Tulsiramji Gaikwad-Patil College of Engineering and Technology

Wardha Road, Nagpur-441 108

NAAC Accredited (A+ Grade)

Third Year (Semester-V) B. Tech. Information Technology

BIT33521: - Introduction to Database Systems

Teaching Scheme		Examination Scheme	
Theory	**3 Hrs/week**	CT-I	15 Marks
Tutorial	**-**	CT-II	15 Marks
Total Credits	**3**	CA	10 Marks
		ESE	60 Marks
		Total	100 Marks
		Duration of ESE: 3 Hrs	

Course Objectives:

1.	To introduce the fundamentals of database systems and the Entity-Relationship (ER) model for conceptual database design.
2.	To explain the Relational Model and Relational Calculus (TRC) as formal foundations for querying data.
3.	To develop proficiency in SQL for defining, manipulating, and querying relational databases.
4.	To explain indexing techniques and query processing strategies for efficient database access.
5.	To introduce normalization theory and transaction processing for ensuring data integrity and consistency.

Course Contents

Unit I	**Introduction to DBMS and ER Model:** Introduction to Database Systems, Database System Architecture, Data Models and Data Independence, File System vs. Database System. Entity-Relationship Model: Entities, Attributes, and Relationships. ER Diagrams, Keys, Mapping Cardinalities. Reduction of ER Diagram to Relational Schema
Unit II	**Relational Model and Relational Calculus:** Structure of Relational Databases, Relational Algebra Operations. Integrity Constraints, Keys (Primary, Foreign, Candidate). Relational Calculus: Tuple Relational Calculus (TRC), Domain Relational Calculus (DRC). Equivalence of Relational Algebra and Calculus
Unit III	**SQL:** Basic Structure of SQL Queries, Data Definition Language (DDL), Data Manipulation Language (DML). Set Operations, Aggregate Functions, Nested Subqueries. Joins, Views, Integrity Constraints in SQL, Triggers and Assertions
Unit IV	**Indexing and Query Processing:** Basic Concepts of Indexing, Ordered Indices, B+ Tree Index Files, Hash-Based Indexing. Query Processing Overview, Measures of Query Cost. Evaluation of Relational Algebra Expressions, Query Optimization Techniques

Unit V	**Normal Forms and Transaction Processing:** Functional Dependencies, Normalization: 1NF, 2NF, 3NF, BCNF. Lossless Decomposition and Dependency Preservation. Transaction Concept, ACID Properties, Transaction States. Concurrency Control, Serializability, Recovery Systems
Text Books	
T.1	Database System Concepts by Abraham Silberschatz, Henry F. Korth, S. Sudarshan
Reference Books	
R.1	Fundamentals of Database Systems by Ramez Elmasri and Shamkant B. Navathe
Useful Links	
1	https://onlinecourses.nptel.ac.in/e-learning/preview/noc20_cs03

	Course Outcomes	CL	Class Sessions
BIT33521.1	**Describe** database system architecture and design ER models for real-world scenarios.	2	9
BIT33521 .2	**Explain** the Relational Model and formulate queries using Relational Calculus.	2	9
BIT33521.3	**Classify** SQL queries for database definition, manipulation, and retrieval.	2	9
BIT33521.4	**Illustrate** indexing structures and query processing strategies for efficient data access.	2	9
BIT33521.5	**Discuss** normalization techniques and analyze transaction processing for data integrity and consistency.	2	9