SECTION A – (10 × 2 = 20 marks)

Answer any TEN questions.

1. Define Normalization.
2. What are integrity constraints?
3. What is a join? Give an example.
4. What is a user interface?
5. What are reports?
6. What is data clustering?
7. What is security?
8. Define data partitioning.
9. What are nested queries?
10. What is a primary key?
11. What is database administration?
12. What is a client-server system?

SECTION B – (5 × 5 = 25 marks)

Answer any FIVE questions.

13. Explain the basic form of an SQL Query with examples.
14. Explain the design of forms and reports in DBMS.
15. Difference between a file system and a DBMS.
16. Discuss database security and privacy.
17. Write short notes on data clustering and partitioning.
18. Explain the aggregate operations in SQL with examples.
19. Explain the role of Database Administration with examples.

SECTION C – (3 × 10 = 30 marks)

Answer any THREE questions.

20. Explain DDL and DML commands with examples.
21. Describe Normal forms and Integrity constraints with examples.
22. Explain data storage methods and custom reports in DBMS.
23. Discuss the features of a user interface in DBMS.
24. Explain the concept of distributed databases and client-server databases.

Answers:

SECTION A

1. **Normalization:** Normalization is a process in database design to organize data to minimize redundancy and improve data integrity. It involves dividing large tables into smaller, related tables and defining relationships between them to ensure consistency and avoid anomalies.

2. **Integrity Constraints:** Integrity constraints are rules applied to database columns to ensure the accuracy and reliability of the data. Examples include primary keys, foreign keys, unique constraints, and check constraints, which enforce data validity and consistency.

3. **Join:** A join is an SQL operation used to combine rows from two or more tables based on a related column. Example:
   ```sql
   SELECT employees.name, departments.dept_name
   FROM employees
   JOIN departments ON employees.dept_id = departments.id;
   ```

4. **User Interface:** A user interface (UI) is the point of interaction between the user and a computer system. It includes elements such as screens, pages, buttons, and icons that allow users to interact with software applications.

5. **Reports:** Reports are formatted and organized presentations of data extracted from a database. They provide meaningful information to users and can be used for analysis, decision-making, and record-keeping.

6. **Data Clustering:** Data clustering is a technique used to group similar data points together. In databases, it often refers to physically storing similar rows together on disk to improve query performance.

7. **Security:** Security in databases refers to the measures and controls that protect data from unauthorized access, disclosure, modification, or destruction. It includes authentication, authorization, encryption, and auditing.

8. **Data Partitioning:** Data partitioning is the process of dividing a large database into smaller, more manageable pieces called partitions. This can improve performance, manageability, and availability by isolating data based on certain criteria.

9. **Nested Queries:** Nested queries, or subqueries, are SQL queries embedded within another query. They allow complex filtering and data retrieval operations. Example:
   ```sql
   SELECT name
   FROM employees
   WHERE dept_id = (SELECT id FROM departments WHERE dept_name = 'Sales');
   ```

10. **Primary Key:** A primary key is a unique identifier for a record in a database table. It ensures each row can be uniquely identified and typically cannot be null. Example: `employee_id` in an `employees` table.

11. **Database Administration:** Database administration involves managing and maintaining a database system to ensure its availability, performance, security, and reliability. This includes tasks like backup, recovery, tuning, and user management.

12. **Client-Server System:** A client-server system is a network architecture where client devices request and receive services from a centralized server. The

server hosts resources and services, while clients access and use them over a network.

SECTION B

13. **SQL Query Example:**
    ```sql
    SELECT name, age
    FROM students
    WHERE age > 18;
    ```
    This query selects the `name` and `age` columns from the `students` table where the age is greater than 18.

14. **Design of Forms and Reports:**
    Forms are user interfaces that allow users to enter and modify data in a database. Reports are formatted outputs of data for analysis. Designing involves layout planning, data binding, and interface usability to ensure efficient data entry and reporting.

15. **File System vs. DBMS:**
    - File System: Manages files and directories, lacks structure, and has no built-in query language or integrity constraints.
    - DBMS: Provides a structured way to store, retrieve, and manage data with support for queries, transactions, and data integrity.

16. **Database Security and Privacy:**
    - Security involves protecting data from unauthorized access using measures like authentication, encryption, and access controls.
    - Privacy ensures sensitive data is accessed only by authorized users and protects against breaches.

17. **Data Clustering and Partitioning:**
    - Data Clustering: Groups similar data together to improve access speed.
    - Data Partitioning: Divides large datasets into smaller segments for improved performance and manageability.

18. **Aggregate Operations in SQL:**
    Aggregate functions compute a single result from a set of input values. Examples include:
    ```sql
    SELECT COUNT(*), AVG(salary), MAX(age)
    FROM employees;
    ```

19. **Role of Database Administration:**
    Database administrators manage database systems, ensuring their optimal performance, security, and availability. They perform tasks like backup and recovery, tuning, and user management to maintain database health.

SECTION C

20. **DDL and DML Commands:**
    - DDL (Data Definition Language) commands define and modify database

structures. Examples: `CREATE`, `ALTER`, `DROP`.
     ```sql
     CREATE TABLE employees (
         id INT PRIMARY KEY,
         name VARCHAR(50),
         age INT
     );
     ```
   - DML (Data Manipulation Language) commands manage data within database structures. Examples: `INSERT`, `UPDATE`, `DELETE`.
     ```sql
     INSERT INTO employees (id, name, age) VALUES (1, 'John Doe', 30);
     ```

21. **Normal Forms and Integrity:**
   - First Normal Form (1NF): Ensures each table column contains atomic, indivisible values.
   - Second Normal Form (2NF): Requires 1NF and all non-key columns fully depend on the primary key.
   - Third Normal Form (3NF): Requires 2NF and no transitive dependencies.
   - Integrity constraints ensure data accuracy and consistency through rules like primary keys, foreign keys, and unique constraints.

22. **Data Storage Methods and Custom Reports:**
   - Data Storage Methods: Techniques for organizing and storing data, such as indexing, partitioning, and clustering.
   - Custom Reports: Tailored reports that meet specific user requirements, often created using SQL queries and reporting tools to extract and format data.

23. **Features of a User Interface in DBMS:**
   A DBMS user interface should be intuitive and user-friendly, enabling users to easily interact with the database. Key features include:
   - Navigation tools for accessing different parts of the database.
   - Data entry forms for inputting and updating data.
   - Query builders for generating SQL queries.
   - Visualization tools for displaying data graphically.

24. **Distributed Databases and Client-Server Databases:**
   - Distributed Database: A database spread across multiple locations or systems, allowing data distribution and redundancy for improved performance and availability.
   - Client-Server Database: A centralized server provides database services to multiple clients over a network, facilitating data sharing and centralized management.
