changes made in a transaction permanently.
* ROLLBACK – Undoes changes if an error occurs before committing.
* SAVEPOINT – Creates a temporary point within a transaction to which changes can be rolled back.
* Importance:- TCL ensures data consistency and reliability by managing transactions effectively.
* **DATA QUERY LANGUAGE (DQL) :**- DQL primarily consists of the SELECT statement, which allows users to retrieve and analyze data from relational databases.
* Example of DQL Command:
* SELECT – Extracts data based on specific conditions.
* Importance:- DQL helps in retrieving meaningful insights from data, making it easier for businesses and applications to process and analyze information efficiently.

1. **What are the key features of SQL?**
2. **What do you understand By Database**
3. **What is Normalization?**
4. **What is MF Cod Rule of RDBMS Systems?**
5. **What do you understand By Data Redundancy?**

**SQL Syntax Theory Questions:**

1. **What are the basic components of SQL syntax?**
2. **Write the general structure of an SQL SELECT statement.**
3. **Explain the role of clauses in SQL statements.**

**SQL Constraints Theory Questions:**

1. **What are constraints in SQL? List and explain the different types of constraints.**
2. **How do PRIMARY KEY and FOREIGN KEY constraints differ?**
3. **What is the role of NOT NULL and UNIQUE constraints?**
4. **What is SQL Key Constraints writing an Example of SQL Key Constraints**

**Main SQL Commands and Sub-commands (DDL) Theory Questions:**

1. **Define the SQL Data Definition Language (DDL).**
2. **Explain the CREATE command and its syntax.**
3. **What is the purpose of specifying data types and constraints during table creation?**
4. **What is DDL Interpreter?**

**ALTER Command Theory Questions:**

1. **What is the use of the ALTER command in SQL?**
2. **How can you add, modify, and drop columns from a table using ALTER?**

**DROP Command Theory Questions:**

1. **What is the function of the DROP command in SQL?**
2. **What are the implications of dropping a table from a database?**

**Data Manipulation Language (DML) Theory Questions:**

1. **Define the INSERT, UPDATE, and DELETE commands in SQL.**
2. **What is the importance of the WHERE clause in UPDATE and DELETE operations?**
3. **What is DML Compiler in SQL?**

**Data Query Language (DQL) Theory Questions:**

1. **What is the SELECT statement, and how is it used to query data?**
2. **Explain the use of the ORDER BY and WHERE clauses in SQL queries.**

**Data Control Language (DCL) Theory Questions:**

1. **What is the purpose of GRANT and REVOKE in SQL?**
2. **How do you manage privileges using these commands?**

**Transaction Control Language (TCL) Theory Questions:**

1. **What is the purpose of the COMMIT and ROLLBACK commands in SQL?**
2. **Explain how transactions are managed in SQL databases.**

**SQL Joins Theory Questions:**

1. **Explain the concept of JOIN in SQL. What is the difference between INNER JOIN, LEFT JOIN, RIGHT JOIN, and FULL OUTER JOIN?**
2. **How are joins used to combine data from multiple tables?**

**SQL Group By Theory Questions:**

1. **What is the GROUP BY clause in SQL? How is it used with aggregate functions?**
2. **Explain the difference between GROUP BY and ORDER BY.**

**SQL Stored Procedure Theory Questions:**

1. **What is a stored procedure in SQL, and how does it differ from a standard SQL query?**
2. **Explain the advantages of using stored procedures.**

**SQL View Theory Questions:**

1. **What is a view in SQL, and how is it different from a table?**
2. **Explain the advantages of using views in SQL databases.**

**SQL Triggers Theory Questions:**

1. **What is a trigger in SQL? Describe its types and when they are used.**
2. **Explain the difference between INSERT, UPDATE, and DELETE triggers.**
3. **What is trigger and how to create a Trigger in SQL?**

**Introduction to PL/SQL Theory Questions:**

1. **What is PL/SQL, and how does it extend SQL's capabilities?**
2. **List and explain the benefits of using PL/SQL.**

**PL/SQL Control Structures Theory Questions:**

1. **What are control structures in PL/SQL? Explain the IF-THEN and LOOP control structures.**
2. **How do control structures in PL/SQL help in writing complex queries?**

**SQL Cursors Theory Questions:**

1. **What is a cursor in PL/SQL? Explain the difference between implicit and explicit cursors.**
2. **When would you use an explicit cursor over an implicit one?**

**Rollback and Commit Savepoint Theory Questions:**

1. **Explain the concept of SAVEPOINT in transaction management. How do ROLLBACK and COMMIT interact with savepoints?**
2. **When is it useful to use savepoints in a database transaction?**
3. **What is save Point? How to create a save Point write a Query?**