22CS201 DATABASE MANAGEMENT SYSTEMS

Hours Per Week :

L	Т	Р	С
2	2	2	4

Source: https:// www.youtube.com/ watch?v=IDpB9zF8LBw

What Is Database Management System ?

DBMS

PREREQUISITE KNOWLEDGE: Discrete Mathematical Structures.

COURSE DESCRIPTION AND OBJECTIVES:

This course presents an introduction to database management systems with an emphasis on how to organize, maintain and retrieve data efficiently from a relational database. It also focuses on requirements gathering and conceptual, logical, physical database design. The objective of the course is to enable the student to understand database design, expressing queries using SQL, query optimization and transaction processing.

MODULE-1

UNIT–1

DATABASE SYSTEM CONCEPTS

Databases And Database Users: Introduction; Characteristics of the database approach; Actors on the scene; Advantages of using DBMS approach.

Database System Concepts and Architecture: Data models, Schemas and instances; Three-Schema architecture and data Independence; Database languages and interfaces; The database system environment; Centralized and Client-Server architectures for DBMS.

Conceptual Data Modeling and Database Design: Entity types, Entity sets, Attributes and keys; Relationship types, Relationship sets, Roles and structural constraints; Weak entity types; Relationship types, Legal and ethical constraints in database design.

UNIT-2

8L+8T+8P=24 Hours

8L+8T+8P=24 Hours

RELATIONAL DATABASE DESIGN

Relational Database Design by ER–To-Relational Mapping: Relational Database design using ER-to-Relational mapping.

The Relational Data Model and Relational Database Constraints: Relational model concepts; Relational model constraints and Relational database schemas.

Relational Algebra: Unary relational operations - SELECT and PROJECT; Relational algebra operations from set theory; Binary relational operations - JOIN and DIVISION.

SQL: SQL data definition and data types; specifying constraints in SQL, Basic retrieval queries in SQL; INSERT, DELETE, and UPDATE statements in SQL.

PRACTICES:

- Development of Relational Database schemas for Company/Student/Sailors/ using DDL constructs of SQL.
- Apply various DML Commands such as select, insert, update etc. of SQL on Relational Database.
- Design of Relational Database schemas by specifying different types of Constraints.
- Apply various Relational Database operators (Arithmetic, Logical &comparison) and stringmatching constructs of SQL.
- Expressing queries using Aggregate Functions of SQL on Relational Database.
- Queries on Relational Database using GROUP BY, HAVING and ORDER BY clauses of SQL.
- Design an ER diagram that ensures the best practices in data design, usage and storage by preserving the privacy and ethical standards of the users in the VFSTR University.

MODULE-2

8L+8T+8P=24 Hours

UNIT-1

NORMALIZATION

Complex Queries, Triggers, Views: More complex SQL retrieval queries; Specifying constraints as assertions and actions as triggers; Views (virtual tables) in PI/SQL.

Basics of Functional Dependencies and Normalization for Relational Databases: Informal design guidelines for relation schemas; Functional dependencies-inference rules, equivalence and minimal cover; Normal forms based on primary keys; Boyce-Codd normal form; Properties of relational decompositions, multi valued dependency, join dependencies.

UNIT-2

8L+8T+8P=24 Hours

TRANSACTION PROCESSING

Introduction To Transaction Processing Concepts and Theory: Introduction to transaction processing; Transaction and system concepts; Desirable properties of transactions; Characterizing schedules based on serializability.

Concurrency Control Techniques: Two-phase locking techniques for concurrency control, concurrency control based on timestamp ordering.

Database Recovery Techniques: Recovery concepts; Shadow paging; The ARIES recovery algorithm.

Indexing Structures for Files and Physical Database Design: Single level and multi-Level indexing; Dynamic multi-level indexing using B-trees and B+ trees.

PRACTICES:

- Design and Development of company database and expressing Nested queries using SQL. Ensure safe/secure storage and disposal of customer information. As well as the data considered for your solution should obey the legal and ethical standards of the company.
- Design and Development of student database and specifying queries using set operations.
- Design and Development of sailor's database and specifying queries using different types of JOINs.
- Implementation of PL/SQL programs with Control Structures.
- Implementation of PL/SQL programs with Procedures.
- Implementation of PL/SQL programs with Function.
- Implementation of PL/SQL programs with Triggers.
- Creation and dropping of VIEWS.
- Relation R has eight attributes ABCDEFGH. Fields of R contain only atomic values. F = {CH
 -> G, A -> BC, B -> CFH, E -> A, F -> EG} is a set of functional dependencies (FDs) so that F+
 is exactly the set of FDs that hold for R. How many candidate keys does the relation R have?
- Apply various DCL and TCL constructs of SQL on Relational Database.

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SKILLS:

- ✓ Develop E-R model for real life applications.
- ✓ Design of relational databases for real world applications.
- ✓ Devise queries using relational algebra and SQL.
- ✓ Analyze transaction processing, concurrency control and recovery techniques

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Develop an E-R model for real life applications.	Apply	1	1,10
2	Design and normalize databases for real time applications.	Create	1	1,3
3	Devise queries using Relational Algebra and SQL.	Analyze	2	2
4	Express queries using database tools like Ora- cle, DB2, MYSQL.	Apply	2	5,10

TEXT BOOKS:

- 1. Ramez, Elmasri and Shamkant B. Navathe, "Fundamentals of Database Systems", 7th Edition, Pearson Education, 2016.
- 2. Raghu Rama Krishnan and Johannes Gehrke, "Database Management Systems", 3rd Edition, Tata McGraw Hill, 2013.

REFERENCE BOOKS:

- 1. Abraham Silberschatz, Henry F.Korth and S.Sudarshan, "Database System Concepts", 7th edition, Tata Mc Graw Hill,2019.
- 2. Allen G. Taylor "Database Development for Dummies" 1st Edition, 2011
- 3. C. J. Date "Introduction to Database Systems" 7th Edition, Addison Wesley, 2003.