

Semester: - III
Subject Name: Database Management System
Subject Code: 09CE1302
Objective:

A major rationale of a database system is to provide users with an intangible view of the data. That is, the system conceals certain details of how the information are put away and maintained. Thereby, data can be stored in compound data structures that permit competent retrieval, yet users see a basic and easy-to-use view of the data. The lowest level of abstraction, the physical level, depicts how the information are really put away and details the data structures.

Credits Earned: 4 Credits

Course Outcomes: After learning the course the students should be able:

- Assess business data issue and discover the necessities of an issue regarding information.
- To understand the different issues engaged in the design of a database system.
- To understand and use data manipulation language to query, update, and manage a database.
- Use different types of physical implementation of database
- Understand the uses the database schema and need for normalization.

Pre-requisite of course: NA.

Teaching and Examination Scheme

| Teaching Scheme (Hours) | | | Credits | Theory Marks | | | Tutorial/ Practical Marks | | Total Marks |
|-------------------------|----------|-----------|---------|--------------|-------------|--------------|---------------------------|----------------|-------------|
| Theory | Tutorial | Practical | | ESE (E) | Mid Sem (M) | Internal (I) | Viva (V) | Term work (TW) | |
| 2 | 0 | 4 | 4 | 50 | 30 | 20 | 25 | 25 | 150 |

Contents:

| Unit | Topics | Contact Hours |
|------|---|---------------|
| 1 | Database Systems: Introducing the database and DBMS, Files and File Systems, Problems with File System and advantages of Database Management systems. Data Models: The importance of Data models, Data Model Basic Building Blocks, Business Rules, The evaluation of Data Models, Degree of Data Abstraction. | 6 |
| 2 | Relational Data Model: Structure of relational databases, Domains, Relations, Relational algebra – primary operators and syntax, relational algebra queries, tuple relational calculus | 5 |
| 3 | Entity Relationship Model: Basic Entity – Relationship Concepts: Entities, Relationship, Attributes, E – R Diagram symbols Conversion of Entity – Relationship Model into Relations, Problems with Entity – Relationship Models, Concepts : Specialisation and Generalisation | 6 |
| 4 | Relational Database design : Normalization of database tables: Database Tables and Normalization, The need for Normalization, The Normal forms and High level Normal Forms, denormalization. | 6 |
| 5 | SQL Concepts: Introduction to SQL: Data Definition Commands, Data Manipulation Commands, Select queries, Advanced Data Definition Commands, Advanced Select queries, Virtual Tables, Joining Database Tables. | 5 |
| | Total Hours | 28 |

References:

1. C J Date, “An introduction to Database Systems”, Addison-Wesley.
2. Abraham Silberschatz, Henry F. Korth & S. Sudarshan, “Database System Concepts”, McGraw Hill.
3. Martin Gruber, “Understanding SQL”, BPB
4. Ivan bayross, “SQL- PL/SQL”
5. Oracle – The complete reference – TMH /oracle press

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

| Distribution of Theory for course delivery and evaluation | | | | | |
|---|------------|-------|---------|----------|--------|
| Remember | Understand | Apply | Analyze | Evaluate | Create |
| 35% | 35% | 30% | 0% | 0% | 0% |

Suggested List of Experiments:
Practical -1
Create a table ACCOUNT

| Column name | Data Type | Size |
|-------------|-----------|------|
| acc_no | varchar2 | 5 |
| Name | varchar2 | 30 |
| City | varchar2 | 20 |
| Balance | Number | 10,2 |
| loan_taken | varchar2 | 5 |

Insert the following records.

| acc_no | Name | City | Balance | loan_taken |
|--------|--------------|-----------|---------|------------|
| A001 | Patel Jigar | Mehsana | 50000 | YES |
| A002 | Patel Ramesh | Mehsana | 50000 | YES |
| A003 | Dave Hardik | Ahmedabad | 75000 | NO |
| A004 | Soni Hetal | Ahmedabad | 100000 | NO |
| A005 | Sony Atul | Vadodara | 100000 | YES |

