



CS022003

Database Management Systems

L-T-P-Cr:

3-0-2-4

Pre-requisites: None

Objectives/Overview:

- To provide fundamental knowledge of database concepts
- To emphasize the understanding of information concepts and to realize those concepts by using the different relational data models, database architectures, data normalization and also to optimize the queries
- To provide an understanding of new developments and trends in the database.
- To become proficient in constructing data models and using SQL to interface to both multi-user DBMS packages and desktop DBMS packages

Course Outcomes:

At the end of the course, a student should:

Sl. No.	Outcome	Mapping to POs
1.	Learn a broad understanding of database concepts and architecture. Learn the difference between file systems by enumerating the features provided by database systems and describing each in both function and benefit.	PO1
2.	Learn to derive an information model expressed in the form of an entity relation diagram. Transform an information model into a relational database schema and use a data definition language and/or utility to implement the schema using a DBMS.	PO1, PO2, PO3
3.	Learn to formulate using relational algebra, relational calculus, SQL, and NoSQL	PO3, PO5
4.	Learn commands of SQL to create tables and indexes, insert/update/delete data, set operations, aggregate functions, join relations and query data in a relational DBMS, and solutions to a broad range of query problems.	PO3, PO11
5.	Learn constraints and how to apply constraints within relations such as domain constraints, entity integrity constraints, referential constraints, triggers, and assertions.	PO1
6.	Learn to understand the functional dependencies and normal forms and how to apply such knowledge to the normalization of a database.	PO1, PO6
7.	Learn the basics of query evaluation techniques and query optimization.	PO3, PO11, PO12
8.	Learn the basic issues of transaction processing, concurrency control, and Locking Protocols	PO3, PO4

UNIT I: Introduction**Lectures: 4**

Introduction: Purpose of database systems, View of data, data models, & interface, database language, Transaction management, Storage management, Database administrator, Database users, Overall system structure, Classification of Database Management System, Three- Schema Architecture.

UNIT II: Data Modeling**Lectures: 6**

Entity- Relationship Model, Basic concepts, design issues, Mapping constraints, keys, E-R diagram, Weak entity sets, Extended E-R features, Design of an E-R database schema, Reduction of an E-R schema to tables.

UNIT III: Relational Model**Lectures: 6**

Structure of relational databases, Relational algebra, Tuple relational calculus, Domain relational calculus, Extended relational algebra operations, Modification of the database and view, SQL, NoSQL and Others.

UNIT IV: Relational Languages**Lectures: 4**

Background, Basic structure, set operations, Aggregate functions, Null values, Nested sub-queries, Derived database, Joined relations, DOL embedded SQL and other SL features, Query-by-example, Datalog.

UNIT V: Integrity Constraints**Lectures: 2**

Domain constraints, Referential integrity, Assertions, Triggers and Functional dependencies.

UNIT VI: Relational Database Design**Lectures: 8**

Pitfalls in relational database design, Decomposition, Normalization using functional, Multi-valued and Join dependencies, Domain key normal form and Alternative approaches to database design.

UNIT VII: Query Processing**Lectures: 6**

Overview, Catalog information for cost estimation, Measures of query cost, Selection operation, sorting, join operation, other operations, Evaluation of expressions, Translating SQL query into Relational Algebra, Transformation of relational expressions, Query Optimization.

UNIT VIII: Transactions**Lectures: 6**

Transaction concept, Transaction state, System log, commit point, Desirable Properties of a Transaction, concurrent executions, Serializability, Recoverability, Implementation of isolation, Transaction definition in SQL, Testing for serializability, and Locking Protocols.

Text/Reference Books

- 1) *Fundamental of Database Systems*. Elmasri, Navathe, Somayajulu, and Gupta, Pearson Education.
- 2) *Database System Concepts*, Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw Hill.
- 3) *Database Systems, A Practical Approach to Design, Implementation & Management*, Thomas Connolly, Carolyn Begg, Pearson Education.

4) *Database management System*. Rajesh Narang, PHI.