GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering
Level: Diploma
Branch: Information Technology
Course / Subject Code : DI03016041
Course / Subject Name : Database Management

w. e. f. Academic Year:	2024-25
Semester:	3rd
Category of the Course:	PCC

Prerequisite:	While no formal prerequisites are strictly required to learn Database Management Systems (DBMS), having a foundational understanding of basic computer concepts, and perhaps some programming experience, can be beneficial.
Rationale:	Database management course introduces students to database design using various models, SQL commands, techniques, and operation. This helps students to design ER-models to represent simple databases and convert them into relational tables, populate relational databases and formulate SQL queries on data. Students will improve database design through normalization. Students will understand how database systems must provide for the safety of the stored information, despite system crashes or attempts at unauthorized access. If data are to be shared among several users, the system must avoid possible anomalous results due to multiple users concurrently accessing the same data**.**

Course Outcome:
After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Explain the basic concepts of databases	U
02	Design database using Entity relationship approach.	U and A
03	Apply SQL Commands for creating, manipulating, and controlling databases.	R, U and A
04	Apply concepts of normalization to design an optimal database	U and A
05	Explain transaction management concepts for concurrent use of database.	U and A

**Revised Bloom's Taxonomy (RBT)*

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	ESE (E)	PA(M)	PA(I)	ESE (V)	
3	**0**	**2**	**4**	**70**	**30**	**20**	**30**	**150**

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	**Introduction to Database Systems** 1.1 Introduction 1.1.1 Data and Information 1.1.2 Database and Database Management System 1.1.3 Purpose of Database System and Application 1.1.4 Metadata 1.1.5 Data items, fields & records 1.1.6 Data Dictionary 1.2 File oriented System versus database system 1.3 Database Administrator 1.3.1 Roles and responsibilities of DBA 1.4 Schema, Sub-Schema, Instances 1.5 Data Abstraction 1.5.1 Internal Level 1.5.2 Conceptual Level 1.5.3 External Level 1.6 Data Independence	7	16
2.	**Entity Relationship Model** 2.1 Basic concepts of E-R 2.1.1 Entity 2.1.2 Attributes 2.1.3 Relationship 2.1.3.1.Participation 2.1.3.2 Recursive relationships 2.1.3.3 Degree of relationship set 2.2 Mapping Cardinality 2.3 ER Diagrams 2.4 Weak Entity Sets 2.5 Enhanced ER Model 2.5.1 Subclass & Super Class	9	20

	2.5.2 Generalization 2.5.3 Specialization 2.5.4 Aggregation 2.6 Converting ER Diagrams to database		
3.	**Structured Query Language** 3.1 Introduction and basic commands 3.1.1 SQL Data types 3.1.2 Data Definition Language Commands : create, alter, truncate and drop 3.1.3 Data Manipulation Language Commands: insert, update and delete 3.1.4 Data query Language: select 3.1.5 Privilege command : grant and revoke 3.1.6 Other Miscellaneous: describe, distinct, order by, group by and having 3.2 SQL Views 3.3 SQL Functions 3.4 SQL Operators	14	25
	3.5 Set Operators: union, union all, intersect and minus 3.6 Joins 3.7 SQL Constraints 3.7.1 Need of Constraints 3.7.2 Domain Integrity constraints: Not null and Check 3.7.3 Entity Integrity constraints: Unique, Primary key, 3.7.4 Referential integrity Constraints: Foreign key, Reference key		
4.	**Normalization** 4.1 Anomalies created by poor database design 4.2 Normalization 4.2.1 Definition and its importance 4.2.2 Goals of Normalization 4.3 Functional Dependencies 4.3.1 Prime Vs Non-Prime Attributes 4.3.2 Functional Dependency	06	19

	4.3.2.1 Partial Functional Dependency 4.3.2.2 Full Functional Dependency 4.3.2.3 Transitive Dependency 4.4 Normal Forms 4.4.1 First Normal Form 4.4.2 Second Normal Form 4.4.3 Third Normal Form 4.4.4 Boyce Codd Normal Form		
5.	**Transaction Management** 5.1 Basic Transaction Concepts 5.1.1 Definition 5.1.2 State transition diagram 5.1.3 ACID Properties 5.1.4 Transaction Log	09	20
	5.2 Concurrency Control 5.2.1 Definition 5.2.2 Problems of Concurrency Control 5.2.3 Schedule and its types 5.3 Serializability of transactions 5.4 Locking methods for Concurrency Control		
	Total	**45**	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
10	**35**	**25**	**-**	**-**	**-**