Create a Table LOAN

| Column Name | Data Type | Size |
|----------------|-----------|------|
| loan_no | varchar2 | 5 |
| acc_no | varchar2 | 5 |
| loan_amt | number | 10,2 |
| interest_rate | number | 5,2 |
| loan_date | date | |
| remaining_loan | number | 10,2 |

Insert the following Records.

| Loan_no | Acc_no | Loan_amt | Interest_rate | Loan_date | Remaining_loan |
|---------|--------|----------|---------------|------------|----------------|
| L001 | A001 | 100000 | 7 | 1-jan-04 | 75000 |
| L002 | A002 | 300000 | 9 | 18-may-04 | 150000 |
| L003 | A005 | 500000 | 11 | 15-june-04 | 300000 |

Create a table INSTALLMENT

| Column Name | Data Type | Size |
|-------------|-----------|------|
| loan_no | varchar2 | 5 |
| inst_no | varchar2 | 5 |
| inst_Date | Date | |
| Amount | Number | 10,2 |

Insert following Records

| Loan_no | Inst_no | Date | Amount |
|---------|---------|------------|--------|
| L001 | I001 | 2-Feb-04 | 15000 |
| L002 | I002 | 18-June-04 | 20000 |
| L003 | I003 | 15-July-04 | 20000 |

Create a Table TRANSACTION

| Column Name | Data Type | Size |
|-------------|-----------|------|
| acc_no | Varchar2 | 5 |
| tr_Date | Date | |
| Amt | Number | 10,2 |
| type_of_tr | Char | 1 |
| mode_of_pay | Varchar2 | 10 |

Insert a Following Records

| Acc_no | Date | Amt | Type_of_tr | Mode_of_pay |
|--------|-----------|-------|------------|-------------|
| A001 | 3-may-04 | 10000 | D | Cash |
| A002 | 5-july-04 | 5000 | W | Cheque |
| A003 | 12-Aug-04 | 25000 | D | Cheque |
| A004 | 15-may-04 | 30000 | D | Cheque |
| A005 | 22-oct-04 | 15000 | W | Cash |

List of queries

1. Display all rows and all columns of table Transaction.
2. Display all rows and selected columns of table Installment.
3. Display selected rows and selected columns of table Account.
4. Display selected rows and all columns of table loan.
5. Show the structure of the table loan, account and transaction.

PRACTICAL-2

Table: **ACCOUNT**.

1. Insert the following records if you have not inserted in PRACTIAL - 1

| Acc_no | Name | City | Balance | Loan_taken |
|--------|--------------|-----------|---------|------------|
| A001 | Patel Jigar | Mehsana | 50000 | YES |
| A002 | Patel Ramesh | Mehsana | 50000 | Yes |
| A003 | Dave Hardik | Ahmedabad | 75000 | NO |
| A004 | Soni Hetal | Ahmedabad | 100000 | NO |
| A005 | Soni Atul | Vadodara | 100000 | YES |

2. Change the name 'patel jigar' to 'patel hiren'.
3. Change the name and city where account number is A005. (new name = 'kothari nehal' and new city = 'patan').
4. Display only those records where loan taken status is 'YES'.
Add the new column (address varchar2 (20)) into table ACCOUNT.
5. Create another table ACCOUNT_TEMP (acc_no, name, balance) from table ACCOUNT.
6. Rename the table ACCOUNT to ACCOUNT_MASTER.
7. Update the column balance for all the account holders.
(Multiply the balance by 2 for each account holders)
8. Describe the structure of table ACCOUNT.
9. Delete the records whose account no is A004.

Table: **LOAN**.

