1) What is SQL?

SQL stands for structured query languageis used to perform operations on the records stored in database such as updating records, deleting records, creating and modifying tables, views etc. SQL is just a query language, it is not a database. To perform SQL queries, you need to install any database for example Oracle, MySQL, MongoDB, PostGre SQL, SQL Server, DB2 etc. sometimes it is pronounced as se-qwell

2) When SQL appeared?

It appeared in 1974.

3) What are the usages of SQL?

* To execute queries against a database
* To retrieve data from a database
* To inserts records in a database
* To updates records in a database
* To delete records from a database
* To create new databases
* To create new tables in a database
* To create views in a database

4) Does SQL support programming?

No, SQL doesn't have loop or Conditional statement. It is used like commanding language to access databases.

5) What are the subsets of SQL?

1. Data definition language (DDL)
2. Data manipulation language (DML)
3. Data control language (DCL)

What are various DDL commands in SQL? Give brief description of their purposes.

Following are various DDL or Data Definition Language commands in SQL −

* **CREATE −** it creates a new table, a view of a table, or other object in database.
* **ALTER −** it modifies an existing database object, such as a table.
* **DROP −** it deletes an entire table, a view of a table or other object in the database.

What are various DML commands in SQL? Give brief description of their purposes.

Following are various DML or Data Manipulation Language commands in SQL −

* **SELECT −** it retrieves certain records from one or more tables.
* **INSERT −** it creates a record.
* **UPDATE −** it modifies records.
* **DELETE −** it deletes records.

What are various DCL commands in SQL? Give brief description of their purposes.

Following are various DCL or Data Control Language commands in SQL −

* **GRANT −** it gives a privilege to user.
* **REVOKE −** it takes back privileges granted from user.

What is Database?

A **database** is *an organized collection of data*. The **main purpose** of database is to operate large amount of information by storing, retrieving and managing. A cylindrical structure is used to display the image of a database.

What is RDBMS?

**RDBMS** stands for *Relational Database Management Systems.* All modern database management systems like SQL, MS SQL Server, IBM DB2, ORACLE, My-SQL and Microsoft Access are based on RDBMS. It is called RDBMS because it is based on relational model introduced by E.F. Codd. Data is represented in terms of tuples (rows) in RDBMS. It contains number of tables and each table has its own primary key.

|  |  |  |  |
| --- | --- | --- | --- |
| **ID** | **Name** | **AGE** | **COURSE** |
| 1 | Ajeet | 24 | B.Tech |
| 2 | aryan | 20 | C.A |
| 3 | Mahesh | 21 | BCA |
| 4 | Ratan | 22 | MCA |
| 5 | Vimal | 26 | BSC |

9) What are tables and fields in database?

A table is a set of organized data. It has columns and rows. Columns can be categorized as vertical which contains all information associated with a specific field in a table. And rows are horizontal which contains the specific information of each individual entry in the table

Field is a smaller entity of the table which contains specific information about every record in the table. In the above example, the field in the student table consist of id, name, age, and course.

Difference between DBMS and RDBMS

|  |  |  |
| --- | --- | --- |
| **No.** | **DBMS** | **RDBMS** |
| 1) | DBMS applications store **data as file**. | RDBMS applications store **data in a tabular form**. |
| 2) | In DBMS, data is generally stored in either a hierarchical form or a navigational form. | In RDBMS, the tables have an identifier called primary key and the data values are stored in the form of tables. |
| 3) | **Normalization is not** present in DBMS. | **Normalization is** present in RDBMS. |
| 4) | DBMS does **not apply any security** with regards to data manipulation. | RDBMS **defines the integrity constraint** for the purpose of ACID (Atomocity, Consistency, Isolation and Durability) property. |
| 5) | DBMS uses file system to store data, so there will be **no relation between the tables**. | in RDBMS, data values are stored in the form of tables, so a **relationship** between these data values will be stored in the form of a table as well. |
| 6) | DBMS has to provide some uniform methods to access the stored information. | RDBMS system supports a tabular structure of the data and a relationship between them to access the stored information. |
| 7) | DBMS **does not support distributed database**. | RDBMS **supports distributed database**. |
| 8) | DBMS is meant to be for small organization and **deal with small data**. it supports **single user**. | RDBMS is designed to **handle large amount of data**. it supports **multiple users**. |
| 9) | Examples of DBMS are file systems, **xml** etc. | Example of RDBMS are **mysql**, **postgre**, **sql server**, **oracle** etc. |

10) What is a primary key?