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

Sr. No.	Title of Book	Author	Publication with place, year, and ISBN
1	Database System Concepts	Henry Korth	Tata McGraw Hill, New Delhi, 978-9390727506
2	SQL/ Pl-SQL	Ivan Bayross	BPB Publications, Delhi 978-8176569644
3	An Introduction to Database Systems	C. J. Date	Pearson Education India 978-0321197849

(b) Open source software and website:

1. Latest database trends: https://cloud.google.com/blog/products/databases
2. SQL Basic Concepts: http://www.w3schools.com/sql/
3. SQL Tutorial: http://beginner-sql-tutorial.com/sql.htm
4. DBMS Course: https://nptel.ac.in/courses/106105175

Suggested Course Practical List:

Sr. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. required
1	Choose an ERP system. Collect requirements for creating its database. Create an ER- diagram for the same and convert it to database (For e.g. Banking management, College management, Hospital management etc.)	1,2	4
2	Design the below given schemas using SQL Command -"Create". Decide the appropriate data type for each column. (a)Create a table **ACCOUNT** with column account number, name, city, balance, loan taken. (b)Create a **LOAN** table with column loan number, account number, loan amount, interest rate, loan date and remaining loan. (c)Create table **INSTALLMENT** with column loan number, installment number, installment date and amount. (d)Create table **TRANSACTION** with column account number, transaction date, amount, type of transaction, mode of payment. (e) Show the structure of above tables using "Describe" command.	3	2

<table>
<tr><th>Sr. No.</th><th>Practical Outcomes (PrOs)</th><th>Unit No.</th><th>Approx. Hrs. required</th></tr>
<tr><td>3</td><td>
Insert data in above tables using SQL Command “Insert”.
(a) Account
<table>
<tr><th>acc_no</th><th>Name</th><th>City</th><th>Balance</th><th>Loan _taken</th></tr>
<tr><td>A001</td><td>Patel Jigar</td><td>Mehsana</td><td>50000</td><td>YES</td></tr>
<tr><td>A002</td><td>Patel Ramesh</td><td>Mehsana</td><td>50000</td><td>YES</td></tr>
<tr><td>A003</td><td>Dave Hardik</td><td>Ahmedabad</td><td>75000</td><td>NO</td></tr>
<tr><td>A004</td><td>Soni Hetal</td><td>Ahmedabad</td><td>100000</td><td>NO</td></tr>
<tr><td>A005</td><td>Son iAtul</td><td>Vadodara</td><td>100000</td><td>YES</td></tr>
</table>
(b) Transaction
<table>
<tr><td>Acc_no</td><td>Tr_date</td><td>Amt</td><td>Type_of_tr</td><td>Mode_of_pay</td></tr>
<tr><td>A001</td><td>1-may-20</td><td>10000</td><td>D</td><td>Cash</td></tr>
<tr><td>A002</td><td>3-july-20</td><td>5000</td><td>W</td><td>Cheque</td></tr>
<tr><td>A003</td><td>12-Aug-20</td><td>25000</td><td>D</td><td>Cheque</td></tr>
<tr><td>A004</td><td>15-may-20</td><td>30000</td><td>D</td><td>Cheque</td></tr>
<tr><td>A005</td><td>22-oct-20</td><td>15000</td><td>W</td><td>Cash</td></tr>
</table>
(c) Loan
<table>
<tr><td>loan_ no</td><td>acc_no</td><td>loan_amt</td><td>Interest _rate</td><td>loan_date</td><td>remaining_ loan</td></tr>
<tr><td>L001</td><td>A001</td><td>100000</td><td>7</td><td>1-jan-20</td><td>75000</td></tr>
<tr><td>L002</td><td>A002</td><td>300000</td><td>9</td><td>18-may-20</td><td>150000</td></tr>
<tr><td>L003</td><td>A005</td><td>500000</td><td>11</td><td>15-june-20</td><td>300000</td></tr>
</table>
(d) Installment
</td><td>3</td><td>2</td></tr>
</table>

