1. Introduction to Databases & SQL

A. What are Databases and RDBMS
B. SQL overview: role in data science and analytics
C. Relational model, tables, keys (primary & foreign)
D. SQL standards, SQL tools (MySQL/PostgreSQL/SQL Server)
E. Installing DBMS and setting up environment

2. Basic SQL Querying

A. SELECT statements and result sets
B. Filtering data with WHERE clause
C. Sorting results (ORDER BY)
D. Handling NULLs and data types
E. Logical operators (AND, OR, NOT)

3. Aggregation & Grouping

A. Aggregate functions: COUNT, SUM, AVG, MIN, MAX
B. GROUP BY and HAVING for summary analysis
C. DISTINCT and LIMIT/OFFSET
D. Creating analytical summaries

4. Joins & Multi-Table Queries

A. Inner Join
B. Left, Right & Full Outer Joins
C. Self Join and Cross Join
D. Combining data across tables for analytical queries

5. Advanced SQL Techniques for Analysis

A. Subqueries and nested SELECTs
B. Common Table Expressions (CTEs)
C. Union and set operations
D. Window functions (ROW_NUMBER, RANK, PARTITION)
E. Case expressions and conditional logic

6. String & Date Manipulation

A. String functions (CONCAT, TRIM, UPPER/LOWER)
B. Date/time functions
C. Formatting outputs

7. Data Modification & Transactions

A. INSERT, UPDATE, DELETE statements
B. Transaction control (COMMIT, ROLLBACK)
C. Understanding data integrity

8. Reporting & Performance Concepts

A. Creating views for reporting
B. Indexes and performance basics
C. Query optimization tips
D. Exporting query results for dashboards

9. Practical Data Science with SQL

A. Writing queries to support analytical use cases
B. Building data sets for visualization (e.g., BI tools)
C. SQL in data pipelines
D. Integrating SQL results with Python/Pandas optional but recommended

Practical:

Hands-on exercises include:

- Basic filtering & sorting exercises
- Aggregation and grouping analysis tasks
- Joins and combined table queries
- Subqueries and CTE practice
- Window function reports
- Real-world dataset query challenges
- Project: Data report creation using SQL + visualization