**PRACTICE SET**

**End Semester (V Sem.) Examination, Dec 2025**

**Course: Database Management System**
**Semester: V**
**Program: B.Tech**
**Course Code: 3PCCCS301**

| Course Outcomes | Description |
|---|---|
| CO1 | Demonstrate the basic elements of a database management system |
| CO2 | Identify the data models for relevant problems. |
| CO3 | Design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data into RDBMS and formulate SQL queries on the data. |
| CO4 | Demonstrate their understanding of key notions of query evaluation and optimization techniques. |

**SECTION A**

**(EACH QUESTION CARRIES 5 MARKS)**

**(No. of Question x 5= Total Marks)**

**1.** State functional dependency concepts. [CO2] [UNIT 1] [REMEMBER, LOT]

**2.** Explain all types of data models. [CO1] [UNIT 1] [UNDERSTAND, LOT]

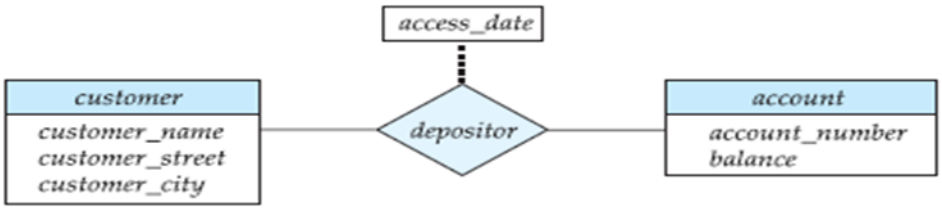
**3.** What is data integrity? Explain the types of integrity constraints.
[CO2][UNIT 1][REMEMBER, LOT]

**4.** Define relational algebra with suitable example. [CO1][UNIT 1][REMEMBER, LOT]

**5.** Explain various DML commands with syntax. [CO1][UNIT 1][UNDERSTAND,LOT]

**6.** Explain network model concept with example. [CO1][UNIT 1][UNDERSTAND, LOT]

**7.** Draw the data structure diagrams in compare of ER diagram with explanation.
[CO4][UNIT 1][APPLY, HOT]



(a) E-R diagram

**8.** Describe Selection and projection used in Relational algebra.
[CO2][UNIT 2][REMEMBER, LOT]

**9.** Given the tables, Orders (order_id, customer_id, order_date) and Customers (customer_id, name), write a query to find customers who have never placed an order.
[CO3] [UNIT 2][APPLY , LOT]

**10.** Differentiate between DELETE, TRUNCATE, and DROP commands with suitable examples.
[CO3] [UNIT 2][ANALYSE, LOT]

**11.** What is normalization? Explain all Normal forms. [CO2] [UNIT 3][REMEMBER, LOT]

**12.** Define BCNF. How does it differ from 3NF? [CO2] [UNIT 3] [REMEMBER, LOT]

**13.** Briefly describe about B+ tree index file structure. [CO4][UNIT 4] [UNDERSTAND,LOT]

**14.** Explain structure of file index. [CO1] [UNIT 4] [UNDERSTAND, LOT]

**15.** Explain different properties of indexes in detail. [CO1] [UNIT 4] [UNDERSTAND, LOT]

**16.** Explain the difference between authorization and authentication.

[CO1][UNIT5][UNDERSTAND ,LOT]

**SECTION B**
**(EACH QUESTION CARRIES 10 MARKS)**

**17.** a. With a neat diagram, explain the structure of a DBMS. [CO3] [UNIT 1] [UNDERSTAND , APPLY, LOT]

b. Draw an E-R diagram for a small marketing company database, assuming your own data requirements.

**18.** [CO1][UNIT 1][UNDERSTAND,LOT]

a. Explain the architecture of DBMS.

b. Compare File systems with Database systems.

**19.** Illustrate roles of data base administrator and the details of aggregate function queries. [CO1][UNIT 1][UNDERSTAND, LOT]

**20.** Construct an ER diagram for a car insurance company that has a set of customers, each of whom owns one/more cars. Each car is associated with it zero to any number of recorded accidents. [CO3][UNIT 1][ANALYSE, HOT]

**21.** Explain the three schema architecture of DBMS. Why do we need mappings between different schema levels? [CO1][UNIT 1][UNDERSTAND, LOT]

**22.** Describe four advantages of DBMS over file processing system. [CO1][UNIT 1][UNDERSTAND, LOT]

**23.** Explain insertion, deletion and modification anomalies with suitable examples. [CO2][UNIT 2][UNDERSTAND,LOT]

**24.** Explain the importance of Null values in Relational Model. [CO1][UNIT 2][UNDERSTAND, LOT]

**25.** Explain in detail about various key constraints used in database system. [CO2][UNIT 2][UNDERSTAND, LOT]

**26.** With relevant examples discuss the following in SQL [CO3][UNIT 2][APPLY, LOT]

1) DDL
2) DML
3) DCL
4) DQL

**27.** Illustrate the usage of SQL GROUP BY, ORDER BY and HAVING clauses.

[CO3][UNIT 2][ANALYSE, HOT]

**28.** The following relation are given: [CO4][UNIT 2][EVALUATE, HOT]

Calculate the natural join operation on R1 and S1 relation.

| sid | bid | day |
|---|---|---|
| 22 | 101 | 10/10/96 |
| 58 | 103 | 11/12/96 |

R1

| sid | sname | rating | age |
|---|---|---|---|
| 22 | dustin | 7 | 45.0 |
| 31 | lubber | 8 | 55.5 |
| 58 | rusty | 10 | 35.0 |

S1

Calculate the left outer join, right outer join, full outer join on relation PEOPLE and MENU.

