

NIRMA UNIVERSITY
Institute of Technology
B. Tech Computer Science and Engineering
Semester IV

L	T	P	C
3	0	2	4

Course Code	2CS402
Course Title	Database Management Systems

Course Outcomes (COs):

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

1. relate various aspects of the relational database like models, functional dependencies and normalization
2. evaluate various storage and retrieval methods to correlate with relational model through appropriate indexing
3. interpret transaction processing, concurrency and recovery protocols for effective database management.

Syllabus

**Teaching
hours**

Unit I

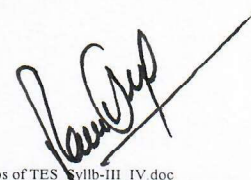
05

Overview and Architecture of Database Systems: Purpose of database, File System versus DBMS, Advantages of a DBMS, Describing and Storing Data in a DBMS: The Relational Model, Levels of Abstraction in a DBMS, Data Independence. Multi-level architecture, Client/Server architecture, Mapping, Database users and Administrators.

Unit II

13

Relational Database: Concepts and Design: Relational Model, Database Schema, Schema Diagrams, Relational Query Languages, Relational Operations. Relational Data Integrity: Keys: Candidate Keys and Constraints: Candidate Keys, Primary Keys and Alternate Keys, Foreign Keys and rules, Null value concept and other integrity constraints. Relational Operators: Relational Algebra: Closure, set operations, special relational operations, algebra for update operations, Relational Comparisons. Relational Calculus: Tuple and Domain-Oriented relational calculus. ER Diagram, ER to Relational Database Design



Unit III

05

SQL Concepts: Basics of SQL, DDL,DML,DCL, structure – creation, alteration, defining constraints – Primary key, foreign key, unique, not null, check, IN operator, Functions - aggregate functions, Built-in functions – numeric, date, string functions, set operations, sub-queries, correlated sub-queries, Use of group by, having, order by, join and its types, Exist, Any, All , view and its types. transaction control commands – Commit, Rollback, Savepoint.

Unit IV

07

Normalization: Functional Dependencies: Introduction, Basic definitions, Trivial and nontrivial dependencies, Closure of a set of dependencies, Closure of a set of attributes, Irreducible sets of dependencies. Introduction to normalization, Non loss decomposition and functional dependencies, Dependency preservation, first, second and third forms, Boyce / Codd normal form, higher level normal forms.

Unit V

07

Data Storage and Querying: Storage and File Structure, Indexing and Hashing, Query Processing and Optimization.

Unit VI

08

Transaction Management: Transactions: Transaction concepts, transaction model, transaction atomicity and durability, serializability. Recovery: Transaction recovery, system recovery, media recovery, two phases commit, SQL support. Database Security. Concurrency: Three concurrency problems, locking, deadlock, serializability, levels of isolation, intent locking, SQL support. Introduction to NOSQL and Streaming SQL

Self-Study:

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Laboratory Work:

Above concepts are to be implemented using SQL and PL/SQL and at least 10 experiments are to be carried out.

Suggested Readings^:

1. Silberschatz, Korth, Sudarshan ,Database System Concepts, McGraw-Hill computer science series
2. C J Date, An introduction to Database Systems, Addison-Wesley
3. Nilesh shah, Database System using Oracle, PHI.
4. RamezElmasri&Shamkant B. Navathe, Fundamentals of Database Systems, Addison-Wesley
5. Hector Gracia-Molina, Jeffrey D. Ullman, and Jennifer Widom, Database System Implementation, Pearson.
6. Ivan Bayross, SQL, PL/SQL, BPB Publications
7. Scott Urman, Oracle9i PL/SQL programming, McGraw-Hill

L = Lecture, T = Tutorial, P = Practical, C = Credit ^ this is not an exhaustive list