GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3130703
Semester – III
Subject Name: Database Management Systems

Type of course: Core

Prerequisite: Basic knowledge of Computer Programming

Rationale:

Database is an integral part of real life application system. The course will enable student understand the different issues involved in the design and implementation of a database system. Student will learn the physical and logical database designs, database modeling, relational, hierarchical, and network models. Student will learn to use data manipulation language to query, update, and manage a database. Student will understand essential DBMS concepts such as: database security, integrity, concurrency, storage strategies etc. The students will get the hands on practice of using SQL and PL/SQL concepts.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
4	0	2	5	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	**Database system architecture:** Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML).	03	05
2	**Data models:** Entity-relationship model, network model, relational and object oriented data models, integrity constraints, data manipulation operations.	06	12
3	**Relational query languages:** Relational algebra, Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS - MYSQL, ORACLE, DB2, SQL server.	04	08
4	**Relational database design:** Domain and data dependency, Armstrong's axioms, Normal forms, Dependency preservation, Lossless design.	05	10
5	**Query processing and optimization:** Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization	06	10

	algorithms.		
6	**Storage strategies:** Indices, B-trees, hashing.	**04**	07
7	**Transaction processing:** Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp based schedulers, Multi-version and optimistic Concurrency Control schemes, Database recovery.	**06**	15
8	**Database Security:** Authentication, Authorization and access control, DAC, MAC and RBAC models, Intrusion detection, SQL injection.	**04**	07
9	**SQL Concepts :** Basics of SQL, DDL,DML,DCL, structure – creation, alteration, defining constraints – Primary key, foreign key, unique, not null, check, IN operator, aggregate functions, Built-in functions –numeric, date, string functions, set operations, sub-queries, correlated sub-queries, join, Exist, Any, All , view and its types., transaction control commands.	**10**	18
10	**PL/SQL Concepts :** Cursors, Stored Procedures, Stored Function, Database Triggers	**04**	08

Suggested Specification table with Marks (Theory): (For BE only)

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
15	**15**	**15**	**10**	**10**	**05**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. "Database System Concepts", 6th Edition by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill.
2. "Fundamentals of Database Systems", 7th Edition by R. Elmasri and S. Navathe, Pearson
3. "An introduction to Database Systems", C J Date, Pearson.
4. "Modern Database Management", Hoffer , Ramesh, Topi, Pearson.
5. "Principles of Database and Knowledge – Base Systems", Vol 1 by J. D. Ullman, Computer Science Press.

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6. "Understanding SQL", Martin Gruber, BPB
7. "SQL- PL/SQL", Ivan bayross

Course Outcomes:

Sr. No.	CO statement	Marks % weightage
CO-1	Recognize the various elements of Database Management Systems	10
CO-2	Given a problem statement, identify the entities and their relations and draw an E-R diagram and design database applying normalization	20
CO-3	Solve the given problem using Relational Algebra, Relational Calculus, SQL and PL/SQL	40
CO-4	Apply and relate the concepts of transaction, concurrency control, recovery and security in database	20
CO-5	Recognize the purpose of query processing, optimization and demonstrate the SQL query evaluation	10

List of Experiments:

1. To study DDL-create and DML-insert commands
2. Create table and insert sample data in tables.
3. Perform queries involving predicates LIKE, BETWEEN, IN etc.
4. To Perform various data manipulation commands, aggregate functions and sorting concept on all created tables.
5. To study Single-row functions.
6. Displaying data from Multiple Tables (join)
7. To apply the concept of Aggregating Data using Group functions.
8. To solve queries using the concept of sub query.
9. To apply the concept of security and privileges
10. To study Transaction control commands
11. Write Cursor
12. Write Trigger

Major Equipment:

Computer system with DBMS system

List of Open Source Software/learning website:

1. **https://www.tutorialspoint.com/dbms/**
2. **https://www.w3schools.com/sql/**
3. **https://www.codecademy.com/learn/learn-sql**
4. **https://in.udacity.com/**