**COURSE 5:  DATABASE MANAGEMENT SYSTEM**

Theory                                   Credits: 3                                   3 hrs/week

**Course Objectives:**

* Graduates will have the expertise in analyzing real time problems and providing appropriate solutions related to Computer Science & Engineering.
* Graduates will have the knowledge of  fundamental principles and innovative technologies to succeed in higher studies and research.
* Graduates will continue to learn and to adapt technology developments combined with deep awareness of ethical responsibilities in profession.

**Course Outcomes:**

* An ability to apply Knowledge of computing and mathematics in Computer Science & Engineering.
* An ability to analyze a problem, identify and define the computing requirements appropriate to its solution.
* An ability to design, implement and evaluate a computer-based system to meet desired needs with appropriate societal considerations.
* An ability to conduct investigations, interpret data and provide conclusions in investigating complex problems related to Computer Science & Engineering.
* An ability to engage in continuing professional development and life-long learning.

UNIT- I

**Overview of Database Systems: Introduction**: Database system, Characteristics (Database Vs File System), Database Users, Advantages of Database systems, Database applications.

**Data Models:** Introduction; types of data models, Concepts of Schema, Instance and data independence; Three tier schema architecture for data independence; Database system structure, environment, Centralized and Client Server architecture for the database.

**Case Study**:
1. Describe  the differences between  Database systems and File based systems
2. Study about database models and their advantages and dis-advantages

**UNIT- II**

**Relational Model**: Introduction to relational model, Codd's rules,  concepts of domain, attribute, tuple, relation, constraints (Domain, Key constraints, integrity constraints) and their importance , concept of keys  (super key, candidate key, primary key, surrogate key, foreign key) , relational Algebra & relational calculus.

**Normalization**: Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency(1NF, 2NF and 3 NF), Boyce-codd normal form(BCNF)

**Case Study**:
Describe Relational model and normalization for database design

## UNIT - III:

**Entity Relationship Model**: Introduction, Representation of entities, attributes, entity set, relationship, relationship set, constraints, sub classes, super class, inheritance, specialization, generalization using ER Diagrams,

**BASIC SQL**: Database schema, data types, DDL operations (create, alter, drop, rename), DML operations (insert, delete, update), basic SQL querying (select and project) using where clause, arithmetic & logical operations, aggregation, grouping, ordering.

**Case Study**:
1. Examine issues in data storage and query processing using SQL.
2. Create, maintain and manipulate a relational database using SQL

## UNIT - IV

**SQL**: Nested queries/ sub queries, implementation of different types of joins, SQL functions(Date, Numeric, String, Conversion functions), Creating tables with relationship, implementation of key and integrity constraints, views, relational set operations , Transaction Control Language: commit, Rollback, Savepoint , DCL :Grant, Revoke

**Case Study**:
1. Try to convert some sample data to information and show how it can you be used in decision making.

## UNIT –V

**PL/SQL**: Introduction , Structure , Control Structures , Cursors , Procedure , Function , Packages , Exception Handling ,Triggers.

**Transaction processing Concepts** : Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for Serializability, Failure Classification, Storage, Recovery and Atomicity, Recovery algorithm.

**Case Study**:
Outline the role and issues in Transaction management of data such as efficiency, privacy, security.
Database management systems Text Books

- Database Management Systems, 3$^{rd}$ Edition , Raghurama Krishnan, Johannes Gehrke, TMH
- Database System Concepts,5$^{th}$ Edition , Silberschatz, Korth, TMH