# SQL SERVER

## Module 1

**Introduction,Installation**

- Data, Databases and RDBMS Software
- Microsoft SQL Server Advantages, Use
- Database Engine Component and OLTP
- BI Components & Data Science Components
- SQL : Purpose, Real-time Usage Options
- SQL Versus Microsoft T-SQL [MSSQL]
- Microsoft SQL Server – Career Options
- Real-time Projects & Job Responsibilities
- Versions and Editions of SQL Server
- SQL Server and SSMS Installation Plan
- SQL Server Pre-requisites : S/W, H/W
- SQL Server 2019 / 2017 Installation
- Instance Name and Server Name
- Features, Collation, Admin Users

## Module 2

**SSMS Tool, SQL Basics**

- SQL Server Management Studio
- Local and Remote Connections
- System Databases: Master and Model
- MSDB, TempDB, Resource Databases
- Creating Databases : Files [MDF, LDF]
- Creating Tables in User Interface
- Data Insertion & Storage. Limitations
- SQL : Purpose and Real-time Usage
- SQL Versus T-SQL : Basic Differences
- DDL, DML, SELECT, DCL and TCL
- Creating Tables using SQL Scripts
- Data Storage, Inserts – Basic Level
- SELECT Statement for Table Retrieval
- Table Data Retrieval, Table Scan

## Module 3

**SQL BASICS, SELECT**

- Creating Databases in SQL Server
- Creating Tables in SQL Databases
- Using Basic Data Types: Int, Char
- Single Row Inserts, Multi Row Inserts
- Rules for Data Insertion Statements
- SELECT Statement For Data Retrieval
- SELECT with WHERE Conditions
- AND and OR Operators Usage
- IN Operator and NOT IN Operator
- BETWEEN, NOT BETWEEN Operators
- LIKE and NOT LIKE Operators
- Using Wild Card Characters
- IS and IS NOT Operator, NULLs
- Using DISTINCT, TOP Keyword

## Module 4

**SCHEMAS, Excel Exports**

- UPDATE Statement & Conditions
- DELETE Statement & Conditions
- TRUNCATE & DELETE Differences
- Table Data / Content Modification
- Table Structure Modifications (DDL)
- ALTER, ADD and DROP Statements
- Removing Tables and Databases
- Schemas : Real-time Usage, Creation
- Table Transfer and 2P, 3P Naming
- Table Migrations across Schemas
- Import / Export Wizard From SSMS
- GO Statement, SQL BATCH Concept
- CHAR Versus VARCHAR Data Types
- VARCHAR & NVARCHAR Data Types

## Module 5

**Constraints Basics**

- Constraints and Keys – Data Integrity
- NULL, NOT NULL Property on Tables
- UNIQUE KEY Constraints: Importance
- PRIMARY KEY Constraint: Importance
- FOREIGN KEY Constraint: Importance
- REFERENCES For Foreign Keys
- CHECK Constraints and Conditions
- Database Diagrams (E R) Diagrams
- Table Key Relations with ER Diagrams
- Relationships Verification and Links
- Identity Property : Sequence Generation
- Identity Property : Seed & Increment
- DEFAULT Constraints, Insert Rules
- Candidate Keys, Real-time Advantages

## Module 6

**DB Objects, Procedure Basics**

- Views : Types, Usage in Real-time
- Creating, Executing Views in Database
- Important System Views For Metadata
- Functions : Types, Usage in Real-time
- Using Parameters in Functions (UDF)
- Create, Execute Functions in Database
- Parameters in SQL Server Database
- Procedures : Types, Usage in Real-time
- Using Parameters in Stored Procedures
- User & System Predefined Procedures
- Sp_help, Sp_helpdb and Sp_recompile
- sp_rename, sp_depends System SPs
- Compare Views, SPs and Functions
- SProcs : Performance Advantage

## Module 7

**JOINS, T-SQL Queries : Level 1**

- JOINS – Table Comparisons Queries
- INNER JOIN – Examples, WHERE, ON
- OUTER JOIN – Examples, WHERE, ON
- Left Outer Joins with Example Queries
- Right Outer Joins with Example Queries
- FULL Outer Joins – Realtime Scenarios
- Join Queries with “ON” Conditions
- MERGE Join Options with Examples
- LOOP Join Options with Examples
- HASH Join Options with Examples
- Big Table Versus Small Table Joins
- Join Type Versus Join Option in T-SQL
- CROSS JOIN Versus CROSS APPLY
- Understand When to Use Which Join

## Module 8

**Group By, T-SQL Queries : Level 1**

- GROUP BY Queries and Aggregations
- DISTINCT Vs GROUP BY Comparisons
- Unique Value Identification Options
- Group By Queries – Design Rules
- GROUP BY Queries with Having Clause
- GROUP BY Queries with Where Clause
- Using WHERE and HAVING in T-SQL
- Rollup : Usage and T-SQL Queries
- Cube : Usage and T-SQL Queries
- Generate Sub Totals & Grand Totals
- Comparing Rollup & Cube Functions
- GROUPING() Function for Row Status
- Query Results : UNION Operator
- Query Results : UNION ALL Operator

