1. ***What is SQL, and what does it stand for?****

- *Answer:* SQL stands for Structured Query Language. It's a domain-specific language used for managing and manipulating relational databases.

2. ***What is the difference between SQL and MySQL?**

- *Answer:* SQL is a language used to interact with databases, while MySQL is a specific relational database management system (RDBMS) that uses SQL. MySQL is one of several RDBMS options for implementing SQL.

3. ***Explain the basic SQL commands for CRUD operations.**

- *Answer:*

  - *Create:* INSERT INTO table_name (column1, column2, ...) VALUES (value1, value2, ...);

  - *Read:* SELECT column1, column2, ... FROM table_name WHERE condition;

  - *Update:* UPDATE table_name SET column1 = value1, column2 = value2, ... WHERE condition;

  - *Delete:* DELETE FROM table_name WHERE condition;

4. ***What is a SQL JOIN, and why is it important?**

- *Answer:* SQL JOIN is used to combine rows from two or more tables based on a related column between them. It's essential for retrieving data from multiple tables in a structured way.

5. ***Explain the difference between INNER JOIN and LEFT JOIN.**

- *Answer:* INNER JOIN returns only the matching rows between two tables, while LEFT JOIN returns all rows from the left table and the matching rows from the right table, filling in with NULLs for non-matching rows on the right.

6. *What is SQL injection, and how can it be prevented?*

- *Answer:* SQL injection is a malicious technique where an attacker inserts malicious SQL code into a query, potentially gaining unauthorized access to the database. Prevention involves using parameterized queries or prepared statements and validating input data.

7. *What is an SQL view, and why would you use it?*

- *Answer:* An SQL view is a virtual table derived from the result of a SELECT query. It's used to simplify complex queries, provide an additional level of security, and encapsulate logic for easier maintenance.

8. *What is the difference between GROUP BY and HAVING clauses in SQL?*

- *Answer:* GROUP BY is used to group rows that share a common value in one or more columns, typically used with aggregate functions like SUM or COUNT. HAVING is used to filter grouped results based on a condition applied to an aggregate function.

9. *Explain the concept of SQL indexing.*

- *Answer:* Indexing is a database optimization technique that speeds up data retrieval by creating a data structure (index) that points to the location of data in a table. It reduces the time required for searching and retrieving specific records.

10. *What is a SQL transaction, and why is it important?*

- *Answer:* A SQL transaction is a series of one or more SQL statements executed as a single unit of work. It's important for ensuring data consistency and integrity, as it guarantees that either all changes are applied (commit) or none at all (rollback).

1. *What is a DBMS, and why is it important?*

- *Answer:* A DBMS, or Database Management System, is software that manages databases. It allows users to store, retrieve, and manipulate data efficiently. It's important because it ensures data integrity, security, and provides a structured way to access and manage large amounts of data.

2. *What are the primary types of DBMS?*

- *Answer:* There are three primary types of DBMS: relational, hierarchical, and network. Relational DBMS, like MySQL and PostgreSQL, are the most widely used today.

3. *What is normalization in the context of databases?*

- *Answer:* Normalization is the process of organizing data in a database to minimize redundancy and dependency. It involves dividing large tables into smaller, related tables and defining relationships between them.

4**. *Explain the differences between SQL and NoSQL databases.***

- *Answer:* SQL databases are relational and use structured query language (SQL) for data manipulation. NoSQL databases are non-relational and provide flexible data models, making them suitable for unstructured or semi-structured data.

5. *What is ACID in the context of database transactions?*

- *Answer:* ACID stands for Atomicity, Consistency, Isolation, and Durability. It is a set of properties that ensure the reliability of database transactions. Atomicity ensures that transactions are treated as a single, indivisible unit; Consistency ensures that the database remains in a valid state; Isolation ensures that concurrent transactions don't interfere; and Durability guarantees that once a transaction is committed, it's permanent.

6. *Explain the concept of indexing in databases.*

- *Answer:* Indexing is a database optimization technique that speeds up data retrieval by creating a data structure (index) that points to the location of data in a table. It helps reduce the time required for searching and retrieving specific records.

7. *What is a primary key and a foreign key in a relational database?*

- *Answer:* A primary key is a unique identifier for each record in a table and ensures data integrity. A foreign key is a field in one table that establishes a link to the primary key in another table, creating relationships between tables.

8. *What is a stored procedure in a DBMS?*

- *Answer:* A stored procedure is a precompiled and stored SQL script in a database. It can be executed multiple times, providing a way to encapsulate and reuse SQL logic for tasks like data manipulation or reporting.

9. *Explain the CAP theorem and its relevance to distributed databases.*

- *Answer:* The CAP theorem, proposed by Brewer, states that in a distributed database, you can have at most two of the following three properties: Consistency, Availability, and Partition Tolerance. It's relevant because it helps architects and developers make trade-offs when designing distributed systems.

10. *What is NoSQL "sharding"?*

- *Answer:* Sharding is a technique in NoSQL databases where data is partitioned and distributed across multiple servers or nodes. It helps improve scalability and performance in large-scale, distributed systems.