A primary key is a combination of fields which uniquely specify a row. This is a special kind of unique key. Primary key values cannot be NULL.

11) What is a foreign key?

A foreign key is specified as a key which is related to the primary key of another table. Relationship needs to be created between two tables by referencing foreign key with the primary key of another table.

12) What is a unique key?

A Unique key constraint uniquely identifies each record in the database. This provides uniqueness for the column or set of columns.

13) What are the type of operators available in SQL?

1. Arithmetic operators
2. Logical operators
3. Comparison operator

14) What is view in SQL?

A view is a virtual table which contains a subset of data within a table. Views are not virtually present, and it takes less space to store. View can have data of one or more tables combined, and it is depending on the relationship.

15) What is an Index in SQL?

Index is used to increase the performance and allow faster retrieval of records from the table. An index creates an entry for each value and it will be faster to retrieve data.

16) Which are the different types of indexes in SQL?

There are three types of Indexes in SQL:

* Unique Index
* Clustered Index
* NonClustered Index

17) What is Unique Index?

**Unique Index:**

This indexing does not allow the field to have duplicate values if the column is unique indexed. Unique index can be applied automatically when primary key is defined

18) What is Clustered Index in SQl?

**Clustered Index:**

The clustered index is used to reorder the physical order of the table and search based on the key values. Each table can have only one clustered index.

19) What is NonClustered Index in SQL?

**NonClustered Index:**

NonClustered Index does not alter the physical order of the table and maintains logical order of data. Each table can have 999 non-clustered indexes.

20) What is the difference between SQL, MySQL and SQL Server?

SQL or Structured Query Language is a language which is used to communicate with a relational database. It provides a way to manipulate and create databases. On the other hand, MySQL and Microsoft's SQL Server both are relational database management systems that use SQL as their standard relational database language.

21) What is the difference between SQL and PL/SQL?

SQL or Structured Query Language is a language which is used to communicate with a relational database. It provides a way to manipulate and create databases. On the other hand, PL/SQL is a dialect of SQL which is used to enhance the capabilities of SQL. It was developed by Oracle Corporation in the early 90's. It adds procedural features of programming languages in SQL.

22) Is it possible to sort a column using a column alias?

Yes. You can use column alias in the ORDER BY clause for sorting.

23) What is the difference between clustered and non clustered index in SQL?

There are mainly two type of indexes in SQL, Clustered index and non clustered index. The differences between these two indexes is very important from SQL performance perspective.

1. One table can have only one clustered index but it can have many non clustered index.(approximately 250).
2. clustered index determines how data is stored physically in table. Actually clustered index stores data in cluster, related data is stored together so it makes simple to retrieve data.
3. reading from a clustered index is much faster than reading from non clustered index from the same table.
4. clustered index sort and store data rows in the table or view based on their key value, while non cluster have a structure separate from the data row.

24) What is the SQL query to display current date?

There is a built in function in SQL called GetDate() which is used to return current timestamp.

25) Which are the most commonly used SQL joins?

Most commonly used SQL joins are INNER JOIN and (left/right) OUTER JOIN.

26) What are the different types of joins in SQL?

Joins are used to merge two tables or retrieve data from tables. It depends on the relationship between tables.

Following are the most commonly used joins in SQL:

* Inner Join
* Right Join
* Left Join
* Full Join

27) What is Inner Join in SQL?

**Inner join:**

Inner join returns rows when there is at least one match of rows between the tables.

28) What is Right Join in SQL?

**Right Join:**

Right join is used to retrieve rows which are common between the tables and all rows of Right hand side table. It returns all the rows from the right hand side table even though there are no matches in the left hand side table.

29) What is Left Join in SQL?

**Left Join:**

Left join is used to retrieve rows which are common between the tables and all rows of Left hand side table. It returns all the rows from Left hand side table even though there are no matches in the Right hand side table.

30) What is Full Join in SQL?

**Full Join:**

Full join return rows when there are matching rows in any one of the tables. This means, it returns all the rows from the left hand side table and all the rows from the right hand side table.

31) What is "TRIGGER" in SQL?