1. Insert the following Records if you have not inserted in PRACTICAL-1

| Loan_no | Acc_no | Loan_amt | Interest_rate | Loan_date | Remaining_loan |
|---------|--------|----------|---------------|-----------|----------------|
| L001 | A001 | 100000 | 7 | 1-jan-04 | 75000 |
| L002 | A002 | 300000 | 9 | 18-may-04 | 150000 |

| | | | | | |
|------|------|--------|----|------------|--------|
| L003 | A005 | 500000 | 11 | 15-june-04 | 300000 |
|------|------|--------|----|------------|--------|

2. for each loan holders Add 100000 Rs. Amount into the column loan_amt.
3. for each loan holders Increase the interest rate 2%.
4. Create another table LOAN_TEMP (loan_no, Acc_no, loan_amt, loan_date) from the table LOAN
5. Display only those records where loan holder taken a loan in month of January.
6. Modify the structure of table LOAN by adding one column credit_no varchar2 (4).
7. Display the Loan amount*2 of table LOAN.
8. Display the records of table LOAN by date wise in ascending order.
9. Display the records of table LOAN by account number wise in descending Order.
10. Increase the size 5 to 7 of column acc_no.

Table: **INSTALLMENT.**

1. Insert following Records if you have not inserted in PRACTICAL-1

| Loan_no | Inst_no | Inst_Date | Amount |
|---------|---------|------------|--------|
| L001 | I001 | 2-Feb-04 | 15000 |
| L002 | I002 | 18-June-04 | 20000 |
| L003 | I003 | 15-July-04 | 20000 |

2. Change the Inst_Date '2-Feb-04' to '3-Mar-04'.
3. Reduce 5000 amount from all Installment holders.
4. Add the amount 5000 where loan no is 'L003' and 'L002'.
5. Change the column size of 5 to 7 where column name is Loan_no.
6. Decrease the column size 5 to 4 where column name Inst_no.
7. Show the structure of the Table.
8. Change the amount 15000 to 5000 where loan number is L001
9. Perform delete operation. (Delete only particular one record)

Table: **TRANSACTION.**

1. Insert a Following Records if you have not inserted in PRACTICAL-1.

| Acc_no | Trans_Date | Amt | Type_of_tr | Mode_of_pay |
|--------|------------|-------|------------|-------------|
| A001 | 3-may-04 | 10000 | D | Cash |
| A002 | 5-july-04 | 5000 | W | Check |
| A003 | 12-Aug-04 | 25000 | D | Check |
| A004 | 15-may-04 | 30000 | D | Check |
| A005 | 22-oct-04 | 15000 | W | Cash |

2. Insert any duplicate value and display all the records without any duplicate rows.
3. Select all the records in descending order(account number wise).
4. Display amt, date, and type of transaction by date wise.
5. Create another table TRANSACTION_TEMP from this table.
6. Create another table TRANS_TEMP by change the column name acc_no to account_no.
7. Delete a table TRANSACTION_TEMP.
8. Rename the table TRANSACTION to TRANS.
9. Display account number where type of transaction is 'D'.

PRACTICAL-3

Note: Bold and Underline column name indicates a primary key

Create a table **ACCOUNT**.

| Column name | Data Type | Size | Attributes |
|----------------------|-----------|------|--|
| <u>Acc_no</u> | Varchar2 | 5 | Primary key/first letter must start with 'A' |
| Name | Varchar2 | 30 | NOT NULL |
| City | Varchar2 | 20 | NOT NULL |
| Balance | Number | 10,2 | Balance >=500 |
| Loan_taken | Varchar2 | 3 | Values('NO','YES') |

1. Insert the records using Practical list-1.

Create a Table **LOAN**.

| Column Name | Data Type | Size | Attributes |
|-----------------------|-----------|------|--|
| <u>Loan_no</u> | Varchar2 | 5 | Primary Key / first letter must start with 'L' |
| Acc_no | Varchar2 | 5 | Foreign key References Acc_no of account table |
| Loan_amt | Number | 10,2 | NOT NULL |
| Interest_rate | Number | 5,2 | NOT NULL |
| Loan_date | Date | | |
| Remaining_loan | Number | 10,2 | Remaining loan < loan amount |

