COURSE TITLE	**DATABASE MANAGEMENT USING SQL**
COURSE CODE	**05MF0204**
COURSE CREDITS	**4**

Objective:

1 To understand about Database Management System, building blocks, applications etc.

2 To impart a thorough understanding about Mapping Relationship in DBMS and installation of SQL.

3 To understand about Normalization in Database and 1NF Normalization example Decomposition, 2NF Normalization.

4 To learn about Advanced SQL Function

5 To develop skills in optimized database design, application development, and advanced data analysis.

Course Outcomes: After completion of this course, student will be able to:

1 Student will be able to write SQL queries for data retrieval, manipulation, and administration tasks. Capability to design and implement well- structured and normalized database schemas using appropriate modeling techniques

2 Students will be able to optimize SQL queries and utilize indexing to enhance the performance of database systems. Students will acquire Proficiency in integrating databases with applications using appropriate connectivity technologies

3 By mastering advanced SQL topics, students will be well-equipped to design efficient database systems, develop complex applications, and perform sophisticated data analysis tasks.

4 Students will learn to use nested SELECT statements to retrieve data within SQL queries. Students will understand how to create temporary result sets for complex queries using CTEs. Students will be introduced to window functions for performing calculations across rows in a query result set. Students will learn about rank-related functions for assigning ranks to rows, and other functions like SUM, cumulative SUM, Nth value retrieval, Lag, and Lead. Mastering these functions will enable students to perform complex data manipulations and analysis in SQL databases efficiently.

5 Students will understand fundamental concepts of databases, including data models, schemas, keys, relationships, and normalization.

Pre-requisite of course:NA

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	0	2	50	30	20	25	25

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Contents : Unit	Topics	Contact Hours
1	**Database Concept & E-R Diagram:** - What is a Database System, Components of Database Systems, DBMS -, Building blocks, applications, advantages, disadvantage , DBMS Architecture , ER model in DBMS , ER model to Relational Model , Relational Model in DBMS, SQL Introduction	11
2	**Advance Database Concept:** - SQL Syntax, SQL Data Type, SQL Introduction, DDL, DML, Create, Drop, DCL , Alter Command, Truncate, Creating Relations (Create Table statement) Modifying Relations (Alter table statement) , Constraints in DBMS, Integrity constraint, Keys in DBMS - , Introduction, Types of Keys, Foreign key in DBMS, Super key in DBMS, Candidate key in DBMS, Primary key in DBMS, keys in DBMS	11
3	**Database Normalization:** Normalization in Database, - 1NF Normalization example , - Decomposition, 2NF Normalization example Decomposition, BCNF Normalization in Database with example , Relational Algebra in Database Management System - Fundamental Operation, Introduction, Unary operation - Projection operation(p), Unary operation - Select Operation(s), Rename Operation(?) - Binary Operation, SET operation, Union operation (?), Binary Operation - , Difference Operation (-), Intersection Operation (n), Binary Operation, Division Operation (%), Binary Operation	11
4	**Join operation with advance function in SQL:** - Cartesian Product Operation(X), Join Operation, Natural Joins - Join Operation, Inner Join, Join Operation, Outer Join, Join Operation, Right Outer Join - Join Operation, Full Outer Join - , Case when example - Subquery in SQL - , Common Table Expression in SQL - , Introduction to Windows Function - String function in SQL with Example - Date function in SQL with Example - , Windows Function Rank, Dense Rank, Row Number - Windows Function Sum, Cum Sum, Nile, Lag, Lead - Views, Indexes, Performance Optimizations - Stored Procedure and functions - SQL Analysis Project	12
Total Hours		**45**

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Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**Unit 1** 1 Design an entity-relationship (ER) diagram for a given scenario and translate it into a relational database schema. 2 Design a database schema for a social media platform, considering factors such as user profiles, posts, comments, and relationships. 3 Create a simple relational database schema with tables for storing student information. 4 Develop a relational database management system for swiggy database management system 5 Define the primary keys for each table and establish relationships between them. 6 Perform insert duplicate data in the table which have primary and not null constraint. 7 Define Not Null for each table and establish relationships between them. 8 Insert sample data into the tables and practice querying to retrieve specific information. 9 Practice creating and dropping tables in a relational database using SQL commands. 10 Practice using SQL clauses (WHERE, ORDER BY, GROUP BY) to filter, sort, and group data. 11 Practice using SQL clauses and find the top and least element from the table.	15
2	**Unit 2** 1 Perform basic data manipulation operations such as inserting new records, updating existing records, and deleting records. 2 Explore different JOIN operations (INNER JOIN, LEFT JOIN, RIGHT JOIN) to retrieve data from multiple related tables. 3 Experiment with DDL commands (CREATE, ALTER, DROP) to modify the structure of a database schema. 4 Apply union and intersection in the table of the database system. 5 Make a list of DDL, DML, DCL, and DQL commands. 6 Find how many orders have been given by each customer and find the top 5 customers who have the most orders. Print only the customer's full name (first name last name). 7 Find How Many products from the category “Snacks & Branded Foods” 8 Find how many orders have been generated for each shipper company whose order amount more than 50000 and find the top 5 company names with the number of orders.	15
Total Hours		**30**

Textbook :

1 Database System Concepts, Abraham Silberschatz, Henry F. Korth, and S. Sudarshan,, McGraw-Hill Education, 2019

References:

1 Fundamentals of Database Systems, Fundamentals of Database Systems, Ramez Elmasri and Shamkant B Navathe, Pearson Education India, 2018

2 SQL for Beginners: Learn SQL using MySQL and Database Design, SQL for Beginners: Learn SQL using MySQL and Database Design, Preston Prescott, Createspace Independent Publishing Platform, 2015

3 SQL Cookbook, SQL Cookbook, Anthony Molinaro, O'Reilly Media, 2005

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References:

4 Database Systems: The Complete Book, Database Systems: The Complete Book, Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom,, Pearson, 2008

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery					
Remember / Knowledge	**Understand**	**Apply**	**Analyze**	**Evaluate**	**Higher order Thinking / Creative**
10.00	20.00	25.00	25.00	10.00	10.00

Instructional Method:

1 Board Work
2 PPT
3 Demo

Supplementary Resources:

1 https://www.mit.edu/~amidi/teaching/data-science-tools/tutorial/queries-with-sql/
2 https://phs.weill.cornell.edu/graduate-education-clinical-training/course-catalog/data-management-sql

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