JHARKHAND Rai University RANCHI

PRACTICE SET

End Semester Examination, Spring-2026

Program: Diploma CSE

Semester: IV

Course: Database Management System

Course Code: 3DPCC206

Unit -1

Section A: 10 marks each

1. Differentiate between DBMS and File System with suitable example and explain why DBMS is preferred.
2. Explain three-level architecture of DBMS with a neat labelled diagram and a simple example.
3. Explain the building blocks of an ER Diagram. Include types of attributes like composite, multi-valued, and derived.
4. Explain hierarchical, network, and relational models. Compare them with suitable examples.
5. Define relational model and explain its main properties with a simple example.
6. Explain primary key, candidate key, and foreign key with suitable examples.
7. Explain different types of integrity constraints used in relational model with examples.
8. Describe Entity Integrity, Referential Integrity, and Domain Integrity. Provide table examples where these rules are violated.
9. Explain the rule for Second Normal Form regarding Partial Dependency. Provide a table example that violates 2NF and show the corrected version
10. Explain the Selection, Projection, and Join operations. Provide a scenario with two tables and show the result of each operation.
11. Explain Tuple Relational Calculus and Domain Relational Calculus. Discuss their importance in query languages.
12. Draw an ER diagram for a university database with proper labels and explain it with example.
13. Discuss the rules for 3NF and BCNF in detail with practical examples.

14. Define Domain Relational Calculus. Consider the table STUDENT (Roll_No, Name, Age, Department); write the DRC expressions for the following:

    i). Find the names of all students who belong to the **'CSE'** department.

    ii). Find the **Roll_No** and **Name** of all students whose age is greater than **19**.

Section B: 20 marks each

1. (a) Explain Set Operations and Cartesian Product.
   (b) Discuss the different types of Joins with syntax and diagrams.
2. (a) Explain the overall system structure of a DBMS with a block diagram. (b) Discuss the roles and detailed responsibilities of a Database Administrator.
3. (a) Illustrate the construction of a B+ Tree of order 3. Insert the following keys one by one and draw the tree after every single insertion: 5, 10, 15, 20, 25.
   (b) Explain the process of "Node Splitting." What happens when a node exceeds its maximum capacity of 2 keys? Describe with a diagram.

Unit - 2

Section A: 10 marks each

15. Explain candidate key, primary key, and alternate key with suitable examples.
16. Explain the classification of SQL commands with at least two examples and syntax for each.
17. How are constraints implemented during table creation? Provide a full CREATE TABLE script.
18. Explain the GROUP BY and HAVING clauses. How does HAVING differ from the WHERE clause? Provide a query-based example.
19. Write and explain SQL queries for Equi-join, non-Equi join, and Natural join using a Student and Course database.
20. What are Views? Explain how they are created, updated, and dropped. List four major benefits of using Views in a bank database.
21. Explain query optimization and its importance in SQL.

Section B: 20 marks each

4. Explain Table Expressions and Conditional Expressions in SQL.
   Discuss Embedded SQL and how it allows C/C++ programs to interact with a database.
5. Explain SQL language with suitable examples. Discuss DDL, DML, table expressions, conditional expressions, embedded SQL, and views.
6. Consider the following table:

EmpID	EmpName	Department	Salary	City
101	Amit Kumar	IT	55000	Ranchi
102	Sneha Singh	HR	48000	Patna
103	Rahul Singh	IT	62000	Delhi
104	Sunita Rao	Finance	75000	Ranchi
105	Vijay Dutt	HR	42000	Mumbai

   i) Write the SQL command to create the EMPLOYEE table shown above. Ensure that EmpID is the Primary Key and Salary cannot be less than 20,000.
   ii) Write a query to display the EmpName and Department of all employees who earn a salary greater than 50,000.
   iii) Write a query to find the details of all employees whose names start with the letter 'S'.
   iv) Write a query to list all employees who work in the 'IT' department and live in the city of 'Ranchi'.
   v) Write a query to display all employee details, sorted by their Salary in descending order (highest to lowest).

Unit-3

Section A: 10 marks each

22. Explain the tree structure diagram in the Hierarchical model. Discuss the concept of Root, Parent, and Child nodes with an example.
23. Describe the Data Structure Diagram in the Network model. Explain how it differs from a tree structure.
24. Explain the DBTG CODASYL model. Describe the concept of "Records" and "Sets" within this model.

Section B: 20 marks each

7. Explain the operations of the DBTG CODASYL network model in detail. Write the commands used in retrieval, update, and set processing operations with suitable examples.
8. Explain the working of operations in the Hierarchical Model. Describe how data retrieval, insertion, deletion, and update are performed with suitable examples.

Unit-4

Section A: 10 marks each

25. Compare Sequential and Random file organization. Discuss the pros and cons of each regarding access speed and storage space.
26. Explain the difference between Logical and Physical file organization. Why is this distinction important for a programmer?
27. Discuss Inverted Files and Null Lists. How do these structures improve the performance of complex search queries?
28. Describe the structure of a B-Tree. Explain the rules for searching a key within a B-Tree of order 'n'.
29. Explain the concept of Hashing and Hash Functions in DBMS
30. What is Indexing? Discuss Primary, Secondary, and Multi-level Indexing.

Section B: 20 marks each

9. (a) Compare B-Trees and B+ Trees.
   (b) Demonstrate the step-by-step creation of a B+ Tree, including node splitting during insertion and merging during deletion.
10. (a) Explain Hashing in detail, including Collision Handling techniques.
    (b) Discuss Indexed Sequential Access Method and its application in large databases.

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