1. Insert the records using Practical list-1.

Create a table **INSTALLMENT**.

| Column Name | Data Type | Size | Attributes |
|-----------------------|-----------|------|--|
| <u>Loan_no</u> | Varchar2 | 5 | Foreign key References Loan_no of Loan table |
| Inst_no | Varchar2 | 5 | first letter must start with 'I' |
| IDate | Date | | NOT NULL |
| Amount | Number | 10,2 | NOT NULL |

1. Insert the records using Practical list-1.

Create a Table **TRANSACTION**.

| Column Name | Data Type | Size | Attributes |
|---------------|-----------|------|--|
| <u>Acc_no</u> | Varchar2 | 5 | Foreign key References Acc_no of account table |
| Trans_Date | Date | | NOT NULL |
| Amt | Number | 10,2 | NOT NULL |
| Type_of_tr | Char | 1 | Values in ('D','W') |
| Mode_of_pay | Varchar2 | 10 | Values in ('cash','check') |

1. Insert the records using Practical list-1.

Using Operator: NOT, BETWEEN, NOT BETWEEN, IN, NOT IN

1. Retrieve specified information for the account holder who are not in 'Ahmedabad'.
2. Retrieve specified information for the account holder who are not in 'Ahmedabad' or 'Vadodara'.
3. Retrieve those records of Account holder whose balance between is 50000 and 100000.
4. Retrieve those records of Account holder whose balance not between is 50000 and 100000.
5. Display only those records whose amount is 5000, 25000, 30000.
6. Display only those records whose amount not in 5000, 25000, 30000.
7. Display System date.
8. Find the total transaction amount of account holder from transaction table.
9. Find minimum amount of transaction.
10. Find maximum amount of transaction.
11. Count the total account holders.
12. Count only those records whose made of payment is 'cash'.
13. Count only those records whose transaction made in the month of 'MAY'.
14. Find the average value of transaction.
15. Display the result of 4 rest to 4.
16. Find the square root of 25.
17. Write the query for the following Function.
18. LOWER,INITCAP,UPPER,SUBSTR,LENGTH,LTRIM

PRACTICAL-4

NOTE: for following queries use TABLES of PRACTICAL-1

1. Display the sum of balance of account holders who's live in same city 'Mehsana' using group by clause.
2. Display the information about account where balance is less than total balance of all account holders.
3. Displays the information of account holders whose loan amount and balance both are same.
4. Display the name of city, remaining loan amount, account, date of loan and loan number of account holders.
5. Display name of account holder, installment number and installment amount Whose loan number is 'L001'.
6. Display name of account holder, city, loan amount and installment amount.
7. Display the balance of account holders whose balance and remaining loan both are same.
8. List of all account holders' information whose balance is same as loan amount.
9. Display the amount of transaction, name of account holders, account number and mode of payment whose mode of payment is 'CHEQUE'.
10. Display account no, loan amount, amount of transaction.
11. List of installment information whose amount is less than average amount of transaction.
12. Display the sum of installment amount and transaction amount.
13. Display the balance and amount of transaction group by amount and balance.
14. List of installment number and account number of account holders.
15. Display loan amount, transaction amount and mode of payment where transaction date and loan taken date both are done in month of 'MAY'.
16. Display all the information of installment and transaction where installment date and transaction date both are done in month of 'JULY'.
17. Display the last three row of account table.

18. Display the balance, mode of payment, loan taken status whose mode of payment is 'CHEQUE' and loan taken is 'YES'.
19. Retrieve only rows 2 to 5 from account table.

Instructional Method:

- a. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
- b. The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
- c. Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
- d. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory

Supplementary Resources:

1. <https://ilearning.oracle.com/>
2. <https://apex.oracle.com/en/>
3. <https://lagunita.stanford.edu/courses/DB/2014/SelfPaced/about>