**SQL Topics Roadmap (Level-Wise & Topic-Wise)**

**✅ BASIC LEVEL SQL TOPICS**

**1️⃣ Introduction to SQL**

* What is SQL?
* History of SQL
* Types of SQL statements (DDL, DML, DCL, TCL)
* Popular RDBMS (MySQL, PostgreSQL, Oracle, SQL Server)

**2️⃣ Database Basics**

* Database vs table
* Schema
* Relational model
* Primary key, candidate key, alternate key
* Foreign key

**3️⃣ Data Types**

* Numeric data types
* Character/string data types
* Date/time data types
* NULL concept

**4️⃣ DDL Commands (Data Definition Language)**

* CREATE TABLE
* ALTER TABLE
* DROP TABLE
* RENAME
* TRUNCATE

**5️⃣ DML Commands (Data Manipulation Language)**

* SELECT
* INSERT
* UPDATE
* DELETE

**6️⃣ Basic SELECT queries**

* Simple SELECT
* Selecting specific columns
* Aliases
* DISTINCT

**7️⃣ Basic Filtering**

* WHERE clause
* Comparison operators (=, <, >, !=, etc.)
* Logical operators (AND, OR, NOT)

**8️⃣ Basic Sorting**

* ORDER BY
* Sorting ascending/descending

**9️⃣ Basic Aggregate Functions**

* COUNT()
* SUM()
* AVG()
* MIN()
* MAX()

**🔟 Grouping Data**

* GROUP BY
* HAVING

**✅ INTERMEDIATE LEVEL SQL TOPICS**

**1️⃣ Joins (multi-table queries)**

* INNER JOIN
* LEFT OUTER JOIN
* RIGHT OUTER JOIN
* FULL OUTER JOIN
* CROSS JOIN
* SELF JOIN

**2️⃣ Subqueries**

* Single-row subquery
* Multi-row subquery
* Correlated subquery
* Subquery in SELECT, FROM, WHERE

**3️⃣ Advanced Filtering**

* IN
* BETWEEN
* LIKE (pattern matching)
* IS NULL

**4️⃣ Set Operators**

* UNION
* UNION ALL
* INTERSECT
* EXCEPT / MINUS

**5️⃣ Constraints**

* PRIMARY KEY
* FOREIGN KEY
* UNIQUE
* NOT NULL
* CHECK
* DEFAULT

**6️⃣ Data Control Language (DCL)**

* GRANT
* REVOKE

**7️⃣ Transaction Control (TCL)**

* COMMIT
* ROLLBACK
* SAVEPOINT

**8️⃣ Views**

* Creating views
* Modifying views
* Dropping views
* Updatable vs non-updatable views

**9️⃣ Indexes**

* Creating indexes
* Composite index
* Unique index

**🔟 Normalization**

* 1NF, 2NF, 3NF
* BCNF
* Denormalization

**✅ ADVANCED LEVEL SQL TOPICS**

**1️⃣ Stored Procedures & Functions**

* Writing stored procedures
* IN, OUT, INOUT parameters
* Stored functions
* Advantages of stored procedures

**2️⃣ Triggers**

* BEFORE / AFTER triggers
* Row-level vs statement-level triggers

**3️⃣ Cursors**

* Implicit and explicit cursors
* Cursor operations (OPEN, FETCH, CLOSE)

**4️⃣ Error Handling**

* Exception blocks in PL/SQL or T-SQL
* TRY...CATCH

**5️⃣ Performance Tuning**

* Explain plans
* Query optimization
* Index optimization
* Partitioning

**6️⃣ Advanced Window Functions**

* OVER clause
* ROW\_NUMBER()
* RANK()
* DENSE\_RANK()
* LEAD(), LAG()

**7️⃣ JSON / XML in SQL**

* Storing JSON data
* Querying JSON columns
* XML processing in SQL

**8️⃣ Common Table Expressions (CTE)**

* WITH clause
* Recursive CTEs

**9️⃣ Materialized Views**

* Refresh options
* Difference with normal views

**🔟 Advanced Security**

* Roles and privileges
* Row-level security
* Encryption of data



