MCPC1004 DATABASE MANAGEMENT SYSTEMS (3-0-0)

Course Objective:

This course provides fundamental and practical knowledge on database concepts by means of organizing the information, storing and retrieve the information in an efficient and a flexible way from a well-structured relational model. This course ensures that every student will gain experience in creating data models and database design and be able to do the followings.

Focus the role of a database management system in an organization and construct ER Diagram.

Demonstrate basic database concepts, including the structure and operation of the relational data model and basic database queries using SQL.

Applying advanced database queries using Structured Query Language (SQL).

Evaluating logical database design principles and database normalization.

Demonstrate the concept of a database transaction, concurrency control, and data object locking and protocols.

Course Outcomes:

After successful completion of the course the student will be able to:
CO1: Understand database design principles.

CO2: Apply data Modelling using E-R diagrams.

CO3: Create refined data models using normalization.

CO4: Build database queries using Structured Query Language.

CO5: Understand the transaction management and concurrency control.

UNIT – 1
Introduction to DBMS: File system vs. DBMS, advantages of DBMS, storage data, queries, DBMS structure, Types of Databases – Hierarchical, Network, Relational, Key-Value, Object Oriented, XML DB Overview of File Structures in database, 3-schema architecture of DBMS, data independence, EF Codd Rule.

UNIT – 2
Data base Design: Data models, the importance of data models. E-R model: Entities, attributes and entity sets, relationship and relationship set, mapping cardinalities, keys, features of ER model, conceptual database design with ER model.
Relational model: Integrity constraints over relations and enforcement, querying relation data, logical database design, views, destroying/altering tables and views, Relational algebra, Extended relational algebra Operations.

UNIT- 3

Schema Refinement and Normal Forms: Introduction to Schema Refinement, Functional Dependencies, Reasoning about Functional Dependencies. Normal Forms, Properties of Decomposition, Normalization, different types of dependencies.

UNIT – 4

Basic SQL: Introduction to SQL, Basic SQL Queries: DML, DDL, DCL, and TCL
Structured Query Language (SQL): Select Commands, Union, Intersection, Except, Nested Queries, Aggregate Operators, Null values, Relational set operators, SQL join operators
Relational Algebra (RA): Selection, Projection, Set operations, joins
Relational Calculus (TRC, DRC): Tuple Relational Calculus, Domain Relational Calculus PL/SQL, Assertions, Triggers. **Introduction to Transaction Management**: ACID properties, Transactions and Schedules, Concurrent Execution of Transactions, Lock-Based Concurrency Control. Concurrency Control: 2PL, Serializability and Recoverability, Introduction to Lock Management, Lock Conversions, Dealing with Deadlocks, Concurrency control without locking. Crash Recovery: Aries, Recovering from a System Crash.
Advanced Database: OODB, WEB based DB, Data warehousing and Data mining.

Textbooks:
1. H.F. Korth, A. Silverschatz, Abraham," Database system concepts", Tata McGraw Hill Publication, 6e, 2011
2. Raghu Ramakrishna and Johannes Gehrke, Database Management Systems, McGraw-Hill, 3e, 2014

References:
1. D. Ullman, Principles of Database and Knowledge – Base Systems, Vol. 1, 1/e, Computer Science Press, 1990.
2. Ramez Elmasri, Shamkant B. Navathe, Fundamentals of Database Systems, Pearson Education, 7e, 2016.
3. Er. Rajiv chopra, "Database management systems, A Practical Approach", S. Chand Publishing