



GUJARAT TECHNOLOGICAL UNIVERSITY
Syllabus for Bachelor of Vocation (B.Voc), 1st Semester
Branch: Software Development
Subject Name: Database Management System
Subject Code: 21110201

**With effective
from academic
year 2021-22**

Type of course: Compulsory

Prerequisite: (1) Elementary knowledge about computers including some experience using UNIX or Windows. (2) Computer Programming & Utilization (3) Knowledge about data structures and algorithms, corresponding to the basic course on Data Structures and Algorithms.

Rationale: A Database Management System (DBMS) is designed to manage a large body of information. Data management involves both defining structures for storing information and providing mechanisms for manipulating the information. In addition, the database system must provide for the safety of the stored information, despite system crashes or attempts at unauthorized access. If data are to be shared among several users, the system must avoid possible anomalous results due to multiple users concurrently accessing the same data.

Examples of the use of database systems include airline reservation systems, company payroll and employee information systems, banking systems, credit card processing systems, and sales and order tracking systems.

A major purpose of a database system is to provide users with an abstract view of the data. That is, the system hides certain details of how the data are stored and maintained. Thereby, data can be stored in complex data structures that permit efficient retrieval, yet users see a simplified and easy-to-use view of the data. The lowest level of abstraction, the physical level, describes how the data are actually stored and details the data structures. The next-higher level of abstraction, the logical level, describes what data are stored, and what relationships exist among those data. The highest level of abstraction, the view level, describes parts of the database that are relevant to each user; application programs used to access a database form part of the view level.

Teaching and Examination Scheme:

Teaching Scheme			Credit	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
			ESE (E)	PA(M)	ESE(V)	PA(I)		
3	0	0	3	50	0	0	0	50

L- Lectures; P- Practical; OJT- On Job Training; C- Credit; ESE- End Semester Examination; PA- Progressive Assessment

Content:

Sr. No.	Practical / Hands on Exercise	Hrs.
1.	Unit 1: Introductory concepts of DBMS: Introduction and applications of DBMS, Purpose of data base, Data, Independence, Database System architecture- levels, Mappings, Database, users and DBA.	02



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2.	Relational Model: Structure of relational databases, Domains, Relations, Relational algebra – fundamental operators and syntax, relational algebra queries, tuple relational calculus.	03
3.	Entity-Relationship model: Basic concepts, 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.	05
4.	Relational Database design: 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.	05
5.	Query Processing & Query Optimization: Overview, measures of query cost, selection operation, sorting, join, evaluation of expressions, transformation of relational expressions, estimating statistics of expression results, evaluation plans, materialized views.	05
6.	Transaction Processing: 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.	09
7.	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.	10
8.	PL/SQL Concepts : Cursors, Stored Procedures, Stored Function, Database Triggers.	03
	Total	42

Suggested Specification Table with Marks(Theory):

Distribution of Theory Marks				
R Level	U Level	A Level	N Level	E Level
5	25	25	10	5

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

Reference Books:

1. An introduction to Database Systems, C J Date, Addition-Wesley.



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2. Database System Concepts, Abraham Silberschatz, Henry F. Korth & S. Sudarshan, McGraw Hill.
3. Understanding SQL by Martin Gruber, BPB
4. SQL- PL/SQL by Ivan bayross
5. Oracle – The complete reference – TMH /oracle press

Course Outcomes:

CO1: Recognize the various elements of Database Management Systems

CO2: Given a problem statement, identify the entities and their relations and draw an E-R diagram and design database applying normalization

CO3: Solve the given problem using Relational Algebra, Relational Calculus, SQL and PL/SQL

CO4: Apply and relate the concepts of transaction, concurrency control, recovery and security in database

CO5: Recognize the purpose of query processing, optimization and demonstrate the SQL query evaluation