

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

Course Curriculum

DATABASE MANAGEMENT SYSTEM

(Code: 3330703)

Diploma Programme in which this course is offered	Semester in which offered
Computer Engineering	3 rd Semester

1. RATIONALE

The aim of this subject is to get broad understanding of the basic concepts of database management system in particular relational database system. The students will also develop the skills to design database system and develop application programs to manage & retrieve data from different perspective using Structured Query Language (SQL) in ORACLE.

2. COMPETENCY (Programme Outcome according to NBA Terminology):

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:

- **Design, Develop and manage databases for simple applications using Structured Query Language (SQL) in ORACLE.**

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE	PA	ESE	PA	150
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

4. COURSE DETAILS

Unit	Major Learning Outcomes (Course Outcomes in Cognitive Domain according to NBA terminology)	Topics and Sub-topics
Unit – I Introduction to Database System	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
Unit– II Database System Architecture	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

Unit	Major Learning Outcomes (Course Outcomes in Cognitive Domain according to NBA terminology)	Topics and Sub-topics
Unit– III Introduction to Structured Query Language (SQL)	3a. 3a. List data types in DBMS	3.1 Data types
	3b. 3b. Perform Data Definition Language (DDL) Commands for creating tables	3.2 Database language. Data Definition Language (DDL): CREATE,ALTER,TRUNCATE, DROP
	3c. 3c. Perform Data Manipulation Language (DML) commands for managing tables	3.3 Database language. Data Manipulation Language(DML) : INSERT,SELECT,UPDATE,DELETE
	3d. 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. 3e. Perform queries on 'Group by', 'Having' and 'Order by' clause	3.5 Group by, Having and Order by clause
Unit– IV Relational Algebra and implementat ion using SQL	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

Unit	Major Learning Outcomes (Course Outcomes in Cognitive Domain according to NBA terminology)	Topics and Sub-topics
	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
	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
Unit- V Database Integrity Constraints	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 constaints: Foreign key, referenced key, on delete cascade
Unit- VI Entity Relational Model	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			
			R Level 1	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
	Total	42	18	26	26	70

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

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

6. SUGGESTED LIST OF PRACTICALS

The practical/exercises should be properly designed and implemented with an attempt to develop different types of practical skills (**Course Outcomes in psychomotor and affective domain**) so that students are able to acquire the competencies (Programme Outcomes). Following is the list of practical exercises for guidance.

Note: Here only Course Outcomes in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of **Programme Outcomes/Course Outcomes in affective domain** as given in a common list at the beginning of curriculum document for this programme. Faculty should refer to that common list and should ensure that students also acquire those Programme Outcomes/Course Outcomes related to affective domain.

S. No.	Unit No.	Practicals (Course Outcomes in Psychomotor Domain according to NBA Terminology)	Approx 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
TOTAL			70

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:

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

8. SPECIAL INSTRUCTIONAL STRATEGIES (If Any)

The course activities include Lectures, Supervised Tutorials and Practical Exercises as per teaching scheme. The programmes would be prepared during tutorials and would be executed during practicals sessions

9. SUGGESTED LEARNING 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.	Pearson Education, New Delhi, 2011
2	SQL/ PL/SQL	Bayross, Ivan	BPB, New Delhi, 2010.
3	An Introduction to Database Systems	Date, C. J.	Pearson Education, 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>

10. COURSE CURRICULUM DEVELOPMENT COMMITTEE**Faculty Members from Polytechnics**

- **Prof. R. M Shaikh** Head Department of Computer Engg., KD Polytechnic Patan
- **Prof. K. N. Raval** Head Department of Computer Engg., RCTI, Ahmedabad
- **Prof.S. D. Shah**, Lecturer Department of Computer Engg., RCTI, Ahmedabad

Coordinator and Faculty Members from NITTTR Bhopal

- **Dr.Shailendra Singh**, Professor & Head, Dept. of Computer Engineering and Applications
- **Dr. K. J. Mathai**, Associate Professor, Dept. of Computer Engineering and Applications