## Module 9

**T-SQL Queries - Level 2**

- Joining 2 and 3 Tables in T-SQL
- Using Aliasing in Join Queries
- Using WHERE and ON Conditions
- Using GROUP BY with WHERE, ON
- Joins with GROUP BY and HAVING
- Joins with Sub Queries, IS NULL
- TOP, OFFSET, FETCH, NEXT ROWS
- Date and Time Functions: Getdate()
- Cast and Convert with Getdate()
- Date & Time Styles, Data Formatting
- DateAdd and DateDiff Functions
- String Functions: Left and Right
- SubString, Replace and CharIndex
- Reverse, Len, LTrim and RTrim

## Module 10

**T-SQL Queries - Level 3**

- Joining 3 and 4 Tables in T-SQL
- Using Joins with Sub Queries
- Using Joins with Nested Sub Queries
- IIF ( ) and CASE Statement Usage
- Using IIF and CASE in Joins
- Joins in Group By, Rollup, Cube
- Replacing Nulls: Isnull, Coalesce
- MERGE Statement For DML, Joins
- WHEN MATCHED & NOT MATCHED
- DML Operations : MERGE Statement
- Sequence Number Generation in T-SQL
- ROW_NUMBER() and RANK() Queries
- DENSE_RANK, Sequence Identification
- PARTITION BY and RowNumber ( )

## Module 11

**Transactions, Normal Forms**

- Transactions : Types, ACID Properties
- Transaction Types and AutoCommit
- EXPLICIT & IMPLICIT Transactions
- COMMIT and ROLLBACK Statements
- Open Transaction Scenarios & Cause
- Query Blocking Scenarios @ Real-time
- NOLOCK and READPAST Lock Hints
- Normal Forms, Entity Relation Diagram
- First, Second, Third Normal Forms
- Boycee-Codd Normal Form : BNCF
- Functional Dependency, Candidate Keys
- Multi-Valued & Transitive Dependencies
- 4 NF and ETNF Differences, Usage
- 1:1, 1:M, M:1, M:M Relationships

## Module 12

**Real-time Case Study (Queries)**

- Writing Queries with Joins
- Writing Sub Queries with Joins
- Queries with Date/Time Formatting
- Queries with String Formatting
- Rollup and Cube with Aggregates
- Writing Views For Query Store
- Accessing / Testing Views
- Excel Integration with SQL DB
- SQL Database Access in Excel
- Generate Excel Pivot Tables
- Excel Pivot Charts & Labels
- Data Formatting with Excel
- ODC Connections with T-SQL
- SQL Server Architecture

## Module 13

**STORED PROCEDURES - Level 2**

- Table Valued Parameters (TVP)
- SQL Injection Attacks – Precautions
- READONLY Parameters – Stored Procs
- OUTPUT Parameters – Stored Procedures
- User Data Types & Real-time Use
- Dynamic Data Insertions with SPs
- Table Cloning, Inserts @ Table Variables
- CTE : Common Table Expressions
- Real-time Scenarios with CTEs – Usage
- ROW_NUMBER() with CTE Queries
- Using CTEs for Avoiding Self Joins
- Using CTEs for Avoiding Sub Queries
- Recursive CTEs and ANCHOR Element
- Termination Checks in Recursive CTEs

## Module 14

**STORED PROCEDURES - Level 3**

- DML Triggers and DDL Triggers
- FOR and INSTEAD OF Triggers
- Magic Tables : Inserted, Deleted
- Views on Tables – SCHEMABINDING
- ENCRYPTION and CHECK OPTION
- Cascaded Views, Encrypted Views
- Updatable Views, Joins with Triggers
- Cursors – Benefits, Cursors in SProcs
- ForwardOnly, Scroll & Local Cursors
- Static, Dynamic & Global Cursors
- Keyset Cursors and @@FetchStatus
- Nesting of Stored Procedures – Dynamic
- Data Formatting and WHILE Loops
- Using Temporary Tables for Formatting

## Module 15

**FUNCTIONS, CONSTRAINTS – 2**

- Functions : Types, Real-world Usage
- Scalar Value Returning Functions
- Inline Table Value Functions
- Multi-Line Table Value Functions
- WHILE Loops and Iteractions in T-SQL
- Table Variables Usage in T-SQL
- PIVOT and UNPIVOT Operations
- Self Referencing Keys and Self Joins
- Cascades : ON UPDATE, ON DELETE
- Composite Keys and Real-time Use
- Computed Columns and Realtime Use
- XML AUTO, XML RAW and XML PATH
- Temporary Tables : Real-time Use
- Local & Global Temporary Tables

## Module 16 & 17

**Server, DB, Index Architecture**

- Server Architecture & Protocols
- Database Engine and Query Processor
- Parser, Optimizer, SQL & DB Manager
- Storage Engine Components, SQL OS
- Database Architecture – Data Files
- Primary, Secondary Files, File Groups
- Transaction Log File [LDF], LSN, VLF
- Indexes: Architecture and Types
- Clustered and Non Clustered Indexes
- Included and ColumnStore Indexes
- FILTERED and COVERING Indexes
- UNIQUE Indexes, Online Indexes
- B Tree Structure, IAM Page [Root]
- Indexed Views / Materialized Views