**Q1. What is a database? Explain with an example on why should we need a database.**

**Ans:** A database is an organized collection of structured information stored electronically. For example, a university needs a database to efficiently manage student records, course information, and grades. Without it, handling data for thousands of students across multiple departments would be chaotic and error-prone.

**Q2. Write a short note on file based storage system. Explain the major challenges of a file based storage system?**

**Ans:** A file-based storage system is a method of organizing and storing data in which information is kept in separate files, typically managed by the operating system. Each application maintains its own set of files, often with custom formats and structures tailored to the specific needs of that application.

Major challenges of a file-based storage system include:

* Data redundancy: The same information may be duplicated across multiple files, leading to wasted storage space and potential inconsistencies.
* Data inconsistency: When data is repeated in multiple files, updating one instance but not others can lead to conflicting information.
* Data isolation: Files are often specific to particular applications, making it difficult to share data between different systems or departments.
* Limited data accessibility: Retrieving specific information often requires writing custom programs to search through files.
* Poor data integrity: It's challenging to enforce constraints and relationships between data in separate files.
* Concurrency issues: Managing simultaneous access by multiple users is difficult and can lead to conflicts or data corruption.
* Limited security: File systems typically offer basic security measures, which may be inadequate for sensitive data.
* Lack of standardization: Each application may use its own file format, complicating data exchange and integration.
* Difficulty in recovery: In case of system failures, recovering data from file-based systems can be complex and time-consuming.

**Q3. What is DBMS? What was the need for DBMS?**

**Ans:** DBMS (Database Management System) is software that manages databases, providing an interface between users and the database. It was needed to address the limitations of file-based systems and provide better data management, security, and accessibility.

**Q4. Explain 5 challenges of file-based storage system which was tackled by DBMS?**

**Ans:** Five challenges of file-based systems tackled by DBMS:

* Data redundancy: DBMS minimizes duplicate data
* Data inconsistency: DBMS ensures data consistency across the system
* Data isolation: DBMS allows easy data integration and sharing
* Concurrent access: DBMS manages multiple user access efficiently
* Security: DBMS provides robust security measures

**Q5. List Out the different types of classification in DBMS and explain?**

**Ans:** Types of DBMS classification:

* Based on data model: Relational, Object-oriented, Hierarchical, Network
* Based on number of users: Single-user, Multi-user
* Based on database distribution: Centralized, Distributed
* Based on purpose: General-purpose, Specific-purpose

**Q6. What is the significance of Data Modelling and explain the types of Data Modelling?**

**Ans:** Data modeling is crucial for organizing and structuring data efficiently. Types include:

* Conceptual: High-level view of data relationships
* Logical: Detailed structure without physical implementation details
* Physical: Specific implementation of the database

**Q7. Explain 3 schema architecture along with its advantages?**

**Ans:** The three-schema architecture consists of:

* External schema (user view)
* Conceptual schema (logical view)
* Internal schema (physical view)

Advantages:

* Data independence
* Improved data sharing
* Reduced complexity
* Enhanced data consistency