22CA1T2: DATABASE MANAGEMENT SYSTEMS

Course Name	Database Management Systems	L	T	P	C	CIA	SEE	TM
Course Code	22CA1T2	4	0	0	4	30	70	100
Year of Introduction: 1991	Year of Offering: 2022	Year of Revision: 2022			Percentage of Revision: 10			
L-Lecture, T-Tutorial, P-Practical, C-Credits, CIA-Internal Marks, SEE-External Marks, TM-Total Marks								

Course Description and Purpose:
Database Management Systems is a course that illustrates basic concepts of *Databases and Database Users*, *Database System Architecture*, *ER & EER Relationship Modeling*, *Structured Query Language*, *Relational Algebra and Relational Calculus*, *Functional Dependencies and Normalization for Relational Databases*, *Transaction Processing Concepts*, *Concurrency Control Techniques* and *Emerging Database Technologies and Applications.*

Course Objectives:
This course will help enable the students t o understand, learn and develop a various *Relational Data Models*, Querying, ER *& EER Modeling*, *Relational Algebra & Calculus*, *Functional Dependencies and Normalization*, *Transaction Processing*, *Concurrency Control* and *Emerging Database Technologies and Applications.*

Specific objectives include:
✓ To understand basic concepts of *Database and Database Users*, *Database Architecture.*
✓ To understand *ER*, *EER Modelling* and *Relational Algebra and Relational Calculus.*
✓ To learn the basics of *Functional Dependencies and Normalization* for Relational Databases.
✓ To learn *Transaction Processing* and *Concurrency Control Techniques.*
✓ To understand the *Structured Query Language* and *Emerging Database Technologies* and Applications:

Course Learning Outcomes:
Upon successful completion of the course, the student will be able to:
CO1: Understand basic concepts of *Database and Database Users*, *Database Architecture.*
CO2: Understand *ER*, *EER Modeling* and *Relational Algebra and Relational Calculus.*
CO3: Learn the basics of *Functional Dependencies and Normalization* for Relational Databases.
CO4: Learn *Transaction Processing* and *Concurrency Control Techniques.*
CO5: Understand the *Structured Query Language* and *Emerging Database Technologies and Applications.*

UNIT I (12 Hours)
Database and Database Users: Introduction, Characteristics of the Database Approach, Actors on the Scene, Workers behind the Scene, Advantages of the using the DBMS Approach.
Database System Concepts and Architecture: Data Models, Schemas and Instances, Three Schema Architecture and Data Independence, Database Languages and Interfaces, Centralized and Client/Server Architecture for DBMS, Classification of Database Management Systems.

UNIT II (12 Hours)
Data Modeling Using the ER Model: Conceptual Data Models, Entity Types, Entity Sets, Attributes and Keys, Relationship Types, Relationship Sets, Roles and Structural Constraints, Weak Entity Types, Relationship Types of Degree Higher than Two, Refining the ER Design for the COMPANY Database.
The Enhanced Entity-Relationship Model: Sub Classes, Super Classes and Inheritance, Specialization and Generalization, Constraints and Characteristics of Specialization and Generalization.
The Relational Algebra and Relational Calculus: Unary Relational Operations: SELECT and PROJECT, Relational Algebra Operations from Set Theory, Binary Relational Operations: JOIN and DIVISION, Additional Relational Operations, Examples, The Tuple Calculus and Domain Calculus.

UNIT III (12 Hours)

Functional Dependencies and Normalization for Relational Databases: Informal Design Guidelines for Relation Schemas, Functional Dependencies, Normal Forms Based in Primary Keys, General Definitions of Second and Third Normal Forms, Boyce-Codd Normal Form, Multivalued Dependencies and Fourth Normal Form, Join Dependencies and Fifth Normal Form, Inclusion Dependencies.

UNIT IV (12 Hours)

Introduction to Transaction Processing Concepts and Theory: Introduction to Transaction Processing, Transaction and System Concepts, Desirable Properties of Transactions, Characterizing Schedules Based on Recoverability, Characterizing Schedules based on Serializability.

