

## GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

### COURSE CURRICULUM

**Course Title: Database Management System**  
(Code: 3330703)

Diploma Programme in which this course is offered	Semester in which offered
<ul style="list-style-type: none"> <li>• Computer Engineering</li> <li>• Information Technology</li> </ul>	<b>Third</b>

#### 1. RATIONALE

This course is intended for the students to manage the database. Therefore this course consists of the principle of database management system in particular relational database system. The students will also develop the skills to manage the database system and manipulate and retrieve data from different perspectives using Structured Query Language (SQL).

#### 2. COMPETENCY

The course should be taught and implemented with the aim to develop various types of skills so that students are able to acquire following competency:

- **Manage databases for any application using Structured Query Language (SQL)**

#### 3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
L	T	P		Theory Marks		Practical Marks		Total Marks
L	T	P	C	ESE	PA	ESE	PA	
3	2	2	7	70	30	20	30	

**Legends:** L -Lecture; T -Tutorial/Teacher Guided Student Activity; P -Practical; C -Credit; ESE-End Semester Examination; PA -Progressive Assessment

**Note:** It is the responsibility of the institute heads that marks for **PA of theory&ESE and PA of practical** for each student are entered online into the GTU Portal at the end of each semester within the dates specified by GTU.

#### 4. COURSE DETAILS

Unit	Major Learning Outcomes	Topics and Sub-topics
<b>Unit – I Introduction to Database System</b>	1a. Differentiate the terms: Data, Information, Records, Fields, Metadata, Data warehouse, Data dictionary	1.1 Concepts and Definitions database and database systems and database environment 1.2 Data, Information, Data Item or Fields, Records, Files, Metadata, System Catalog, Data Warehouse, Data dictionary and it's components
	1b. List Functions of DA and DBA	1.3 Data Administrator (DA) and Database Administrator (DBA) 1.4 Functions and Responsibilities of DBAs
	1c. Compare File oriented approach and Database approach	1.5 Advantage and Disadvantages of File- oriented system 1.6 Advantage and disadvantages of DBMS, File oriented System versus database system
<b>Unit– II Database System Architecture</b>	2a. Define Schemas, Sub- schemas and instances	2.1 Schemas, Sub-schemas, and Instances
	2b. Explain Three-level ANSI SPARC database Architecture	2.2 Three-level ANSI SPARC Database Architecture: Internal Level, Conceptual Level, External Level, 2.3 Advantages of three-tier Architecture
	2c. Differentiate between physical and Logical Data Independence	2.4 Data Independence: Physical Data Independence, Logical Data Independence
	2d. Analyze Conceptual, Internal and External Mapping	2.5 Mappings: Conceptual / Internal Mapping, External / Conceptual Mapping
	2e. Explain the Components and Functions of DBMS	2.6 Structure Components, and Functions of DBMS: Structure of DBMS, Execution Steps of a DBMS, Components of a DBMS, Function and Services of DBMS
	2f. Explain various Data Models	2.7 Data Models: Record-based Data Models, Object based Data Models, Physical Data Models, Hierarchical Data Model, Network Data Model, Relation Data Model, Entity – Relationship (E-R) Data Model, Object – oriented Data Model, Comparison between Data Models
	2g. Explain various types of Database systems	2.8 Types of Database System: Centralized Database System, Parallel Database System, Client / Server Database System, Distributed Database System
	3a. List data types in DBMS	3.1 Data types

