TECHNOCATION FREELANCING TRAINING INSTITUTE & SOFTWARE HOUSE

Professional SQL Course Outline

Module 1: Introduction to SQL & Databases

- What is SQL? Importance & Applications
- Types of Databases: Relational vs. Non-Relational
- SQL vs. NoSQL: Key Differences
- Introduction to RDBMS (MySQL, PostgreSQL, SQL Server, Oracle)

Module 2: Database Design & Normalization

- Understanding Database Schema & ER Diagrams
- Primary Keys, Foreign Keys & Relationships
- Normalization (1NF, 2NF, 3NF) & Denormalization
- Indexing for Performance Optimization

Module 3: SQL Basics – Data Querying

- Writing Basic SQL Queries (`SELECT`, `FROM`, `WHERE`)
- Using `ORDER BY` & `GROUP BY` Clauses
- Filtering Data with `LIKE`, `IN`, `BETWEEN`
- Working with `DISTINCT` to Remove Duplicates

Module 4: Advanced Data Retrieval & Joins

- Using `INNER JOIN`, `LEFT JOIN`, `RIGHT JOIN`, `FULL JOIN`
- Self-Joins & Cross-Joins Explained
- Subqueries & Nested Queries
- Using `UNION`, `INTERSECT`, `EXCEPT`

Module 5: Data Manipulation with SQL

- Inserting Data (`INSERT INTO`)
- Updating & Modifying Records (`UPDATE`, `DELETE`)
- Using Transactions (`COMMIT`, `ROLLBACK`, `SAVEPOINT`)
- Implementing Constraints (`CHECK`, `DEFAULT`, `UNIQUE`)

Module 6: SQL Functions & Operators

- Aggregate Functions (`SUM`, `AVG`, `MIN`, `MAX`, `COUNT`)
- String Functions (`CONCAT`, `LENGTH`, `SUBSTRING`, `REPLACE`)
- Date & Time Functions (`NOW`, `DATEDIFF`, `TIMESTAMP`)
- Mathematical Functions (`ROUND`, `CEIL`, `FLOOR`, `MOD`)

Module 7: Stored Procedures, Views & Triggers

- Creating & Using Views for Data Abstraction
- Writing & Executing Stored Procedures
- Working with Triggers for Automation
- Using Cursors for Row-by-Row Processing

Module 8: Performance Optimization & Indexing

- Understanding Indexing & Its Impact on Performance
- Clustered vs. Non-Clustered Indexes
- Optimizing Queries with `EXPLAIN` & `ANALYZE`
- Caching Techniques for Large Databases

Module 9: SQL for Data Analysis & Reporting

- Using SQL for Business Intelligence & Reporting
- Generating Summaries & Statistical Reports
- Combining SQL with Visualization Tools (Power BI, Tableau)
- Advanced Query Optimization for Reporting

Module 10: SQL Security & User Management

- Managing Database Users & Roles
- Granting & Revoking Permissions (`GRANT`, `REVOKE`)
- Preventing SQL Injection Attacks
- Implementing Data Encryption & Backups

Module 11: SQL in Cloud & Big Data

- Working with SQL in Cloud Databases (AWS RDS, Google BigQuery, Azure SQL)

- Introduction to Big Data & SQL (Hive, Spark SQL)
- ETL (Extract, Transform, Load) Processes
- Real-World SQL Use Cases in Data Engineering

Module 12: Final Project & Certification Preparation

- Designing & Implementing a Real-World Database
- Writing Optimized SQL Queries for Business Scenarios
- Database Performance Testing & Debugging
- Preparing for SQL Certification Exams (Oracle, Microsoft, PostgreSQL)