### Name of Department: - Computer Science and Engineering

1. Subject Code:

TCS 503

1. Contact Hours: L:
2. Semester: V

Course Title:

T: P:

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**Data Base Management Systems**

1. Pre-requisite: TCS 302, TCS 404
2. Course Outcomes: After completion of the course students will be able to
   1. Understand the different issues involved in the design and implementation of a database system.
   2. Study the physical and logical database designs, database modeling, relational, hierarchical, and network models
   3. Understand and use data manipulation language to query, update, and manage a database
   4. Develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency,
   5. Design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.
   6. Evaluate a business situation and designing & building a database application
3. Detailed Syllabus

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| **UNIT** | **CONTENTS** | **Contact**  **Hrs** |
| **Unit – I** | **Introduction:** An overview of DBMS; Advantages of using DBMS approach; Database systems vs File Systems, 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; Classification of  Database Management systems. | **9** |
| **Unit - II** | **Entity-Relationship Model:** Using High-Level Conceptual Data Models for Database Design; An Example Database Application; Entity Types, Entity Sets, Attributes and Keys; Relationship types, Relationship Sets, Roles and Structural Constraints; Weak Entity Types; Refining the ER Design; ER Diagrams, Naming Conventions and Design Issues; Relationship types of  degree higher than two. | **9** |
| **Unit – III** | **Relational Model and Relational Algebra :** Relational Model Concepts; Relational Model Constraints and Relational Database Schemas; Update Operations, Transactions and dealing with constraint violations; Unary Relational Operations: SELECT and PROJECT; Relational Algebra Operations from Set Theory; Binary Relational  Operations : JOIN and DIVISION; Additional Relational Operations; | **11** |

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|  | Examples of Queries in Relational Algebra; Relational Database Design Using ER- to-Relational Mapping.  **SQL – 1:** SQL Data Definition and Data Types; Specifying basic constraints in SQL; Schema change statements in SQL; Basic queries in SQL; More complex SQL Queries.  Insert, Delete and Update statements in SQL; Specifying constraints as Assertion and Trigger; Views (Virtual Tables) in SQL; Additional features of SQL; Database programming issues and techniques; Embedded SQL, Dynamic SQL; Database stored procedures. |  |
| **Unit – IV** | **Database Design – 1:** Informal Design Guidelines for Relation Schemas; Functional Dependencies; Normal Forms Based on Primary Keys; General Definitions of Second and Third Normal Forms; Boyce-Codd Normal Form  Properties of Relational Decompositions; Algorithms for Relational Database Schema Design; Multivalued Dependencies and Fourth Normal  Form; Join Dependencies and Fifth Normal Form; Inclusion Dependencies; Other Dependencies and Normal Forms | **9** |
| **Unit – V** | **Transaction Management:** The ACID Properties; Transactions and Schedules; Concurrent Execution of Transactions; Lock- Based Concurrency Control; Performance of locking; Transaction support in SQL; Introduction to crash recovery; 2PL, Serializability and Recoverability; Lock  9Management; Log Files; Checkpointing; Recovering from a System Crash; Media Recovery | **9** |
|  | **Total** | **47** |

### Text Books:

* 1. Elmasri and Navathe: “Fundamentals of Database Systems”, 5th Edition, Pearson Education, 2007.
  2. Raghu Ramakrishnan and Johannes Gehrke: “ Database Management Systems”, 3rd Edition, McGraw-Hill, 2003.