PEOPLE:

| Name | Age | Food |
|---|---|---|
| Alice | 21 | Hamburger |
| Bill | 24 | Pizza |
| Carl | 23 | Beer |
| Dina | 19 | Shrimp |

MENU:

| Food | Day |
|---|---|
| Pizza | Monday |
| Hamburger | Tuesday |
| Chicken | Wednesday |
| Pasta | Thursday |
| Tacos | Friday |

**29.** Construct a set of relations that initially violate 1NF–4NF and demonstrate how you would normalize them step-by-step. [CO4][UNIT 3][CREATE, HOT]

**30.** Illustrate the properties of Functional Dependency (FD) in a relational database with example. [CO2][UNIT 3][APPLY LOT]

**31.** How Transactions Processing System deal with database? Explain briefly. [CO1][UNIT 4][ANALYSE, HOT]

**32.** Describe transaction state and explain its ACID properties. [CO1][UNIT 4][UNDERSTAND, LOT]

**33.** Analyse the main differences between DAC, MAC, and RBAC in terms of flexibility and security. [CO4][UNIT 5][ANALYSE,HOT]

## SECTION C

## (EACH QUESTION CARRIES 20 MARKS)

**34.** Differentiate between network model and hierarchical model with structure diagram. [CO2][UNIT 1][ANALYSE, HOT]

**35.** Explain the characteristics of 1NF, 2NF, 3NF and BCNF with suitable example.

[CO1][UNIT 2][UNDERSTAND, LOT]

**36.** [CO2][UNIT 2][EVALUATE,REMEMBER,HOT]

a. Consider the universal relation R= {A, B, C, D, E, F, G, H, I, J} and the set of functional dependencies f = {AB → C, A → D, B → F, F → GH, D → IJ}. What is the key for R? Normalize the relation R upto 3NF, justify your answer.

b. What are the pitfalls in relational database design?

**37.** a. Identify different aggregate functions in SQL. Give examples.

[CO3][UNIT 2][ANALYSE, HOT]

i. The SQL COUNT function returns the number of rows in a table satisfying the criteria specified in the WHERE clause.

ii. The SQL SUM function is used to select the sum of values from numeric column.

iii. The SQL AVG function retrieves the average value for a numeric column.

iv. The SQL MIN function selects the smallest number from a numeric column.

v. The SQL MAX function retrieves the maximum numeric value from a numeric column.

Table Name: A

| Name | Salary |
|---|---|
| | Email 5000 |
| Chang | 5000 |
| Emily | 4500 |
| Nick | 4000 |

b. With a suitable example, explain the role of functional dependency in the process of normalization.

**38.** a. Consider the following tables: [CO3] [UNIT 2][CREATE, HOT]

Employee (Emp_no, Name, Emp_city)

Company (Emp_no, Company_name, Salary)

Write a SQL query to display Employee name and company name.

Write a SQL query to display employee name, employee city, company name and salary of all the employees whose salary >10000

Write a query to display all the employees working in 'XYZ' company.

b. What are the relational algebra operations supported in SQL? [CO2]

**39.** [CO3][UNIT 2][APPLY, HOT]

a. Consider the following schema: Suppliers (sid : integer, sname : string, address : string) Parts (pid : integer, pname : string, color : string) Catalog (sid : integer, pid : integer, cost : real) The key fields are underlined and domain of each field is listed after the field name. Apply relational algebra.[CO2]

i. Find the name of suppliers who supply some red parts

ii. Find the sid of suppliers who supply some red or green parts

iii. Find the sid of suppliers who supply some red part or are at Ranchi

b. By considering an example describe various data update operations in SQL.

**40.** Examine the internal structure of a B+ Tree and explain how it differs from a simple B-Tree [CO3][UNIT 3] [ANALYSE, HOT]

**41.** Explain various recovery techniques during transaction in detail. [CO2][UNIT 4][UNDERSTAND, LOT]

**42.** [CO4][UNIT 4[ANALYSE,HOT]

a. How can we achieve concurrency control achieved in DBMS?

b. Analyse the differences between locking-based and timestamp-based concurrency control methods in terms of performance and complexity.

## Summary Sheet:

**CO Wise**

| CO | Q. No | Marks |
|---|---|---|
| CO1 | | |
| CO2 | | |
| CO3 | | |
| CO4 | | |
| **Total** | | |

**Unit Wise**

| Unit | Q. No | Marks |
|---|---|---|
| Unit 1 | | |
| Unit 2 | | |
| Unit 3 | | |
| Unit 4 | | |

| Total | |
|---|---|

**Blooms Taxonomy Level (BTL) Wise**

| BTL | Q. No | Marks |
|---|---|---|
| LOT | | |
| HOT | | |
| **Total** | | |

Prepared by:

**Disclaimer: -**This is a Practice Set. The Question in End term examination will differ from the Practice Set. This Practice Set is meant for practice only.