SQL Assessment

1. Basic SQL Syntax and Queries (15%)

- **Objective**: Test the understanding of fundamental SQL commands.
- **Tasks**:
  - Write a query to create a table with constraints (CREATE TABLE with PRIMARY KEY, NOT NULL).
  - Insert sample data into the table.
  - Use basic SELECT queries with WHERE, ORDER BY, and DISTINCT.
- **Evaluation**:
  - Syntax correctness.
  - Understanding of constraints and data types.
  - Ability to retrieve and filter data.

2. Data Manipulation (15%)

- **Objective**: Assess ability to manipulate data.
- **Tasks**:
  - Update records (UPDATE) based on specific conditions.
  - Delete specific records (DELETE).
  - Add, modify, and delete columns (ALTER TABLE).
- **Evaluation**:
  - Execution accuracy.
  - Integrity maintenance.
  - Avoidance of unintended data loss.

3. Data Analysis with SQL (20%)

- **Objective**: Test data summarization and analysis skills.
- **Tasks**:
  - Use aggregate functions (COUNT, SUM, AVG, MIN, MAX).
  - Perform grouping (GROUP BY) and filtering grouped data using HAVING.
  - Calculate percentages and rankings with OVER and PARTITION BY clauses.
- **Evaluation**:

- Accuracy of results.
- Logical structuring of queries.
- Application of aggregate functions.

4. Advanced SQL Concepts (20%)

- **Objective**: Test advanced SQL features and practical application.
- **Tasks**:
  - Write queries using **Common Table Expressions (CTEs)**.
  - Use **Window Functions** for advanced analysis (e.g., ROW_NUMBER(), RANK(), LAG(), LEAD()).
  - Create a recursive query to solve hierarchical data problems.
  - Write Corelated query

- **Evaluation**:
  - Understanding of advanced concepts.
  - Problem-solving in complex scenarios.
  - Ability to manipulate hierarchical or semi-structured data.

5. Working with Joins and Relationships (15%)

- **Objective**: Assess understanding of relational database concepts.
- **Tasks**:
  - Write queries using INNER JOIN, LEFT JOIN, RIGHT JOIN, FULL OUTER JOIN, and CROSS JOIN.
  - Perform operations with UNION, INTERSECT, and EXCEPT.
  - Write subqueries for data retrieval.
- **Evaluation**:
  - Correctness of relationships.
  - Use of appropriate joins for different scenarios.
  - Handling of multiple tables effectively.

6. Performance Optimization and Problem Solving (15%)

- **Objective**: Test problem-solving and query optimization.

- **Tasks**:
    - Analyze a slow-running query and optimize it (e.g., by adding an INDEX or rewriting).
    - Use indexing and explain plans to improve query performance.
    - Write queries that avoid redundant data using techniques like **deduplication**.
- **Evaluation**:
    - Problem-solving approach.
    - Understanding of query optimization techniques.
    - Execution speed improvement.

7. Real-World Case Study (Advanced) (10%)

- **Objective**: Assess application of SQL skills in a real-world scenario.
- **Tasks**:
    - Analyze a dataset (e.g., sales, customer data).
    - Write queries to answer business questions, such as:
        - Identify the top 5 customers contributing the most revenue.
        - Find products with declining sales over time.
        - Detect anomalies in transaction data.
- **Evaluation**:
    - End-to-end problem-solving.
    - Business understanding.
    - Creativity and data storytelling.

Assessment Weightage and Marking Scheme

Category	**Weightage**	**Key Skills Evaluated**
Basic SQL Syntax and Queries	15%	Foundational knowledge, query writing skills
Data Manipulation	15%	Data updating, integrity maintenance
Data Analysis with SQL	20%	Analytical thinking, aggregate operations
Advanced SQL Concepts	20%	Window functions, CTEs, recursion,

Category	Weightage	Key Skills Evaluated
		JSON data
Working with Joins and Relationships	15%	Relational understanding, query structuring
Performance Optimization	15%	Problem-solving, efficiency
Real-World Case Study	10%	Application to business problems

Marking for Future Job Alignment

1. **Score Range**:
    - **90–100%**: **Expert** – Ready for complex data science roles; potential leader.
    - **75–89%**: **Proficient** – Can handle most tasks independently.
    - **50–74%**: **Intermediate** – Needs some mentorship; suitable for supervised work.
    - **Below 50%**: **Beginner** – Requires foundational upskilling.
2. **Competency Notes for Job Alignment**:
    - Data Scientist: Strong in Advanced SQL, Analysis, Optimization.
    - Data Analyst: Proficient in Manipulation, Joins, Analysis.
    - Data Engineer: Strong in Performance Optimization, Advanced SQL.