**Structured SQL**

**1. Introduction to SQL**

* What is SQL?
* Why use SQL?
* Advantages & Disadvantages
* SQL Database Types:
  + Relational Databases
  + Non-relational Databases

**2. SQL Commands Classification**

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

**3. Database Queries**

* Writing and executing queries
* Query optimization basics

**4. Data Types in SQL**

* **Numeric Data Types:** INT, BIGINT, SMALLINT, TINYINT, DECIMAL, NUMERIC, FLOAT, REAL
* **Character Data Types:** CHAR, VARCHAR, TEXT
* **Date & Time Data Types:** DATE, TIME, DATETIME, TIMESTAMP
* **Boolean Data Type:** BOOLEAN
* **Binary Data Types:** BLOB, BINARY, VARBINARY
* **Other Data Types:** JSON, XML, ENUM, SET

**5. Creating Tables and Constraints**

**a) Table Creation & Modification**

* CREATE TABLE
* ALTER TABLE

**b) Constraints**

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

**c) Table Removal**

* DROP TABLE
* TRUNCATE TABLE

**6. SQL Operators**

**a) Arithmetic Operators**

* (+, -, \*, /, %)

**b) Comparison Operators**

* (=, !=, >, <, >=, <=)

**c) Logical Operators**

* AND, OR, NOT

**d) Other Operators**

* BETWEEN, IN, NOT IN, LIKE, IS NULL
* ALL, ANY, EXISTS, SOME
* Wildcards (% and \_ with LIKE)

**7. Select Queries and Filtering Data**

* SELECT, FROM, WHERE
* DISTINCT
* ORDER BY
* GROUP BY
* HAVING
* TOP, PERCENT, WITH TIES
* OFFSET FETCH

**8. Functions in SQL**

**a) Single Row Functions**

* **String Functions:** LEN, LOWER, UPPER, SUBSTRING, etc.
* **Numeric Functions:** ROUND, CEIL, FLOOR, etc.
* **Date Functions:** GETDATE(), DATEADD(), DATEDIFF(), etc.

**b) Group Functions (Aggregate)**

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

**9. Joins in SQL**

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

**10. Subqueries and Advanced Queries**

* **Subqueries:** Single-row, Multi-row, Nested
* **Common Table Expressions (CTE)**
* EXISTS, IN, ANY, ALL

**11. Views**

* CREATE VIEW
* Types of Views
* Advantages & Disadvantages

**12. Indexes**

* Clustered Index
* Non-Clustered Index
* Unique Index
* Why Indexes are Used

**13. Stored Procedures**

* CREATE PROCEDURE
* Parameters (IN, OUT)
* RETURN Values
* Advantages of Stored Procedures

**14. Triggers**

* AFTER Trigger
* INSTEAD OF Trigger
* DML Triggers (INSERT, UPDATE, DELETE)

**15. Cursors**

* What is a Cursor?
* Types of Cursors
* DECLARE, OPEN, FETCH, CLOSE, DEALLOCATE

**16. Transactions and ACID Properties**

* START TRANSACTION
* COMMIT
* ROLLBACK
* SAVEPOINT
* ACID Properties (Atomicity, Consistency, Isolation, Durability)

**17. Temporary Tables & Magic Tables**

* Temporary Tables (Local, Global)
* Magic Tables (Inserted, Deleted in Triggers)

**18. Sequences and Identity**

* SEQUENCE (CREATE, NEXT VALUE FOR)
* IDENTITY Columns

**19. SQL Injection**

* What is SQL Injection?
* How to Prevent SQL Injection

**20. Performance Optimization Techniques**

* Query Optimization
* Index Optimization
* Execution Plans
* Avoiding Cursors