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Practical SQL Syllabus for MIS & Data Analysts

Module 1: Introduction to Databases & SQL (Basics)

- Introduction to Databases
- What is SQL?
- Types of Databases (Relational & Non-Relational)
- Database Management System (DBMS)
- RDBMS Concepts
- Popular RDBMS: MySQL, SQL Server, Oracle, PostgreSQL
- Data, Table, Record, Field Concepts
- SQL Standards and SQL Commands Classification
    - DDL (Data Definition Language)
    - DML (Data Manipulation Language)
    - DQL (Data Query Language)
    - DCL (Data Control Language)
    - TCL (Transaction Control Language)

Module 2: Database & Table Management (DDL Commands)

- Creating Databases
- Selecting and Dropping Databases
- Creating Tables
- Data Types in SQL
- Table Constraints:
    - NOT NULL
    - UNIQUE
    - PRIMARY KEY
    - FOREIGN KEY
    - CHECK
    - DEFAULT
- Altering Table Structure:
    - Add Column
    - Modify Column
    - Rename Column
    - Drop Column
- Dropping and Truncating Tables
- Understanding Schema
- Best Practices for Table Design

Module 3: Data Manipulation Techniques (DML Commands)

- INSERT Statement:
    - Insert Single Row
    - Insert Multiple Rows
    - Insert from Another Table
- UPDATE Statement:
    - Update with Conditions
    - Update Multiple Columns
- DELETE Statement:
    - Delete Specific Records

- Delete All Records
- Difference Between DELETE, TRUNCATE, and DROP
- Handling NULL Values
- Data Consistency and Integrity

Module 4: Data Retrieval Using SELECT (Core SQL)

- SELECT Statement Syntax
- Selecting Specific Columns
- Using DISTINCT
- WHERE Clause with Conditions
- Comparison Operators
- Logical Operators (AND, OR, NOT)
- BETWEEN, IN, NOT IN
- LIKE and Wildcards
- ORDER BY Clause
- LIMIT / TOP / FETCH
- Aliases (AS Keyword)
- Using SELECT with Expressions

Module 5: Functions in SQL

A. Single Row Functions

- String Functions:
  - UPPER, LOWER
  - LENGTH
  - SUBSTRING
  - TRIM
- Numeric Functions:
  - ROUND
  - CEILING
  - FLOOR
- Date Functions:
  - CURRENT_DATE
  - NOW
  - DATE ADD / DATE DIFF

B. Aggregate Functions

- COUNT
- SUM
- AVG
- MIN
- MAX
- GROUP BY Clause
- HAVING Clause
- Difference Between WHERE and HAVING

Module 6: Joins & Relationships (Intermediate SQL)

- Concept of Table Relationships
- Primary Key vs Foreign Key
- Types of Joins:
  - INNER JOIN
  - LEFT JOIN

    - RIGHT JOIN
    - FULL JOIN
    - SELF JOIN
- Join Multiple Tables
- Join with Conditions
- Real-world Join Scenarios
- Performance Considerations in Joins

Module 7: Subqueries & Nested Queries

- What is a Subquery
- Types of Subqueries:
    - Single Row Subquery
    - Multiple Row Subquery
    - Correlated Subquery
- Subqueries with SELECT
- Subqueries with INSERT, UPDATE, DELETE
- Using IN, EXISTS, ANY, ALL
- Practical Use Cases of Subqueries

Module 8: Views, Indexes & Sequences

- What is a View
- Creating and Dropping Views
- Updating Data Through Views
- Advantages of Views
- What is an Index
- Types of Indexes
- Creating and Dropping Indexes
- When to Use Indexes
- Performance Impact of Indexes

Module 9: Transactions & TCL Commands

- What is a Transaction
- ACID Properties
- Transaction Control Commands:
    - COMMIT
    - ROLLBACK
    - SAVEPOINT
- Auto Commit vs Manual Commit
- Practical Transaction Examples

Module 10: Security & User Management (DCL Commands)

- Database Security Concepts
- Creating Users
- Granting Privileges
- Revoking Privileges
- Role Management
- Best Practices for Database Security

Module 11: Advanced SQL Concepts

- CASE Statements
- IF / ELSE Logic in SQL
- Window Functions:
  - ROW_NUMBER
  - RANK
  - DENSE_RANK
  - OVER Clause
- Common Table Expressions (CTE)
- Temporary Tables
- Handling Large Datasets
- Query Optimization Basics

Module 12: SQL for Data Analytics & MIS

- SQL in Reporting & Dashboards
- Writing Queries for MIS Reports
- KPI Calculations Using SQL
- Time-based Analysis
- Sales, Finance & HR Use Cases
- SQL with Excel / Power BI Overview
- Real-World Business Scenarios