Trigger allows you to execute a batch of SQL code when an insert, update or delete command is executed against a specific table.

Actually triggers are special type of stored procedures that are defined to execute automatically in place or after data modifications.

32) What is self join and what is the requirement of self join?

Self join is often very useful to convert a hierarchical structure to a flat structure. It is used to join a table to itself as like if that is the second table.

33) What are set operators in SQL?

**Union**, **Intersect** or **Minus** operators are called set operators.

34) What is the difference between BETWEEN and IN condition operators?

The BETWEEN operator is used to display rows based on a range of values. The IN condition operator is used to check for values contained in a specific set of values.

35) What is a constraint? Tell me about its various levels.

Constraints are representators of a column to enforce data entity and consistency. There are two levels :

1. column level constraint
2. table level constraint

36) Write an SQL query to find names of employee start with 'A'?

1. **SELECT** \* **FROM** Employees **WHERE** EmpName like 'A%'

37) Write an SQL query to get third maximum salary of an employee from a table named employee\_table.

1. **SELECT** **TOP** 1 salary
2. **FROM** (
3. **SELECT** **TOP** 3 salary
4. **FROM** employee\_table
5. **ORDER** **BY** salary **DESC** ) **AS** emp
6. **ORDER** **BY** salary **ASC**;

38) What is the difference between DELETE and TRUNCATE statement in SQL?

The main differences between SQL DELETE and TRUNCATE statements are given below:

|  |  |  |
| --- | --- | --- |
| **No.** | **DELETE** | **TRUNCATE** |
| 1) | DELETE is a **DML command**. | TRUNCATE is a **DDL command**. |
| 2) | We **can use WHERE** clause in DELETE command. | We **cannot use WHERE** clause with TRUNCATE |
| 3) | DELETE statement is used **to delete a row** from a table | TRUNCATE statement is used **to remove all the rows** from a table. |
| 4) | DELETE is **slower** than TRUNCATE statement. | TRUNCATE statement is **faster** than DELETE statement. |
| 5) | You **can rollback** data after using DELETE statement. | It is **not possible to rollback** after using TRUNCATE statement. |

39) What is ACID property in database?

ACID property is used to ensure that the data transactions are processed reliably in a database system.

A single logical operation of a data is called transaction.

ACID is an acronym for Atomicity, Consistency, Isolation, Durability.

**Atomicity:** it requires that each transaction is all or nothing. It means if one part of the transaction fails, the entire transaction fails and the database state is left unchanged.

**Consistency:** the consistency property ensure that the data must meet all validation rules. In simple words you can say that your transaction never leaves your database without completing its state.

**Isolation:** this property ensure that the concurrent property of execution should not be met. The main goal of providing isolation is concurrency control.

**Durability:** durability simply means that once a transaction has been committed, it will remain so, come what may even power loss, crashes or errors.

40) What is the difference among NULL value, zero and blank space?

Ans: A NULL value is not same as zero or a blank space. A NULL value is a value which is 'unavailable, unassigned, unknown or not applicable'. On the other hand, zero is a number and blank space is treated as a character.

41) What is the usage of SQL functions?

SQL functions are used for following purpose:

* To perform calculations on data.
* To modify individual data items.
* To manipulate the output.
* To format dates and numbers.
* To convert data types.

42) Which are the different case manipulation functions in SQL?

There are three case manipulation functions in SQL:

* LOWER
* UPPER
* INITCAP

43) What is the usage of NVL function?

The NVL function is used to convert NULL value to a actual value.

44) Which function is used to return remainder in a division operator in SQL?

The MOD function returns the remainder in a division operation.

45) What is the syntax and use of the COALESCE function?

The syntax of COALESCE function:

1. COALESCE(exp1, exp2, ... expn)

The COALESCE function is used to return the first non-null expression given in the parameter list.

46) What is the usage of DISTINCT keyword?

The DISTINCT keyword is used to ensure that the fetched value is only a non-duplicate value.

What is the difference between SQL and MySQL or SQL Server?

SQL or Structured Query Language is a language; language that communicates with a relational database thus providing ways of manipulating and creating databases. MySQL and Microsoft’s SQL Server both are relational database management systems that use SQL as their standard relational database language.

What is the difference between SQL and PL/SQL?

