Here are some SQL interview questions and answers suitable for someone with 3 years of experience:

### Basic Questions

\*\*1. What is SQL?\*\*

\*\*Answer:\*\*

SQL (Structured Query Language) is a standardized programming language used for managing and manipulating relational databases. It is used to query, update, insert, and delete data, as well as to create and modify the structure of database objects.

\*\*2. What are the different types of SQL statements?\*\*

\*\*Answer:\*\*

SQL statements are categorized into:

- \*\*DDL (Data Definition Language):\*\* CREATE, ALTER, DROP, TRUNCATE- \*\*DML (Data Manipulation Language):\*\* SELECT, INSERT, UPDATE, DELETE- \*\*DCL (Data Control Language):\*\* GRANT, REVOKE- \*\*TCL (Transaction Control Language):\*\* COMMIT, ROLLBACK, SAVEPOINT

\*\*3. What is a primary key?\*\*

\*\*Answer:\*\*

A primary key is a column or a set of columns in a table that uniquely identifies each row in that table. It must contain unique values and cannot contain NULL values.

### Intermediate Questions

\*\*4. How do you write a SQL query to find the second highest salary from an employee table?\*\*

\*\*Answer:\*\*

```sql

SELECT MAX(salary) AS SecondHighestSalary

FROM employees

WHERE salary < (SELECT MAX(salary) FROM employees);

```

\*\*5. What is a join? Explain different types of joins.\*\*

\*\*Answer:\*\*

A join is a SQL operation used to combine rows from two or more tables based on a related column. Types of joins include:

- \*\*INNER JOIN:\*\* Returns only the rows that have matching values in both tables- \*\*LEFT JOIN (LEFT OUTER JOIN):\*\* Returns all rows from the left table and matched rows from the right table. Unmatched rows from the left table appear with NULL values for columns from the right table.- \*\*RIGHT JOIN (RIGHT OUTER JOIN):\*\* Returns all rows from the right table and matched rows from the left table. Unmatched rows from the right table appear with NULL values for columns from the left table.- \*\*FULL JOIN (FULL OUTER JOIN):\*\* Returns all rows when there is a match in either left or right table. Rows without a match in one of the tables will have NULL values for columns from that table.- \*\*CROSS JOIN:\*\* Returns the Cartesian product of the two tables.

\*\*6. What is a subquery? Provide an example.\*\*

\*\*Answer:\*\*

A subquery is a query nested inside another query. It can be used in SELECT, INSERT, UPDATE, or DELETE statements.

Example:

```sql

SELECT employee\_id, first\_name, last\_name

FROM employees

WHERE department\_id = (SELECT department\_id FROM departments WHERE department\_name = 'Sales');

```

\*\*7. What are indexes in SQL?\*\*

\*\*Answer:\*\*

Indexes are special lookup tables that the database search engine uses to speed up data retrieval. They are created on columns that are frequently used in WHERE clauses or join conditions. Types of indexes include unique indexes, composite indexes, and full-text indexes.

### Advanced Questions

\*\*8. What is normalization? Explain its types.\*\*

\*\*Answer:\*\*

Normalization is the process of organizing data in a database to reduce redundancy and improve data integrity. Types of normalization include:

- \*\*1NF (First Normal Form):\*\* Ensures each column contains atomic (indivisible) values and each column contains values of a single type.

- \*\*2NF (Second Normal Form):\*\* Meets all requirements of 1NF and ensures that all non-key attributes are fully functional dependent on the primary key.

- \*\*3NF (Third Normal Form):\*\* Meets all requirements of 2NF and ensures that all attributes are only dependent on the primary key.

- \*\*BCNF (Boyce-Codd Normal Form):\*\* A stricter version of 3NF where every determinant is a candidate key.

\*\*9. What is a transaction in SQL, and what are its properties?\*\*

\*\*Answer:\*\*

A transaction is a sequence of one or more SQL operations treated as a single logical unit of work. The properties of a transaction are known as ACID:

- \*\*Atomicity:\*\* Ensures that all operations within the transaction are completed; if not, the transaction is aborted.

- \*\*Consistency:\*\* Ensures the database is in a valid state before and after the transaction.

- \*\*Isolation:\*\* Ensures that transactions are executed in isolation from each other.

- \*\*Durability:\*\* Ensures that the result of a completed transaction is permanently stored in the database.

\*\*10. How would you optimize a slow-running query?\*\*

\*\*Answer:\*\*

- \*\*Use Indexes:\*\* Create appropriate indexes on the columns used in WHERE clauses and join conditions.

- \*\*Optimize Joins:\*\* Use joins efficiently, avoid unnecessary complex joins.

- \*\*Use SELECT with specific columns:\*\* Avoid using SELECT \*; instead, specify only the columns needed.

- \*\*Use query hints:\*\* If necessary, use database-specific query hints to guide the optimizer.

- \*\*Analyze execution plan:\*\* Use the execution plan to identify bottlenecks.

- \*\*Partition large tables:\*\* Partitioning can help in managing and querying large tables more efficiently.

- \*\*Avoid functions on indexed columns:\*\* Functions on indexed columns can prevent the use of indexes.

These questions and answers should help you prepare for an SQL interview tailored to your experience level.