Unit	Major Learning Outcomes	Topics and Sub-topics
<b>Unit– III Introduction to Structured Query Language (SQL)</b>	3b. Perform Data Definition Language (DDL) Commands for creating tables	3.2 Database language. Data Definition Language (DDL): CREATE,ALTER,TRUNCATE, DROP
	3c. Perform Data Manipulation Language (DML) commands for managing tables	3.3 Database language. Data Manipulation Language( DML) : INSERT,SELECT,UPDATE,DELETE
	3d. Execute various SQL operators and Functions	3.3 Operators Arithmetic, Comparison, Logical 3.4 SQL functions- Single row function i. Single row function. ii. Date functions (add-months,months-between, round,truncate, greatest, new-time). iii. Numeric Functions (abs, ceil, cos, cosh, exp, floor, power, mod, round, trunc, sqrt) iv. Character Fucntions (initcap, lower, upper, ltrim, rtrim, translate, replace, substring) v. Conversion Functions (to-char, to-date, to-number) vi. Miscellaneous functions (uid, user, nvl, vsize) vii. Group functions : Avg, Min,Max,Sum,Count, Decode
	3e. Perform queries on 'Group by', 'Having' and 'Order by' clause	3.5 Group by, Having and Order by clause
<b>Unit– IV Relational Algebra and implementat ion using SQL</b>	4a. Explain Relational Algebra and its notations	4.1 Structure of Relational Database 4.2 Domain 4.3 Keys of Relations
	4b. Derive the information using operations of Relational Algebra  4c. Implement set operations using SQL	4.4 Relational Algebra : Selection Operation, Projection Operation, Joining Operation, Outer join Operation, Union Operation, Difference Operation, Intersection Operation, Cartesian Product Operation, Division Operation, Examples of queries in Relation Algebraic using symbols 4.5 Implementing Relational Algebra using SQL 4.6 Set operators: Union, union all, Intersect, Minus
	4d. Implement 'Joins'	4.7 Joins: Simple, Equi-join, Non-equi, Self-Joins, Outer-joins.
	4e. Perform other types of queries	4.8 Sub queries Multiple, Correlated

Unit	Major Learning Outcomes	Topics and Sub-topics
	4f. Create report using formatting commands	4.9 Reports: Advanced formatting, Break on , Order of column in break on, Title, btitle and formatting commands, Break on row. 4.10 Adding views
<b>Unit– V Database Integrity Constraints</b>	5a. Explain with examples Domain Integrity and Entity Integrity constraint	5.1 Domain Integrity constraints:Not null, Check 5.2 Entity Integrity constraints:Unique, Primarykey.
	5b. Explain with examples Referential Integrity constraints	5.3 Referential integrity constraints: Foreign key, referenced key, on delete cascade
<b>Unit– VI Entity Relational Model</b>	6a. Explain E – R concepts- Entity, Relationship, Attributes	6.1 Basic Entity – Relationship Concepts: Entities, Relationship, Attributes 6.2 E – R Diagram symbols
	6b. Convert E – R model into Relational model	6.3 Conversion of Entity – Relationship Model into Relations
	6c. Solve problems with E – R Models	6.4 Problems with Entity – Relationship Models
	6d. Explain Specialisation and Generalisation concepts of EER Model	6.5 Concepts : Specialisation and Generalisation

## 5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS(THEORY)

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks (Duration – .....Hours)			
			R Level	U Level	A Level	Total
I.	Introduction to Database System	6	4	4	0	8
II.	Database System Architecture	7	4	6	2	12
III.	Introduction to Structured Query Language (SQL)	8	2	4	10	16
IV.	Relational Algebra and implementation using SQL	10	2	6	8	16
V.	Database Integrity Constraints	5	4	4	2	10
VI.	Entity Relational Model	6	2	2	4	8
	<b>Total</b>	<b>42</b>	<b>18</b>	<b>26</b>	<b>26</b>	<b>70</b>

**Legends:**R = Remember; U= Understand; A= Apply and above levels (Bloom's revised taxonomy)

**Note:** This specification table shall be treated as only general guideline for students and teachers. The actual distribution of marks in the question paper may vary from above table.

## 6. SUGGESTED LIST OF PRACTICALS

The practical should be properly designed and implemented with an attempt to develop different types of skills so that students are able to acquire the above mentioned competency. Following is the list of exercises for guidance.

