

# GUJARAT TECHNOLOGICAL UNIVERSITY

## Diploma in Computer Engineering

### Semester: 3

**Subject Code**

**Subject Name** DATABASE MANAGEMENT SYSTEM

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<b>Sr. No.</b>	<b>Course content</b>
1.	<p><b>Introduction to Database System :</b></p> <ul style="list-style-type: none"><li>1.1 Introduction</li><li>1.2 Basic Concepts and Definitions<ul style="list-style-type: none"><li>1.2.1. Data</li><li>1.2.2. Information</li><li>1.2.3. Data Versus Information</li><li>1.2.4. Data Warehouse</li><li>1.2.5. Metadata</li><li>1.2.6. System Catalog</li><li>1.2.7. Data Item or Fields</li><li>1.2.8. Records</li><li>1.2.9. Files</li></ul></li><li>1.3 Data Dictionary<ul style="list-style-type: none"><li>1.3.1 Components of Data Dictionaries</li><li>1.3.2 Active and Passive Data Dictionaries</li></ul></li><li>1.4 Data base</li><li>1.5 Data base system<ul style="list-style-type: none"><li>1.5.1 Operations performed on Database Systems</li></ul></li><li>1.6 Data Administrator (DA)</li><li>1.7 Database Administrator (DBA)<ul style="list-style-type: none"><li>1.7.1. Functions and Responsibilities of DBAs</li></ul></li><li>1.8 File oriented System versus database system<ul style="list-style-type: none"><li>1.8.1. Advantage of Learning File-oriented system</li><li>1.8.2. Disadvantages of File – oriented system</li><li>1.8.3. Database Approach</li><li>1.8.4. Database System Environment</li><li>1.8.5. Advantage of DBMS</li><li>1.8.6 Disadvantages of DBMS</li></ul></li></ul>
2.	<p><b>Database System Architecture :</b></p> <ul style="list-style-type: none"><li>2.1 Introduction</li><li>2.2 Schemas, Sub-schemas, and Instances<ul style="list-style-type: none"><li>2.2.1 Schema</li><li>2.2.2 Sub-Schema</li><li>2.2.3 Instances</li></ul></li><li>2.3. Three-level ANSI SPARC Database Architecture<ul style="list-style-type: none"><li>2.3.1 Internal Level</li></ul></li></ul>

	<ul style="list-style-type: none"> <li>2.3.2 Conceptual Level</li> <li>2.3.3 External Level</li> <li>2.3.4 Advantage of three-tier Architecture</li> <li>2.3.5 Characteristics of three tier Architecture</li> <li>2.4 Data Independence <ul style="list-style-type: none"> <li>2.4.1. Physical Data Independence</li> <li>2.4.2. Logical Data Independence</li> </ul> </li> <li>2.5 Mappings <ul style="list-style-type: none"> <li>2.5.1. Conceptual / Internal Mapping</li> <li>2.5.2. External / Conceptual Mapping</li> </ul> </li> <li>2.6 Structure Components, and Functions of DBMS <ul style="list-style-type: none"> <li>2.6.1. Structure of DBMS</li> <li>2.6.2. Execution Steps of a DBMS</li> <li>2.6.3. Components of a DBMS</li> <li>2.6.4. Function and Services of DBMS</li> </ul> </li> <li>2.7 Data Models <ul style="list-style-type: none"> <li>2.7.1. Record-based Data Models</li> <li>2.7.2. Object based Data Models</li> <li>2.7.3. Physical Data Models</li> <li>2.7.4. Hierarchical Data Model</li> <li>2.7.5. Network Data Model</li> <li>2.7.6. Relation Data Model'</li> <li>2.7.7. Entity – Relationship (E-R) Data Model</li> <li>2.7.8. Object – oriented Data Model</li> <li>2.7.9. Comparison between Data Models</li> </ul> </li> <li>2.8 Types of Database System <ul style="list-style-type: none"> <li>2.8.1 Centralized Database System</li> <li>2.8.2 Parallel Database System</li> <li>2.8.3 Client / Server Database System</li> <li>2.8.4 Distributed Database System</li> </ul> </li> </ul>
<p><b>3.</b></p>	<p><b>THE RELATION Algebra and Calculus :</b></p> <ul style="list-style-type: none"> <li>3.1. Introduction</li> <li>3.2. Historical perspective of Relational Model</li> <li>3.3. Structure of Relational Database <ul style="list-style-type: none"> <li>3.3.1. Domain</li> <li>3.3.2. Keys of Relations</li> </ul> </li> <li>3.4. Relational Algebra <ul style="list-style-type: none"> <li>3.4.1. Selection Operation</li> <li>3.4.2. Projection Operation</li> <li>3.4.3. Joining Operation</li> <li>3.4.4. Outer join Operation</li> <li>3.4.5. Union Operation</li> <li>3.4.6. Difference Operation</li> <li>3.4.7. Intersection Operation</li> <li>3.4.8. Cartesian Product Operation</li> <li>3.4.9. Division Operation</li> <li>3.4.10. Examples of queries in Relation Algebraic using symbols</li> </ul> </li> </ul>

