AIT 212   RELATIONAL DATABASE MANAGEMENT SYSTEM   3 (2+1)

Objective(s)
The objective of the course is to present an introduction to database management systems, with an emphasis on how to create, organize, retrieve and update information efficiently and effectively from the database. At the end of this course, the student will get acquainted about the creation of relational databases include storing, retrieving, updating and displaying data using Structured Query Language (SQL) integrated into Stored Procedures, Functions and Triggers.

UNIT I – INTORDUCTION TO DBMS
Introduction of DBMS, Applications of DBMS, Purpose of database, Data, Independence, Database System architecture - levels, Mappings, Database, users and DBA.

UNIT II – RELATIONAL AND E-R MODEL
Structure of relational databases, Domains, Relations, Relational algebra – fundamental operators and syntax, Relational algebra Queries, Tuple relational calculus, Basic concepts of E-R Model, Design process, constraints, Keys, Design issues, E-R diagrams, Weak entity sets, Extended E-R features – generalization, specialization, aggregation, reduction to E-R database schema.

UNIT III – RELATIONAL DATABASE DESIGN AND QUERY PROCESSING
Functional Dependency – definition, trivial and non-trivial FD, closure of FD set, closure of attributes, irreducible set of FD, Normalization – 1NF, 2NF, 3NF, Decomposition using FD-dependency preservation, BCNF, Multi-valued dependency, 4NF, Join dependency and 5NF, Overview of query processing, Measures of query cost, Selection operation, Sorting, Join, Evaluation of expressions, Transformation of relational expressions, Estimating statistics of expression results, Evaluation plans, Materialized view

UNIT IV – TRANSACTION MANAGEMENT AND SECURITY
Transaction concepts, Properties of transactions, Serializability of transactions, Testing for serializability, System recovery, Two-Phase Commit protocol, Recovery and Atomicity, Log-based recovery, Concurrent executions of transactions and related problems, Locking mechanism, Solution to concurrency related problems, Deadlock, , Two-phase locking protocol, Isolation, Intent locking, Introduction to security, Discretionary access control, Mandatory Access Control, Data Encryption.

UNIT V – SQL AND PL/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, Cursors, Stored Procedures, Stored Function, Database Triggers.

Reference Book(s)

w.e.f. 2022-23

1. Database System Concepts, Silberschatz, Korth and Sudarshan, McGraw Hill.
2. An introduction to Database Systems, C J Date, Addition-Wesley.
3. SQL,PL/SQL The programming Language of Oracle, Ivan Bayross – BPB Publications
4. Oracle PL/SQL Programming, Steven Feuerstein, O'Reilly Media.
5. Understanding SQL by Martin Gruber, BPB
6. Oracle – The complete reference – TMH /oracle press

Practical(s)
1. Installation of RDBMS
2. Database and table creation with constraints
3. Insert records into the table
4. Practical based on SELECT, GROUP BY and Having, ORDER BY Clause
5. Practical based on ALTER and DROP table
6. Practical based on operators and functions
7. Practical based on cursor and trigger
8. Practical based on PL/SQL Blocks