<table>
<tr><th>Sr. No.</th><th>Practical Outcomes (PrOs)</th><th>Unit No.</th><th>Approx. Hrs. required</th></tr>
<tr><td></td><td><table>
<tr><th>Loan_no</th><th>Inst_no</th><th>Date</th><th>Amount</th></tr>
<tr><td>L001</td><td>I001</td><td>2-Feb-04</td><td>15000</td></tr>
<tr><td>L002</td><td>I002</td><td>18-June-04</td><td>20000</td></tr>
<tr><td>L003</td><td>I003</td><td>15-July-04</td><td>20000</td></tr>
</table></td><td></td><td></td></tr>
<tr><td>4</td><td>Retrieve data from tables in Practical 2 using Data SQL command- “Select”
(a) Display all rows and all columns of table Transaction.
(b) Display selected rows and selected columns of table Account.
(c) Display list of those branches that have balance greater than 1 Lakh rupees.
(d)Display those records where mode of payment is “cheque”</td><td>3</td><td>2</td></tr>
<tr><td>5</td><td>Write SQL queries to use Update, alter, rename, delete, truncate, Order By and distinct. (Use tables of Practical 2)
Table: ACCOUNT.
(a)Change the name ‘patel jigar’ to ‘patel hiren’.
(b)Change the name and city where account number is A005. (new name = ‘kothari nehal’and new city = ‘patan’).
(c)Add the new column (address varchar2 (20)) into table ACCOUNT.
(d)Create another table ACCOUNT_TEMP (acc_no, name, balance) from table ACCOUNT.
(e)Rename the table ACCOUNT to ACCOUNT_MASTER.
(f)Update the column balance for all the account holders. (Multiply the balance by 2 for each account holders)
(g)Delete the records whose account no is A004

Table: LOAN.
(a)For each loan holders add 100000 Rs. Amount into the column loan_amt.
(b)Modify the structure of table LOAN by adding one column credit_no varchar2 (4).
(c)Increase the size 5 to 7 of column acc_no.

Table: INSTALLMENT.
(a)Change the Inst_Date ‘2-Feb-04’ to ’3-Mar-04’.
(b)Reduce 5000 amount from all Installment holders.
(c)Add the amount 5000 where loan no is ‘L003’ and ‘L002’.</td><td>3</td><td>4</td></tr>
</table>

Sr. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. required
	(d)Change the column size of 5 to 7 where column name is Loan_no. (e)Delete row where inst_no is 'I001'. (f)Only create a structure of table installment1 from table installment. **Table: TRANSACTION.** (a)Insert any duplicate value and display all the records without any duplicate rows. (b)Select all the records in descending order (account number wise). (c) Delete a table TRANSACTION_TEMP.		
6	Write SQL queries to use various date functions and numeric functions.	3	2
7	Write SQL queries to use various character functions.	3	2
8	Write SQL queries to use various group function and operators using tables created in Practical 2. (a)Retrieve specified information for the account holder who are not in 'Ahmedabad 'or 'Vadodara'. (b)Retrieve those records of Account holder whose balance is between 50000 and 100000. (c)Display only those records whose amount is 5000, 25000, 30000. (d)Find the total transaction amount of account holder from transaction table. (e)Find minimum, maximum and average amount of transaction. (f)Count the total account holders. (g)Count only that record where mode of payment is 'cash'. (h)Display total balance for each branch from account table. (i)Display total balance for account in Ahmadabad city.	3	2
9	Write SQL query for set operators and join operations.(Use tables of Practical 2) (a)Display all customer account number who have account or taken loan from bank. (b)Display all customer account number who have account and also taken loan from bank. (c)Find the list of all account number of customer who have no loan in bank. (d)Display name of all customer whose remaining loan amount is greater than 50000.	3	2
10	Write SQL queries for applying integrity/data constraints while creating/ altering a table.	3	2
11	Write SQL queries for CREATE USER, GRANT, REVOKE AND DROP USER command.	3	2

Sr. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. required
12	Normalize the database created in Practical1 up to 2nd normal form.	4	2
13	Prepare a report on transactions concepts and concurrency control.	5	2
	Total		**30**

Note*: Faculties may change the sample datasets provided for practical 2 to 9.

List of Laboratory/Learning Resources Required:

Sr. No.	Equipment Name with Broad Specifications	PrO. No.
1	Computer system with operating system: Windows/MacOS/ Linux, with 4GB or higher RAM	All
2	Oracle 10 or above **Download Link:** https://www.oracle.com/in/database/technologies/oracle-database-software-downloads.html#db_free	2 to 11

Suggested Project List can be given as a part of assignments other than practical.

A suggestive list of small projects is given here. Sample Project Definitions: Hotel management, Event Management, Hospital Management, Health Monitoring Management System, Airline Management, Bank Management system, Transportation Management System, Library Management System, or any other ERP based system.

Students can perform the following steps for any chosen project definition.

a) Choose any topic of your choice and enlist its requirements.

b) Draw an ER Diagram for your chosen topic and prepare tables, establish relationships between them.

c) Normalize the database.

d) Determine the different scenarios and how data will be fetched with queries.

Suggested Activities for Students: If any

Students can undertake Massive Open Online Course for Database management.

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