Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E. (Computer Engineering Sp. in Software Engineering) (Full Time)			
Subject Code & Name	**Instructions Hours per Week**			**Credits**			
SER1E1	**L**	**T**	**P**	**L**	**T**	**P**	**Total**
DATBASE ENGINEERING	**3**	**1**	**2**	**3**	**1**	**1**	**5**
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To understand how transactions are executed and concurrency mechanisms are used in practice.
- To understand how DBMS process queries and how it estimates the cost of query optimization.
- To understand how DBMS maintains data records and access paths.
- To understand the need and use of distributed database systems in practice.
- To familiarize with the emerging technologies of databases.

Prerequisites: Introductory knowledge of Database Systems.

COURSE CONTENTS

Unit-I

Transaction Processing & Concurrency Control: Introduction to Transaction Processing, Transaction Properties, Transaction recoverability and serializability, Transaction Support in SQL, Introduction to Concurrency Control, Two-phase locking, Timestamp ordering, Validation and other issues.

Unit-II

Query Processing & Optimization: Introduction, Translating SQL queries, Algorithms – External Sorting, Select, Join and Project operations, Aggregate and Outer Joins, Heuristics for Query optimization, Estimating cost in query optimization, Semantic optimization, Optimization used in practice.

Unit-III

Data Storage and Querying: File organization, Organization of records, Indexing and Hashing – Basic concepts, B+-tree index files, Static and dynamic hashing, comparison of indexing and hashing etc..

Unit-IV

Distributed Databases : Concepts, Techniques for Distributed database design – Data fragmentation, replication, and allocation techniques; Types of Distributed Systems, Query processing in Distributed Databases, Concurrency control & Recovery in Distributed Databases, Distributed Databases in MySQL.

Unit-V

Advance Topics: Information Retrieval and XML data, Spatial data management, NoSQL – Diffrences from Relational Databases, Theory, Key-Value Databases, Graph Databases etc.

Books Recommended:

1. Fundamentals of Database Systems, By R. Elmasri and S. Navathe, 6th Ed. Pearson Education, 2010.
2. Database Management Systems, R. Ramkrishnan and J. Gehrke, 3rd Edition, McGraw Hill Education, 2014.
3. Database System Concepts, By A. Silberschatz, H. Korth and S. Sudarshan, 6th Ed. McGraw Hill Education, 2013.
4. Database Systems, By T. Connolly and C. Begg, 4th Edition, Pearson Education, 2008.

List of Assignments:

During the learning of course, students need to do assignments:

1. Solving intermediate SQL queries involving join expressions, views and transaction support.
2. Using PL/SQL constructs involving procedures, triggers, recursive queries etc.
5. Assignment on Query processing and indexing.
4. Using concurrency and transactions
6. Distributed database support in MySQL or PostgreSQL.