



**B. Tech.
Semester III**

DATABASE MANAGEMENT SYSTEM

CE4012

Effective from July-2022

Syllabus version: 1.00

Subject Code	Subject Title	Teaching Scheme			
		Hours		Credits	
		Theory	Practical	Theory	Practical
CE4012	Database Management System	3	4	3	2

Subject Code	Subject Title	Theory Examination Marks		Practical Examination Marks	Total Marks
		Internal	External	CIE	
CE4012	Database Management System	40	60	100	200

Objectives of the course:

- To develop understanding about primary concepts of database management system and database design.
- To unfold Structured Query Language (SQL) along with its applications.

Course outcomes:

Upon completion of the course, the student shall be able to,

C01: Recognize the need for a database management system. Construct relational model and formulate relational algebra queries

C02: Understand and apply Structured Query Language

C03: Design Entity Relationship model and Understand concept of normalization

C04: Understand and use concepts of Storage, Indexing and Hashing

C05: Use query processing and understand the significance of query optimization

C06: Understand the concept transaction and ACID properties

Sr. No.	Topics	Hours
Unit – I		
1	Introduction to DBMS and Relational Model: Introduction, Purpose of database systems, View of data, Database languages, File system v/s Database system, Data independence, Relational databases, Database Design, Data storage and querying, Transaction management, Database architecture, Database users and administrators, Structure of relational databases, Database schema, Keys, Schema diagrams, Relational query languages, Relational operations.	8

Unit – II		
2	Structured Query Language (SQL): Introduction, SQL data definition, Basic structure of SQL queries, Additional basic operations, Set operations, Null values, Aggregate functions, Nested subqueries, Modification of the database, Join expressions, Views, Transactions, Integrity constraints, SQL data types and schemas, Accessing SQL from a programming language, Functions and Procedures, Triggers, Recursive queries, Advanced aggregate features, OLAP.	8
Unit – III		
3	The Entity-Relationship (ER) Model: Introduction to ER model, Constraints, removing redundant attributes in Entity sets, ER diagrams, Reductions to relational schemas, Issues in ER design, Extended ER features, Alternative notations for modeling. Relational-Database Design: Features of good relational designs, Atomic domains and first normal form, Functional Dependencies and decomposition, Functional dependency theory – Closure of attribute sets, Lossless and lossy decompositions, Algorithms for Decomposition – BCNF, 3NF, Comparison between BCNF and 3NF, 4NF, More normal forms.	7
Unit – IV		
4	Data Storage: Overview of physical storage Media, RAID, File organization, Organization of records in files, Data dictionary storage, Database buffer. Indexing and Hashing: Introduction, Ordered indices, B ⁺ tree index file, B ⁺ tree extensions, Multiple-Key access, Static hashing, Dynamic hashing, Bitmap indices, Index definition in SQL.	6
Unit – V		
5	Query Processing and Query Optimization: Introduction, Measures of query cost, Selection operations, Sorting, Join operation, Other operations, Evaluation of expressions, Transformation of relational expressions, Materialized views.	8
Unit – VI		
6	Transaction Management: Transaction concept, Simple transaction model, Storage structure, ACID properties, Serializability, Transaction isolation levels, Implementation of isolation levels, Transactions as SQL statements, locking based	8

	protocols, Timestamp based protocols, Validation based protocols, Recovery, Logging methods.	
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Sr. No.	Database Management System (Practical)	Hours
1	To implement Basic SQL commands and to access & modify Data using SQL. Create and populate database using Data Definition Language (DDL) and DML Commands	4
2	Identify the case study and detailed statement of the problem. Design an Entity-Relationship (ER) / Extended Entity-Relationship (EER) Model.	2
3	Mapping ER/EER to Relational schema model.	2
4	To implement Integrity Constraints. Queries (along with sub Queries)	2
5	Queries using Conversion functions (to_char, to_number and to_date), string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), date functions (Sysdate, next_day, add_months, last_day, months_between, least, greatest, trunc, round, to_char, to_date)	2
6	To implement Joins and Views.	4
7	To Perform Simple queries, string manipulation operations. Nested queries and Complex queries.	4
8	Create a simple PL/SQL program which includes the declaration section, executable section and exception –Handling section (Ex. Student marks can be selected from the table and printed for those who secured first class and an exception can be raised if no records were found) ii. Insert data into the student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.	4
9	Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers	4
10	Create a table and perform the search operation on the table using indexing and non-indexing techniques.	4
11	Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES	4
12	To implement B-trees/B+ trees and Indexing.	8
13	Case study on recent databases and applications.	16

Text book:

1. Abraham Silberschatz, Henry F. Korth and S. Sudarshan “Database System Concepts”, McGraw Hill.

Reference books:

1. C. J. Date - “An Introduction to Database Systems”, Addison Wesley.
2. Ivan Bayross - “SQL, PL/SQL - The Programming Language of Oracle”, BPB Publications”.
3. Raghu Ramakrishnan and Johannes Gehrke, “Database Management Systems”, TMH.

Course objectives and Course outcomes mapping:

- To develop understanding about primary concepts of database management system and database design: C01, C03, C04, C05 and C06
- To unfold Structured Query Language (SQL) along with its applications: C01 and C02

Course units and Course outcomes mapping:

Unit No.	Unit Name	Course Outcomes					
		C01	C02	C03	C04	C05	C06
1	Introduction to DBMS and Relational Model	✓					
2	Structured Query Language (SQL)		✓				
3	Database Design			✓			
4	Data Storage				✓		
5	Query Processing					✓	
6	Transaction Management						✓

Programme outcomes:

- PO 1: Engineering knowledge: An ability to apply knowledge of mathematics, science, and engineering.
- PO 2: Problem analysis: An ability to identify, formulates, and solves engineering problems.
- PO 3: Design/development of solutions: An ability to design a system, component, or process to meet desired needs within realistic constraints.
- PO 4: Conduct investigations of complex problems: An ability to use the techniques, skills, and modern engineering tools necessary for solving engineering problems.
- PO 5: Modern tool usage: The broad education and understanding of new engineering techniques necessary to solve engineering problems.
- PO 6: The engineer and society: Achieve professional success with an understanding and appreciation of ethical behavior, social responsibility, and diversity, both as individuals and in team environments.
- PO 7: Environment and sustainability: Articulate a comprehensive world view that integrates diverse approaches to sustainability.
- PO 8: Ethics: Identify and demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships, and field work.

- PO 9: Individual and team work: An ability to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO 10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give/receive clear instructions.
- PO 11: Project management and finance: An ability to demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- PO 12: Life-long learning: A recognition of the need for, and an ability to engage in life-long learning.

Programme outcomes and Course outcomes mapping:

Programme Outcomes	Course Outcomes					
	CO1	CO2	CO3	CO4	CO5	CO6
P01	✓	✓	✓			
P02	✓	✓	✓	✓		
P03	✓	✓				
P04						✓
P05		✓	✓	✓	✓	
P06						
P07						
P08						
P09						
P010			✓		✓	
P011				✓	✓	
P012	✓	✓	✓			✓