1. Define Data Model. List categories?

A data model is a way to describe the structure of a database, including data types, relationships, and constraints.

Categories:

1. Hierarchical

2. Network

3. Relational

4. Object-oriented

2. Define Data Independence. Mention their types?

Data Independence means changes in data structure do not affect the application programs.

Types:

- Logical Data Independence

- Physical Data Independence

3. What is Schema and instance?

Schema: The structure/design of a database (blueprint).

Instance: The actual data stored in the database at a particular moment.

4. What are the basic tasks of DBMS?

1. Data storage, retrieval, and update

2. User access control

3. Data integrity

4. Backup and recovery

5. Transaction management

5. List the responsibilities of DBA?

1. Database design

2. User access control

3. Backup and recovery

4. Performance tuning

5. Data security

6. Define attribute and entity and give example?

Entity: A real-world object (e.g., Student)

Attribute: Property of an entity (e.g., Name, Roll No)

7. Define Primary Key and Foreign Key?

Primary Key: Uniquely identifies a record (e.g., StudentID)

Foreign Key: Refers to a primary key in another table (e.g., DeptID in Student refers to Department table)

8. Give Different DBMS languages?

1. DDL (Data Definition Language)

2. DML (Data Manipulation Language)

3. DCL (Data Control Language)

4. TCL (Transaction Control Language)

9. What is domain of relation? Give example?

A domain is the set of allowable values for an attribute.

Example: Age domain = {18 to 60}

10. Explain Projection in Relation algebra?

Projection (Projection) returns only selected columns from a relation.

Example: Projection_Name(Student) returns only names from Student table.

11. What is COMMIT & ROLL BACK?

COMMIT: Saves all changes made by the transaction permanently.

ROLLBACK: Undoes all changes made by the transaction.

12. What are Domain integrity constraints?

These ensure attribute values stay within a defined domain (range of values).

Example: Age must be between 18 and 60.

13. What is PL/SQL? Write a basic structure of PL/SQL?

PL/SQL is Oracle's procedural extension of SQL.

```
DECLARE
  -- Variable declaration
```

```
BEGIN
  -- Executable statements
EXCEPTION
  -- Error handling
END;
```

14. What is relationship type? What are their types?

Relationship type defines how entities are related.

Types:

1. One-to-One

2. One-to-Many

3. Many-to-Many

15. List various aggregate functions in SQL?

1. COUNT()

2. SUM()

3. AVG()

4. MIN()

5. MAX()

16. Define Domain? What are Domain constraints?

Domain: Set of valid values for an attribute.

Domain Constraints: Rules that restrict the domain of an attribute.

17. List the Data types in SQL?

INT, VARCHAR, DATE, FLOAT, BOOLEAN

18. Define Normalization? Mention advantages of normalization?

Normalization is the process of organizing data to reduce redundancy.

Advantages:

1. Removes data redundancy

2. Improves data integrity

19. Why we need to normalize the table? Define 1NF, 2NF?

Normalization reduces duplication and maintains data integrity.

1NF: No repeating groups, atomic values

2NF: 1NF + No partial dependency

20. List ACID properties of Transaction?

1. Atomicity

2. Consistency

3. Isolation

4. Durability

21. Define transaction. Give example?

A transaction is a sequence of operations performed as a single logical unit.

Example: Withdraw 1000 from bank.

22. What is the purpose of lock and types of locks?

Locks control concurrent access to data.

Types:

- Shared Lock

- Exclusive Lock

23. What is Data Recovery?

Data Recovery is the process of restoring data after failure using backup or logs.

24. What is Deadlock?

A deadlock occurs when two or more transactions wait indefinitely for each other to release resources.

25. Explain ACID properties?

Atomicity: All or nothing

Consistency: Maintains valid state

Isolation: No interference between transactions

Durability: Changes persist after commit

26. What are the types of Database architecture?

1. Single-tier

2. Two-tier

3. Three-tier

27. What is the different level of Data Abstraction?

1. Physical Level How data is stored

2. Logical Level What data is stored

3. View Level User interaction with data