**SQL**

**1. What is SQL?**

SQL stands for Structured Query Language. It is a language used to interact with the database, i.e to create a database, to create a table in the database, to retrieve data or update a table in the database, etc. SQL is an ANSI(American National Standards Institute) standard. Using SQL, we can do many things. For example – we can execute queries, we can insert records into a table, we can update records, we can create a database, we can create a table, we can delete a table, etc.

**2. What is a database?**

A Database is defined as a structured form of data storage in a computer or collection of data in an organized manner and can be accessed in various ways. It is also the collection of schemas, tables, queries, views, etc. Databases help us with easily storing, accessing, and manipulating data held on a computer. The Database Management System allows a user to interact with the database.

**3. Does SQL support programming language features?**

It is true that SQL is a language, but it does not support programming as it is not a programming language, it is a command language. We do not have conditional statements in SQL like for loops or if..else, we only have commands which we can use to query, update, delete, etc. data in the database. SQL allows us to manipulate data in a database.

**4. What is the difference between BETWEEN and IN operators in SQL?**

**BETWEEN**

The BETWEEN operator is used to fetch rows based on a range of values.

For example,

SELECT \* FROM Students WHERE ROLL\_NO BETWEEN 20 AND 30;

This query will select all those rows from the table. Students where the value of the field ROLL\_NO lies between 20 and 30.

**IN**

The IN operator is used to check for values contained in specific sets.

For example,

SELECT \* FROM Students WHERE ROLL\_NO IN (20,21,23);

This query will select all those rows from the table Students where the value of the field ROLL\_NO is either 20 or 21 or 23.

**5. What is the difference between primary key and unique constraints?**

The primary key cannot have NULL values, the unique constraints can have NULL values. There is only one primary key in a table, but there can be multiple unique constraints. The primary key creates the clustered index automatically but the unique key does not.

**6. What is the view in SQL?**

Views in SQL are a kind of virtual table. A view also has rows and columns as they are on a real table in the database. We can create a view by selecting fields from one or more tables present in the database. A View can either have all the rows of a table or specific rows based on certain conditions.

**7. What is a join in SQL? What are the types of joins?**

An SQL Join statement is used to combine data or rows from two or more tables based on a common field between them. Different types of Joins are:

INNER JOIN: The INNER JOIN keyword selects all rows from both the tables as long as the condition satisfies. This keyword will create the result-set by combining all rows from both the tables where the condition satisfies i.e the value of the common field will be the same.

LEFT JOIN: This join returns all the rows of the table on the left side of the join and matching rows for the table on the right side of the join. For the rows for which there is no matching row on the right side, the result-set will be null. LEFT JOIN is also known as LEFT OUTER JOIN

RIGHT JOIN: RIGHT JOIN is similar to LEFT JOIN. This join returns all the rows of the table on the right side of the join and matching rows for the table on the left side of the join. For the rows for which there is no matching row on the left side, the result-set will contain null. RIGHT JOIN is also known as RIGHT OUTER JOIN.

FULL JOIN: FULL JOIN creates the result-set by combining results of both LEFT JOIN and RIGHT JOIN. The result-set will contain all the rows from both tables. For the rows for which there is no matching, the result-set will contain NULL values.

**8. What is an index?**

A database index is a data structure that improves the speed of data retrieval operations on a database table at the cost of additional writes and the use of more storage space to maintain the extra copy of data. Data can be stored only in one order on a disk. To support faster access according to different values, a faster search like binary search for different values is desired. For this purpose, indexes are created on tables. These indexes need extra space on the disk, but they allow faster search according to different frequently searched values.

**9. What is table and Field?**

Table: A table has a combination of rows and columns. Rows are called records and columns are called fields. In MS SQL Server, the tables are being designated within the database and schema names.

Field: In DBMS, a database field can be defined as – a single piece of information from a record.

**10. What is a trigger?**

Trigger is a statement that a system executes automatically when there is any modification to the database. In a trigger, we first specify when the trigger is to be executed and then the action to be performed when the trigger executes. Triggers are used to specify certain integrity constraints and referential constraints that cannot be specified using the constraint mechanism of SQL.

**11. What are local and global variables and their differences?**

Global Variable:

In contrast, global variables are variables that are defined outside of functions. These variables have global scope, so they can be used by any function without passing them to the function as parameters.

Local Variable:

Local variables are variables that are defined within functions. They have local scope, which means that they can only be used within the functions that define them.

