Database Management System

Course Code: CIT210 Year: 2

Semester: III

Credit Hour: (3+1)

# Course Objectives:

The objective of this course is to provide the fundamental concepts and understanding of the database systems, theory and practices in design and implementation of DBMS.

# Course Outcomes:

At the end of the course, the students will be able to

* get the broad understanding of database and database management software
* have a high-level understanding of different models and allows to use these models as per user require- ments.
* to use different SQL commands in relational DBMS.
* apply different normal forms to design the database.

# Course Contents:

## Introduction 5hrs

Introduction to database and database management system, Characteristics of database management system and its applications, Data Abstraction and Data Independence, Database users and database administrator, Application Architecture, Basics of Database Language(DDL, DML, DCL).

## Data Model 6hrs

Different data model concepts; conceptual, physical, logical model, Types of model ; E-R model, Net- work/Hierarchical Model, Relational Model, Object Oriented Model, Entities, Entities Types and Entities Set, Strong Entity Sets and Weak Entity Sets, Relationship and Relationship Set, Attributes and Keys; Primary Key, Candidate Key, Super Key, E-R diagram, Reducing E-R diagram to tables, Generalization and Specialization, Aggregation, Mapping Cardinalities in E-R diagram , Extended E-R Features

## Relational Model 4hrs

Introduction to Relational Database, Database Schema and views, Relational Model Constraints, Re- lational Operations, Relational Algebra

1. **Relational Language and Database Constraints 11hrs** Brief Introduction to Structured Query Language, Features, SQL queries and sub queries, Joined and Derived Relations, Different DDL and DML Operations, Views, Modification of database, Joined con- ditions and categories, transaction control language(Commit, Rollback), Integrity Constraints, Domain Constraints, Referential Integrity in SQL, Assertions and Triggering.

## Relational Database Design 7hrs

Features of good database design, Concept of functional dependencies, Decomposition using func- tional dependencies, Concept of multi-valued and joined dependencies, Normalization, Different Nor- mal Forms(INF, 2NF, 3NF, 4NF, 5NF, BCNF).

1. **Transaction management and concurrency control 5hrs** Concept of Transaction, ACID properties, Transaction Atomicity and Durability, General Concept of Concurrency Control and Recovery, Serializability Concept, Lock based Protocols, Time Stamp based Protocols

## Recovery System 3hrs

Basic concept of Crash Recovery, Classification of failure, Recovery and Atomicity, Log based recovery, Shadow paging

## Advanced Database Model 4hrs

Extension of Relational Model, Object -Oriented Model, Distributed Model, NOSQL Systems, XML database

## Laboratory Work:

There will be minimum 10 laboratory exercises which covers basic operations using MS-Access or MySQL, Installing and working with database server, practicing DDL and DML commands,. Also, the students are required to perform the group project work.

# Textbooks:

1. Abraham Silberschatz, Henry F.Korth, S. Sudarshan “Database System Concepts”, Mc Graw Hill, 7th Edition
2. Ramez Elmasri and Shamkant B. Navathe , “Fundamentals of Database Systems”, Pearson Education Asia
3. Raghurama Krishnan, Jonannes Gehrke, “Database Management System”, TATA McGrawHill
4. Pramod Sadalage, Martin Fowler, NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Pearson