S. No.	Unit No.	Practicals	Hrs.
1	III	Implement SQL queries to perform various DDL Commands. (Create minimum 5 tables with different datatypes and operate upon them)	4
2	III	Implement SQL queries to perform various DML Commands. (Insert minimum 10 rows using different insert methods, edit and remove data using update and delete commands)	4
3	III	Retrieve data using SELECT command and various SQL operators.	4
4	III	Implement SQL queries using Date functions like add-months, months-between, round, nextday, truncate, greatest, new-time etc	4
5	III	Implement SQL queries using Numeric functions like abs, ceil, cos, cosh, exp, floor, power, mod, round, trunc, sqrt etc.	6
6	III	Implement SQL queries using Character Functions like initcap, lower, upper, ltrim, rtrim, translate, replace, substring etc.	6
7	III	Implement SQL queries using Conversion Functions like to-char, to-date, to-number and Miscellaneous functions like uid, user, nvl, vsize etc.	6
8	III	Implement SQL queries using Group functions like Avg, Min, Max, Sum, Count, Decode etc.	6
9	III	Implement SQL queries using Group by, Having and Order by clause	6
10	IV	Implement SQL queries using Set operators like Union, union all, Intersect, Minus etc.	6
11	IV	Retrieve data spread across various tables or same table using various Joins.	6
12	IV	Retrieve data from multiple tables using Sub queries (Multiple, Correlated) (write minimum 3 level sub query)	6
13	IV	Tabulate formatted output using various report commands like Break on Title, btitle etc.	6
<b>TOTAL</b>			<b>70</b>

**Note:**

- In tutorials - Students will write programs and in practical session - execute program

**7. SUGGESTED LIST OF STUDENT ACTIVITIES**

Following is the list of proposed student activities like:

- Prepare seminar presentations explaining the organization of database in various live systems like banking, insurance, online booking etc.
- Mini projects such as: Prepare charts for database architecture, E – R Model, Relational algebra etc.

## 8.SUGGESTEDLEARNING RESOURCES

### (A)List of Books

S. No.	Title of Books	Author	Publication and Year
1	Database Systems Concepts, design and Applications 2/e	Singh, S. K.	PearsonEducation, New Delhi, 2011
2	SQL/ PL/SQL	Bayross, Ivan	BPB, New Delhi, 2010.
3	An Introduction to Database Systems	Date, C. J.	PearsonEducation, New Delhi,2006
4	Database System Concepts,	Korth, Henry	McGrawHill, Delhi, 2011
5	Introduction to Database Systems	ITL ESL.	Pearson Education, New Delhi, 2010

### B. List of Major Equipment/Materials

- i. Hardware: Computer Systems with minimum PIV processor ( or equivalent) and 1 GB RAM.
- ii. Software: SQL/PLSQL supporting software. (e.g. Oracle, SQL Server, MySQL)

### C List of Software/Learning Websites

- i. DBMS:<http://nptel.iitm.ac.in/video.php?subjectId=106106093>
- ii. SQL Plus Tutorial: <http://holowczak.com/oracle-sqlplus-tutorial/>
- iii. Database Tutorials:<http://www.roseindia.net/programming-tutorial/Database-Tutorials>
- iv. SQL Basic Concepts: <http://www.w3schools.com/sql/>
- v. SQL Tutorial : <http://beginner-sql-tutorial.com/sql.htm>

## 9. INSTRUCTIONAL STRATEGIES

The course activities include: Formal Lecture: 30% Supervised Classroom Work: 30% Supervised Laboratory Tutorials: 30% Unsupervised Directed Learning: 10%

- i. Concepts will be introduced in lectures.
- ii. problem solving will be done through tutorials.
- iii. Practical work will be through laboratory sessions.

## 10. COURSE CURRICULUM DEVELOPMENT COMMITTEE

### Faculty Members from Polytechnics

1. R. M Shaikh Head of Computer Engg. Dept. KD Polytechnic,Patan.
2. K. N. Raval Head of Computer Engg. Dept. RCTI , Ahmedabad
3. Mr.S. D. Shah Lecturer Computer Engg. Dept. RCTI , Ahmedabad

### Coordinator and Faculty Members from NITTTR Bhopal

1. Dr.Shailendra Singh, Professor & Head Dept. of Computer Engineering and Applications, NITTTR, Bhopal.
2. Dr. K. J. Mathai, Associate Professor Dept. of Computer Engineering and Applications, NITTTR, Bhopal.