PL/SQL is a dialect of SQL that adds procedural features of programming languages in SQL. It was developed by Oracle Corporation in the early 90's to enhance the capabilities of SQL.

Can you sort a column using a column alias?

Yes. A column alias could be used in the ORDER BY clause.

Is a NULL value same as zero or a blank space? If not then what is the difference?

The NULL value of the table specifies that the field has been left blank during record creation. It is totally different from the value filled with zero or a field that contains space.

A NULL value is not same as zero or a blank space. A NULL value is a value which is ‘unavailable, unassigned, unknown or not applicable’. Whereas, zero is a number and blank space is a character.

Say True or False. Give explanation if False.

## Data Integrity

There are the following categories of data integrity exist with each RDBMS:

**Entity integrity**: It specifies that there should be no duplicate rows in a table.

**Domain integrity**: It enforces valid entries for a given column by restricting the type, the format, or the range of values.

**Referential integrity**: It specifies that rows cannot be deleted, which are used by other records.

**User-defined integrity**: It enforces some specific business rules that are defined by users. These rules are different from entity, domain or referential integrity.

If a column value taking part in an arithmetic expression is NULL, then the result obtained would be NULLM.

True.

If a table contains duplicate rows, does a query result display the duplicate values by default? How can you eliminate duplicate rows from a query result?

A query result displays all rows including the duplicate rows. To eliminate duplicate rows in the result, the DISTINCT keyword is used in the SELECT clause.

What is the purpose of the condition operators BETWEEN and IN?

The BETWEEN operator displays rows based on a range of values. The IN condition operator checks for values contained in a specific set of values.

How do you search for a value in a database table when you don’t have the exact value to search for?

In such cases, the LIKE condition operator is used to select rows that match a character pattern. This is also called ‘wildcard’ search.

What is the default ordering of data using the ORDER BY clause? How could it be changed?

The default sorting order is ascending. It can be changed using the DESC keyword, after the column name in the ORDER BY clause.

What are the specific uses of SQL functions?

SQL functions have the following uses −

* Performing calculations on data
* Modifying individual data items
* Manipulating the output
* Formatting dates and numbers
* Converting data types

What are the case manipulation functions of SQL?

LOWER, UPPER, INITCAP

Which function returns the remainder in a division operation?

The MOD function returns the remainder in a division operation.

What is the purpose of the NVL function?

The NVL function converts a NULL value to an actual value.

What is the difference between the NVL and the NVL2 functions?

The NVL(exp1, exp2) function converts the source expression (or value) exp1 to the target expression (or value) exp2, if exp1 contains NULL. The return value has the same data type as that of exp1.

The NVL2(exp1, exp2, exp3) function checks the first expression exp1, if it is not null then, the second expression exp2 is returned. If the first expression exp1 is null, then the third expression exp3 is returned.

What is the use of the NULLIF function?

The NULLIF function compares two expressions. If they are equal, the function returns null. If they are not equal, the first expression is returned.

Discuss the syntax and use of the COALESCE function?

The COALESCE function has the expression COALESCE(exp1, exp2, …. expn)

It returns the first non-null expression given in the parameter list.

Which expressions or functions allow you to implement conditional processing in a SQL statement?

There are two ways to implement conditional processing or IF-THEN-ELSE logic in a SQL statement.

* Using CASE expression
* Using the DECODE function

You want to display a result query from joining two tables with 20 and 10 rows respectively. Erroneously you forget to write the WHERE clause. What would be the result?

The result would be the Cartesian product of two tables with 20 x 10 = 200 rows.

What is the difference between cross joins and natural joins?

The cross join produces the cross product or Cartesian product of two tables. The natural join is based on all the columns having same name and data types in both the tables.

What is the purpose of the group functions in SQL? Give some examples of group functions.

Group functions in SQL work on sets of rows and returns one result per group. Examples of group functions are AVG, COUNT, MAX, MIN, STDDEV, SUM, VARIANCE.

Say True or False. Give explanation if False.

By default the group functions consider only distinct values in the set.

By default, group functions consider all values including the duplicate values.

Say True or False. Give explanation if False.

The DISTINCT keyword allows a function consider only non-duplicate values.

True.

Say True or False. Give explanation if False.

All group functions ignore null values.

True.

Say True or False. Give explanation if False.

COUNT(\*) returns the number of columns in a table.

False. COUNT(\*) returns the number of rows in a table.