Concurrency Control Techniques: Two Phase Locking Techniques for Concurrency Control, Concurrency Control Based on Timestamp Ordering, Multiversion Concurrency control techniques, Validation Concurrency Control Techniques.

UNIT V (12 Hours)

SQL-99: Schema Definition, Constraints, Queries and Views: SQL Data Definitions and Data Types, Specifying Constraints in SQL, Schema Change Statements on SQL, Basic Queries in SQL, More Complex SQL Queries, INSERT, DELETE and UPDATE statements in SQL, Triggers and Views.

Emerging Database Technologies and Applications: Mobile Databases, Multimedia Databases, Geographic Information Systems.

Reference Text Books:
1. Ramez Elmasri, Shamkant B. Navathe, Fundamentals of Database Systems, Pearson Education, Seventh Edition, 2017.
2. C.J.Date, A.Kannan, S.Swamynathan, An Introduction to Database Systems, VII Edition, Pearson Education , 2006.
3. Peter Rob, Carlos Coronel, Database Systems-Design, Implementation and Management, Eight Edition, Thomson, 2008
4. Raman A Mata, Toledo, Panline K. Cushman, Database Management Systems, Schaum's Outlines, TMH, 2007.
5. Steven Feuerstein, Oracle PL/SQL, Programming, 10th Anniversary Edition, OREILLY, 2008.

PARVATHANENI BRAHMAYYA SIDDHARTHA COLLEGE OF ARTS & SCIENCE

(An Autonomous College in the jurisdiction of Krishna University)
M.Sc.(Computer Science), First Semester
Course Name: Database Management Systems
Course Code: 22CA1T2
(w.e.f admitted batch 2022-23)

Time: 3 Hours   Max Marks: 70

SECTION-A
Answer ALL questions. All Questions Carry Equal Marks.   (5×4 = 20 Marks)

1.(a) Name the advantages of the DBMS. (CO1,L1)
                                     (or)
  (b) What is Data Independence? Explain the difference between *Physical Data Independence* and
      Logical Data Independence. (CO1,L1)

2. (a) What is *Generalization*? Explain it diagram. (CO2,L1)
                                     (or)
  (b) What are various symbols used in *ER Modeling*. (CO2,L1)

3. (a) Explain *First Normal Form*. (CO3,L2)
                                     (or)
  (b) Explain *Dependency Preservation* with example. (CO3,L2)

4. (a) Explain *Properties of Transaction.* (CO4,L2)
                                     (or)
  (b) Explain *Shared* and *Exclusive* Locks. (CO4,L2)

5. (a) Explain *DML Commands* with example. (CO5,L5)
                                     (or)
  (b) Explain *Mobile Databases*. (CO5,L5)

SECTION-B
Answer ALL questions. All Questions Carry Equal Marks.   (5×10 = 50 Marks)

6. (a) Explain various *Data Models* of Database Management Systems. (CO1,L1)
                                     (or)
  (b) Explain *Three Schema Architecture* of DBMS with neat diagram. (CO1,L1)

7. (a) Demonstrate *Select* and *Project* operations of *Relational Algebra*. (CO2,L2)
                                     (or)
  (b) Explain *ER Design* for the *Company Database* with all constraints. (CO2,L2)

8. (a) Explain *BCNF* with example. (CO3,L5)
                                     (or)
  (b) Explain *Fifth Normal Form* with example.(CO3,L5)

9. (a) Identify whether the transactions T1 & T2 ensure *serializability*. (CO4,L3)

T1	T2
read_item(x); X:=X – N;	
	read_item(x); X:=X + M;
write_item(X); read_item(Y);	
	Write_item(x);
Y:=Y+N; Write_item(Y);	

(or)

(b) Develop a technique for *Concurrency Control Based on Timestamp Ordering.* (CO4,L3)

10. (a) Analyze *Multimedia Databases* in detail. (CO5,L4)

(or)

(b) Distinguish various *Constraints* of SQL. (CO5,L4)