COURSE TITLE	**DATABASE MANAGEMENT SYSTEM**
COURSE CODE	**01CT0407**
COURSE CREDITS	**4**

Objective:

1. Students will be able to use some of the mathematical concepts and apply that knowledge to solve any real world problem
2. To know how huge data is managed by each and every application is modern technologies. To store and retrieve data in efficient manner, how query language is useful will be helpful. This course will give deep knowledge about data storage and querying functionalities used in real life applications.

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

1. Understand the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra, normalization and SQL
2. Solve the given problem using Relational Algebra, Relational Calculus, SQL and PL/SQL
3. Analyze basic data storage schemes and real-life database applications
4. Apply efficient query optimization techniques to solve different problems
5. Perform PL/SQL programming using concept of Cursor Management, Error Handling, Package and Triggers

Pre-requisite of course: The proper understanding of data structures and algorithms will help you to understand the DBMS quickly.

Teaching and Examination Scheme

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

Contents : Unit	Topics	Contact Hours
1	**Introduction to DBMS** Introduction to Database Management Systems, Types of DBMS, Implementation of DBMS in storage and querying, Applications of DBMS	4
2	**Database Design and E-R Model** Overview of the Design Process, The Entity-Relationship Model, Complex Attributes, Mapping Cardinalities, Primary Key, Reducing E-R Diagrams to Relational Schemas, Extended E-R Features, and Entity-Relationship Design Issues	6

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Contents : Unit	Topics	Contact Hours
3	**Introduction to RDBMS & SQL** Structure of Relational Databases, Database Schema, Keys, Schema Diagrams, Relational Query Languages, The Relational Algebra Overview of the SQL Query Language, SQL Data Definition. Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Null Values, Aggregate Functions, Nested Subqueries, Modification of the Database	8
4	**Advanced SQL** Join Expressions, Views, Integrity Constraints, SQL Data Types and Schemas, Index Definition in SQL, Accessing SQL from a Programming Language, Functions and Procedures, Triggers, Recursive Queries	8
5	**Functional Dependencies & Normalization** Theoretical overview of types of functional dependencies: Trivial and Non-trivial, Multilevel dependencies, Algorithms for decomposition using multilevel dependencies. Purpose of normalization, Introduction and definition of normalization, Normalization techniques: 1NF, 2NF, 3NF, 4NF and BCNF	8
6	**Concurrency and Recovery in Transactional DBMS** Introduction to transaction, ACID properties of Transaction, Locking mechanism, solution to concurrency related problems, deadlock, two-phase locking protocol, Deadlock, Concurrency handling protocols and schemes, Transactional Recovery Algorithms, System recovery, Two- Phase Commit protocol, Recovery and Log-based recovery	8
Total Hours		**42**

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**Experiment - 1** Introduction to MySQL Workbench and MySQL server	2
2	**Experiment - 2** Use of Create and Alter command in SQL	2
3	**Experiment - 3** Use of Drop and Truncate command in SQL	2
4	**Experiment - 4** Implementation and use of Constraints in SQL	2
5	**Experiment - 5** Use of insert, select and delete command in SQL	2
6	**Experiment - 6** Use of in-built and aggregate functions in SQL	2
7	**Experiment - 7** Use of relational, like and in operator in SQL	2

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Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
8	**Experiment - 8** Implementation & use of nested queries in SQL	2
9	**Experiment - 9** Implementation and use of keys in SQL	2
10	**Experiment - 10** Implementation of various join operations in SQL.	2
11	**Experiment - 11** Implementation and use of Views in SQL	2
12	**Experiment - 12** Implementation & use of procedures in SQL.	2
13	**Experiment - 13** Implementation & use of functions in SQL.	2
14	**Experiment - 14** Implementation & use of triggers in SQL.	2
Total Hours		**28**

Textbook :

1 Understanding SQL, by Martin Gruber, BPB, 1990

References:

1 Database System Concepts, Database System Concepts, Sudars Abraham Silberschatz, Henry F. Korth & S. han, McGraw Hill, 2019

2 An introduction to Database Systems, An introduction to Database Systems, C J Date, Addition-Wesley, 1975

3 Oracle – The complete reference – TMH /oracle press

4 SQL – PL/SQL by Ivan Bayross

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**
15.00	15.00	40.00	10.00	10.00	10.00

Instructional Method:

1 The course delivery method will depend upon the requirement of content and need of the students. The teacher in addition to conventional teaching method (Chalk and Talk) may use any of the tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc. for effective teaching.

Instructional Method:

2 The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.

3 Practical examination will be conducted at the end of the semester for evaluation of performance of students in laborator

4 Students may use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory, etc.

Supplementary Resources:

1 https://www.geeksforgeeks.org/dbms

2 http://nptel.iitm.ac.in/video.php?subjectId=106106093

3 http://holowczak.com/oracle-sqlplus-tutorial

4 http://www.roseindia.net/programming-tutorial/Database- Tutorialsiv.

5 http://www.w3schools.com/sql

6 http://beginner-sql-tutorial.com/sql.htm

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