What’s wrong in the following query?

SELECT subject\_code, count(name)

FROM students;

It doesn’t have a GROUP BY clause. The subject\_code should be in the GROUP BY clause.

SELECT subject\_code, count(name)

FROM students

GROUP BY subject\_code;

What’s wrong in the following query?

SELECT subject\_code, AVG (marks)

FROM students

WHERE AVG(marks) > 75

GROUP BY subject\_code;

The WHERE clause cannot be used to restrict groups. The HAVING clause should be used.

SELECT subject\_code, AVG (marks)

FROM students

HAVING AVG(marks) > 75

GROUP BY subject\_code;

Say True or False. Give explanation if False.

Group functions cannot be nested.

False. Group functions can be nested to a depth of two.

What do you understand by a subquery? When is it used?

A subquery is a SELECT statement embedded in a clause of another SELECT statement. It is used when the inner query, or the subquery returns a value that is used by the outer query. It is very useful in selecting some rows in a table with a condition that depends on some data which is contained in the same table.

Say True or False. Give explanation if False.

A single row subquery returns only one row from the outer SELECT statement

False. A single row subquery returns only one row from the inner SELECT statement.

Say True or False. Give explanation if False.

A multiple row subquery returns more than one row from the inner SELECT statement.

True.

Say True or False. Give explanation if False.

Multiple column subqueries return more than one column from the inner SELECT statement.

True.

What’s wrong in the following query?

SELECT student\_code, name

FROM students

WHERE marks =

(SELECT MAX(marks)

FROM students

GROUP BY subject\_code);

Here a single row operator = is used with a multiple row subquery.

What are the various multiple row comparison operators in SQL?

IN, ANY, ALL.

What is the pupose of DML statements in SQL?

The DML statements are used to add new rows to a table, update or modify data in existing rows, or remove existing rows from a table.

Which statement is used to add a new row in a database table?

The INSERT INTO statement.

Say True or False. Give explanation if False.

While inserting new rows in a table you must list values in the default order of the columns.

True.

How do you insert null values in a column while inserting data?

Null values can be inserted into a table by one of the following ways −

* Implicitly by omitting the column from the column list.
* Explicitly by specifying the NULL keyword in the VALUES clause.

Say True or False. Give explanation if False.

INSERT statement does not allow copying rows from one table to another.

False. INSERT statement allows to add rows to a table copying rows from an existing table.

How do you copy rows from one table to another?

The INSERT statement can be used to add rows to a table by copying from another table. In this case, a subquery is used in the place of the VALUES clause.

What happens if you omit the WHERE clause in the UPDATE statement?

All the rows in the table are modified.

Can you modify the rows in a table based on values from another table? Explain.

Yes. Use of subqueries in UPDATE statements allow you to update rows in a table based on values from another table.

Say True or False. Give explanation if False.

The DELETE statement is used to delete a table from the database.

False. The DELETE statement is used for removing existing rows from a table.

What happens if you omit the WHERE clause in a delete statement?

All the rows in the table are deleted.

Can you remove rows from a table based on values from another table? Explain.

Yes, subqueries can be used to remove rows from a table based on values from another table.

Say True or False. Give explanation if False.

Attempting to delete a record with a value attached to an integrity constraint, returns an error.

True.

Say True or False. Give explanation if False.

You can use a subquery in an INSERT statement.

True.

What is the purpose of the MERGE statement in SQL?

The MERGE statement allows conditional update or insertion of data into a database table. It performs an UPDATE if the rows exists, or an INSERT if the row does not exist.

Say True or False. Give explanation if False.

A DDL statement or a DCL statement is automatically committed.

True.

What is the difference between VARCHAR2 AND CHAR datatypes?

VARCHAR2 represents variable length character data, whereas CHAR represents fixed length character data.

Say True or False. Give explanation if False.

A DROP TABLE statement can be rolled back.

False. A DROP TABLE statement cannot be rolled back.

Which SQL statement is used to add, modify or drop columns in a database table?

The ALTER TABLE statement.

What is a view? Why should you use a view?

A view is a logical snapshot based on a table or another view. It is used for −

* Restricting access to data;
* Making complex queries simple;
* Ensuring data independency;
* Providing different views of same data.

Say True or False. Give explanation if False.

A view doesn’t have data of its own. True.