**12. What is a constraint?**

Constraints are the rules that we can apply to the type of data in a table. That is, we can specify the limit on the type of data that can be stored in a particular column in a table using constraints.

**13. Explain SQL Having statement?**

HAVING is used to specify a condition for a group or an aggregate function used in the select statement. The WHERE clause selects before grouping. The HAVING clause selects rows after grouping. Unlike the HAVING clause, the WHERE clause cannot contain aggregate functions

**14. Explain SQL AND OR statement with example?**

In SQL, the AND & OR operators are used for filtering the data and getting precise results based on conditions.

The AND and OR operators are used with the WHERE clause.

These two operators are called conjunctive operators.

AND Operator: This operator displays only those records where both the conditions condition1 and condition2 evaluates to True.

OR Operator: This operator displays the records where either one of the conditions condition1 and condition2 evaluates to True. That is, either condition1 is True or condition2 is True.

**15. What are ACID properties?**

A transaction is a single logical unit of work that accesses and possibly modifies the contents of a database. Transactions access data using read and write operations. In order to maintain consistency in a database, before and after the transaction, certain properties are followed. These are called ACID properties. ACID (Atomicity, Consistency, Isolation, Durability) is a set of properties that guarantee that database transactions are processed reliably. For more details please read ACID properties in the DBMS article.

**16. What is Normalization?**

Normalization represents the way of organizing structured data in the database efficiently. It includes the creation of tables, establishing relationships between them, and defining rules for those relationships. Inconsistency and redundancy can be kept in check based on these rules, hence, adding flexibility to the database.

**17. What is Denormalization?**

Denormalization is the inverse process of normalization, where the normalized schema is converted into a schema that has redundant information. The performance is improved by using redundancy and keeping the redundant data consistent. The reason for performing denormalization is the overheads produced in the query processor by an over-normalized structure.

**18. What is an Alias in SQL?**

An alias is a feature of SQL that is supported by most, if not all, RDBMSs. It is a temporary name assigned to the table or table column for the purpose of a particular SQL query. In addition, aliasing can be employed as an obfuscation technique to secure the real names of database fields. A table alias is also called a correlation name. An alias is represented explicitly by the AS keyword

**19. What is the difference between DROP and TRUNCATE statements?**

If a table is dropped, all things associated with the tables are dropped as well. This includes - the relationships defined on the table with other tables, the integrity checks and constraints, access privileges and other grants that the table has. To create and use the table again in its original form, all these relations, checks, constraints, privileges and relationships need to be redefined. However, if a table is truncated, none of the above problems exist and the table retains its original structure.

**20. What is the difference between DELETE and TRUNCATE statements?**

The TRUNCATE command is used to delete all the rows from the table and free the space containing the table.

The DELETE command deletes only the rows from the table based on the condition given in the where clause or deletes all the rows from the table if no condition is specified. But it does not free the space containing the table.

**21. What are Aggregate and Scalar functions?**

An aggregate function performs operations on a collection of values to return a single scalar value. Aggregate functions are often used with the GROUP BY and HAVING clauses of the SELECT statement. Following are the widely used SQL aggregate functions:

AVG() - Calculates the mean of a collection of values.

COUNT() - Counts the total number of records in a specific table or view.

MIN() - Calculates the minimum of a collection of values.

MAX() - Calculates the maximum of a collection of values.

SUM() - Calculates the sum of a collection of values.

FIRST() - Fetches the first element in a collection of values.

LAST() - Fetches the last element in a collection of values.

Note: All aggregate functions described above ignore NULL values except for the COUNT function.

A scalar function returns a single value based on the input value. Following are the widely used SQL scalar functions:

LEN() - Calculates the total length of the given field (column).

UCASE() - Converts a collection of string values to uppercase characters.

LCASE() - Converts a collection of string values to lowercase characters.

MID() - Extracts substrings from a collection of string values in a table.

CONCAT() - Concatenates two or more strings.

RAND() - Generates a random collection of numbers of a given length.

ROUND() - Calculates the round-off integer value for a numeric field (or decimal point values).

NOW() - Returns the current date & time

**22. What is the main disadvantage of deleting data from an existing table using the DROP TABLE command?**

DROP TABLE command deletes complete data from the table along with removing the complete table structure too. In case our requirement entails just remove the data, then we would need to recreate the table to store data in it. In such cases, it is advised to use the TRUNCATE command.