Savitribai Phule Pune University

Third Year of E & Tc Engineering (2019 Course)

304183: Database Management

Teaching Scheme:	Credit	Examination Scheme:
Theory: 03 hrs. / week	03	In-Sem (Theory): 30 Marks End Sem (Theory): 70 Marks

Prerequisite Courses, if any:

1. Data Structures

Companion Course, if any: Database Management Lab

Course Objectives:

- To understand fundamental concepts of database from its design to its implementation.
- To analyze database requirements and determine the entities involved in the system and with one another.
- To manipulate database using SQL Query to create, update and manage Database.
- Be familiar with the basic issues of transaction processing and concurrency control.
- To learn and understand Parallel Databases and its Architectures.
- To learn and understand Distributed Databases and its applications.

Course Outcomes: On completion of the course, learner will be able to -

CO1: Ability to implement the underlying concepts of a database system.

CO2: Design and implement a database schema for a given problem-domain using data model.

CO3: Formulate, using SQL/DML/DDL commands, solutions to a wide range of query and update problems.

CO4: Implement transactions, concurrency control, and be able to do Database recovery.

CO5: Able to understand various Parallel Database Architectures and its applications.

CO6: Able to understand various Distributed Databases and its applications.

Course Contents

Unit I	Introduction to DBMS	(07 Hrs.)

Introduction to Database Management Systems, Purpose of Database Systems, Database-System Applications, Data Abstraction and Database System Structure.

Relational Model: Structure of relational databases, Domains, Relations, Relational algebra – fundamental operators and syntax, relational algebra queries, tuple relational calculus.

Entity-Relationship model: Basic Concepts, Entity Set, Relationship Sets and Weak Entity Sets, Mapping Cardinalities, Keys, E-R diagrams, Design Issues, Extended E-R Features, Converting E-R & EER diagram into tables.

Mapping of Course Outcomes for Unit I	**CO1: Ability to implement the underlying concepts of a database system.**

Unit II	Relational Database Design	(06 Hrs.)
Basic concepts, CODD's Rules, Relational Integrity: Domain, Referential Integrities, Enterprise Constraints, Database Design: Features of Good Relational Designs, Normalization, Atomic Domains and First Normal Form, Decomposition using Functional Dependencies, Algorithms for Decomposition, 2NF, 3NF, 4NF and BCNF.		
Mapping of Course Outcomes for Unit II	**CO2: Design and implement a database schema for a given problem-domain using data model.**	
Unit III	**Basics of SQL**	**(07 Hrs.)**
DDL, DML, DCL, Structure: Creation, Alteration, Defining constraints – Primary key, Foreign key, Unique key, Not null, Check, IN operator, Functions - Aggregate Functions, Built-in Functions –Numeric, Date, String Functions, Set operations, sub-queries, correlated subqueries, Use of group by, having, order by, join and its types, Exist, Any, All, view and its types. **Transaction control commands**: Commit, Rollback, Save-point PL/SQL Concepts: Cursors, Stored Procedures, Stored Function, Database Triggers.		
Mapping of Course Outcomes for Unit III	**CO3: Formulate, using SQL/DML/DDL commands, solutions to a wide range of query and update problems.**	
Unit IV	**Database Transactions Management**	**(07 Hrs.)**
Basic concepts of a Transaction, Transaction Management, Properties of Transactions, Concept of Schedule, Serial Schedule, Serializability: Conflict and View, Cascaded Aborts, Recoverable and Non-recoverable Schedules, Concurrency Control: Need, Locking Methods, Deadlock handling and Time-stamp based Protocols.		
Mapping of Course Outcomes for Unit IV	**CO4: Implement transactions, concurrency control, and be able to do Database recovery.**	
Unit V	**Parallel Databases**	**(06 Hrs.)**
Introduction to Database Architectures: Multi-user DBMS Architectures, Case study- Oracle Architecture. **Parallel Databases:** Performance Parameters for Parallel Databases, Types of Parallel Database Architecture, Evaluating Parallel Query in Parallel Databases and Virtualization on Multicore processors.		
Mapping of Course Outcomes for Unit V	**CO5: Able to understand various Parallel Database Architectures and applications.**	
Unit VI	**Distributed Databases**	**(07 Hrs.)**
Distributed Databases: Distributed Database Management System, Factors Encouraging DDBMS, Advantages of Distributed Databases, Types of Distributed Databases, Architecture of Distributed Databases, Distributed Database Design, Distributed Data Storage, and Distributed Transaction: Basics, Failure modes, Commit Protocols, Concurrency Control in Distributed Database.		
Mapping of Course Outcomes for Unit VI	**CO6: Able to understand various Distributed Databases and its applications.**	

Learning Resources

Text Books:

1. A. Silberschatz, H.F. Korth and S. Sudarshan , "Database System Concepts", McGraw Hill, 6th Edition.
2. C.J. Date, A. Kannan, S. Swamynathan "An introduction to Database Systems", Pearson, 8th Edition.

Reference Books:

1. Martin Gruber, "Understanding SQL", Sybex Publications.
2. Ivan Bayross, "SQL- PL/SQL", BPB Publications, 4th Edition.
3. S.K. Singh, "Database Systems: Concepts, Design and Application", Pearson, Education, 2nd Edition.

MOOC / NPTEL Courses:

1. NPTEL Course **"Database Management System"**

   Link of the Course: https://nptel.ac.in/courses/106/106/106106220/