4.	<p><b>SQL :</b></p> <ul style="list-style-type: none"> <li>4.1. Tools of Oracle</li> <li>4.2. Data types</li> <li>4.3. Database language. <ul style="list-style-type: none"> <li>4.3.1. DDL <ul style="list-style-type: none"> <li>4.3.1.1. CREATE,ALTER,TRUNCATE,DROP, TABLE</li> </ul> </li> <li>4.3.2. DML <ul style="list-style-type: none"> <li>4.3.2.1. INSERT,SELECT,UPDATE,DELETE</li> </ul> </li> </ul> </li> <li>4.4. Operators <ul style="list-style-type: none"> <li>4.4.1. Arithmetic, Comparison, Logical</li> </ul> </li> <li>4.5. SQL functions <ul style="list-style-type: none"> <li>4.5.1. Single row function. <ul style="list-style-type: none"> <li>4.5.1.1. Date functions ADD-MONTHS,MONTHS-BETWEEN, ROUND, NEXT-DAY, TRUNCATE,GREATEST, NEW-TIME.</li> <li>4.5.1.2. Numeric functions. ABS,CEIL,COS,COSH,EXP,FLOOR,POWER,MOD,ROUND,TRUNC,SQRT.</li> <li>4.5.1.3. Character functions INITCAP,LOWER,UPPER,LTRIM,RTRIM,TRANSLATE,REPLACE,SUBSTRING.</li> <li>4.5.1.4. Conversion function. TO-CHAR,TO-DATE,TO-NUMBER</li> <li>4.5.1.5. Miscellaneous functions. UID,USER,NVL,VSIZ</li> <li>4.5.1.6. Group functions Avg.Min,Max,Sum,Count</li> <li>4.5.1.7. Decode</li> </ul> </li> <li>4.5.2. Group by, Having and Order by clause</li> <li>4.5.3. Set operators <ul style="list-style-type: none"> <li>4.5.3.1. Union, union all, Intersect, Minus</li> </ul> </li> <li>4.5.4. Joins <ul style="list-style-type: none"> <li>4.5.4.1. Simple,Equi-join,Non-equi,Self-join,Outer-joi</li> </ul> </li> <li>4.5.5. Sub queries</li> <li>4.5.6. Multiple, Correlated</li> </ul> </li> <li>4.6. Reports <ul style="list-style-type: none"> <li>4.6.1. Advanced formatting.</li> <li>4.6.2. Break on</li> <li>4.6.3. Order of column in break on</li> <li>4.6.4. Title, btitle and formatting commands</li> <li>4.6.5. Break on row.</li> <li>4.6.6. Adding views.</li> </ul> </li> </ul>
5.	<p><b>Constraints :</b></p> <ul style="list-style-type: none"> <li>5.1 Domain Integrity constraints. <ul style="list-style-type: none"> <li>5.1.1 Not null, Check</li> </ul> </li> <li>5.2 Entity Integrity constraints <ul style="list-style-type: none"> <li>5.2.1 Unique, primary key.</li> </ul> </li> </ul>

	<p>5.3 Referential integrity constraints.  5.3.1 Foreign key, referenced key, on delete cascade</p>
6.	<p><b>Entity – Relationship (ER) Model :</b></p> <p>6.1 Introduction  6.2 Basic E – R Concepts  6.2.1 Entities  6.2.2 Relationship  6.2.3 Attributes  6.3 Conversion of E – R Model into Relations  6.3.1 Conversion of E.R. Model into Relations  6.4 Problems with E – R Models  6.5 E – R Diagram symbols</p>
7.	<p><b>Enhanced Entity Relationship (EER) Model :</b></p> <p>7.1. Introduction  7.2. Subclasses, subclass Entity Types and Super Classes  7.2.1 Notation for Superclasses and subclasses  7.2.2 Attribute Inheritance  7.2.3 Conditions for Using supertype / Subtype Relationships  7.2.4 Advantages of Using Superclasses and Subclasses  7.3. Specialisation and Generalisation  7.3.1. Specialisation  7.3.2. Generalisation  7.3.3. Specifying Constraints on Specialisation and Generalisation  7.4. Categorisation  7.5. Example of EER Diagram</p>

### **LABORATORY EXPERIENCES:**

1. Write queries using relational algebra
2. Create a table.
3. Insert, display and update the records.
4. Alter and drop the table.
5. Perform all join operations using atleast Two tables.
6. Perform all set operations using atleast Two tables
7. Demonstrate various functions.
8. Apply all constraints using atleast two tables.
9. Perform subqueries and correlate queries.
10. Create simple report using Break on, btitle, Title etc.

## **Reference Books:**

1. Database Systems Concepts, design and Applications, S. K. Singh Pearson Education
2. Database System Concepts, Henry Korth, MGH
3. Database Systems Design, Implementation, Peter Rob /Carlost Coronel Cengage And Management Seventh or higher ed., Learning
4. An Introduction to Database Systems, C. J. Date, Pearson Education
5. Sql/ PL/SQL, Ivan Bayross, BPB
6. ORACLE complete reference, ORACLE PRESS, TMH
7. Beginners Guide, ORACLE PRESS, THM
8. PL/SQL, ORACLE Press, TMH