PE-CS-CAP-303

DATABASE TECHNOLOGIES

Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
3	0	0	3	70	30	100	3 Hrs.

Purpose

The course aims to provide students with fundamental and advanced knowledge of database technologies, focusing on data modeling, database design, SQL, relational models, normalization, and dependencies to build efficient, secure, and scalable database systems.

Course Outcomes (CO)

CO1	Understand the basic concepts of data, information, database systems, and the roles of database users.
CO2	Analyze and design data models using ER diagrams and apply integrity constraints.
CO3	Gain proficiency in SQL and relational algebra for database manipulation.
CO4	Apply normalization techniques and handle functional/multivalued dependencies in relational models.

Lecture Plan

S. No.	Lecture No.	Topic	Subtopics
1	L1	Basic Concepts	Data, Information, Records, Files, Schema and Instance
2	L2	File Based Approach	Limitations of File Based Approach
3	L3	Database Approach	Characteristics of Database Approach, Database Management System (DBMS)
4	L4	DBMS Functions	DBMS Functions and Components, Database Interfaces
5	L5	DBMS Environment	Advantages and Disadvantages of DBMS

6	L6	Database Users	Data and Database Administrator, Roles and Responsibilities
7	L7	Database Designers	Applications Developers, Database Administrators
8	L8	System Architecture	1-Tier, 2-Tier & 3-Tier Architecture
9	L9	Levels of Architecture	External, Conceptual, and Internal Levels, Schemas, Mappings
10	L10	Data Independence	Logical and Physical Data Independence
11	L11	Data Models	Hierarchical, Network, and Relational Data Models
12	L12	Entity Relationship Model	Entity, Entity Sets, Entity Type, Attributes, Types of Attributes
13	L13	Keys	Primary, Candidate, Foreign, Super Keys
14	L14	Constraints	Integrity Constraints
15	L15	ER Diagram Design	Designing ER Diagram, Symbolic Notation
16	L16	SQL Basics	Meaning, Purpose, Need, Data Types
17	L17	SQL Components	DDL, DML, DCL, TCL
18	L18	SQL Operations	Select, Project, Join, Union, Intersection, Difference, Cartesian Product
19	L19	SQL Queries	Sub-Queries, Views, Indexes
20	L20	Constraints in SQL	Constraints and their implementation
21	L21	Relational Algebra	Basic Operations, Examples
22	L22	Relational Calculus	Tuple Relational Calculus, Domain Relational Calculus
23	L23	Relational Model	Functional

			Dependency, Characteristics
24	L24	Functional Dependency Rules	Inference Rules, Types of Functional Dependencies
25	L25	Normalization	Need and Benefits, 1NF, 2NF
26	L26	Normalization (contd.)	3NF, BCNF
27	L27	Advanced Normal Forms	4NF, 5NF, Domain Key Normal Form
28	L28	Multivalued Dependencies	Definition, Examples
29	L29	Join Dependencies	Concept and Applications
30	L30	Revision & Case Study	Database Design Example integrating ER, SQL, Normalization