GUJARAT TECHNOLOGICAL UNIVERSITY
MASTERS IN COMPUTER APPLICATION
Year – 2 (Semester – III) (W.E.F. JULY 2018)

Subject Name: Database Management Systems (DBMS)
Subject Code: 4639303

1. **Learning Objectives:**

   - To understand the fundamental concepts of Database Management Systems.
   - To understand the concepts necessary for designing, using and implementing database systems and applications

2. **Prerequisites:** Basic knowledge of working with computers.

3. **Contents:**

Unit No.	Chapter Details	Weightage Percentage
1	**Introduction to Database System** **Database and Users:** Introduction(Basic Concepts : Data, Database, Database systems, Database Management Systems), Characteristics of Database Approach, Actors on Scene, Workers behind the Scene, Advantages of using the DBMS approach **Database System Concepts and Architecture:** Data Models, Schemas, Instances, the three schema architecture and data independence, Database Languages and interfaces, Database System environment, Centralized and client / Server Architecture for DBMSs, Classifications of Database Management Systems	10%
2	**Entity Relationship Diagram** Using high level conceptual data models for database design (Design Phases of database design), Entity types, Entity Sets, Attributes and keys, Relationship Types, Relationship sets, Roles and structural constraints, Weak entity Types, Refining teh ER diagram for company Database, Entity Relationship Diagram Naming conventions and Design issues, Example of other Notation: UML class diagram, Relationship types of degree higher than 2 Subclasses, Super Classes, Inheritance, Specialization and Generalization Relational Database design by ER and EER to Relational Mapping	20%

3	**Database Design**	20%
	Informal Design Guidelines for Relational Schema, Functional Dependencies, Normal Forms based on Primary keys, General definitions of 1NF,2NF and 3NF, Boyce-Codd Normal Forms(BCNF), Multi-valued Dependency and Fourth Normal Form	
4	**Relational Model**	20%
	Relational Model concepts: Relational Model concepts, Relational Model constraints and Relational Database Schemas	
	Relational Algebra: Unary Relational Operations (Select and Project), Relational Algebra operations from Set Theory, Binary Relational Operations (JOIN and Division) and Additional Relational Operations (Generalized projection, aggregate functions and grouping, Recursive Closure Operations, Outer Join Operations, the outer union operation)	
5	**Introduction to Transaction Processing Concepts**	10%
	Introduction to Transaction Processing, Transaction and System concepts, Desirable properties of Transactions, characterizing Schedule Based on Recoverability and Serializability	
6	**Concurrency Control Techniques**	20%
	Two-Phase Locking Techniques for Concurrency Control, Concurrency Control Based on Timestamp Ordering	
	Overview of Multi-version Concurrency Control Techniques, Validation (Optimistic) Techniques and Snapshot Isolation Concurrency Control	
	Database Recovery Techniques	
	Recovery Concepts, NO-UNDO/REDO Recovery Based on Deferred Update, Recovery Techniques Based on Immediate Update	
	Overview of Shadow Paging	

4. Reference Book(s):

Ramez Elmsari,Shamkant B Navathe, "Fundamentals of Database Systems", 7th Edition, Pearson Education

5. **Suggested Additional Reading:**

1. Silberschatz, Korth, Sudarshan, "Database System Concepts", 5th Edition, McGraw Hill Publication.
2. S K Singh, "Database Systems : Concepts, Design and Applications", Pearson Education
3. Peter Rob, Carlos Coronel, "Database Systems : Design, Implementation and Management", Cengage Learning
4. C J Date, A Kannan, S Swaminathan, "An Introduction to Database Systems", 8th Edition, Pearson Education

6. Chapter wise Coverage from Main Reference Book(s):

Unit No.	Text Books	Topics/Subtopics
1	Book-I	Chapter 1(1.1 to 1.6), Chapter 2
2	Book-I	Chapter 3, Chapter4 (4.1 & 4.2), Chapter 9
3	Book-I	Chapter 14 (14.1 to 14.6)
4	Book-I	Chapter 5 (5.1 & 5.2), Chapter 8
5	Book-I	Chapter 20 (20.1 to 20.5)
6	Book-I	Chapter 21 (21.1, 21.2), Overview of 21.3 and 21.4 Chapter 22 (22.1 to 22.4)

7. Accomplishments of the student after completing the course :

- A student would be able to effectively squeeze the "real world" data into the relational data model of the database system and data retrieval
- Clear understanding for the need of a database.
- Understand the uses the database schema
- Understand the need for normalization
- Use different types of physical implementation of database
- Use database for concurrent use.
- Backup data from database.