

## Output Design

Output design focuses on presenting information to users in a meaningful and useful manner. It involves:

- Determining what information should be presented (content).
- Deciding how the information should be arranged (layout).
- Choosing the appropriate media for delivery (e.g., screen, paper).

## Reports

Reports are structured presentations of data that help users make informed decisions. Types include:

- **Detail reports:** Provide detailed data on specific transactions or events.
- **Summary reports:** Condense large volumes of data into manageable summaries.
- **Exception reports:** Highlight deviations from expected values or conditions.

## Guidelines for UI Design

Leaders in UI design include principles such as:

- **Consistency:** Uniformity in design elements throughout the interface.
- **Clarity:** Clear and understandable presentation of information.
- **Efficiency:** Minimizing user effort to achieve tasks.
- **Feedback:** Providing timely responses to user actions.

## Ergonomics

Ergonomics ensures that the system interface is designed for human comfort and efficiency:

- Considers factors like display readability, input device usability, and user posture.
- Aims to reduce physical and cognitive strain on users.

## Data Structure

Data structures define how data is organized, stored, and accessed in a system:

- Examples include arrays, linked lists, trees, and graphs.
- Choosing the right structure impacts efficiency and ease of data manipulation.

## Data Design Concepts

Includes:

- **Entity-Relationship Diagram (ERD):** Illustrates entities, attributes, and relationships in a database.
- **Normalization:** Reduces redundancy and improves data integrity.

- **Object-oriented data modeling:** Uses objects and classes to represent data and its relationships.

## DBMS Components

Components of a Database Management System (DBMS):

- **Storage Manager:** Handles storage allocation and data retrieval.
- **Query Processor:** Translates queries and commands into efficient operations.
- **Concurrency Control:** Manages simultaneous access to data.
- **Recovery Manager:** Ensures database consistency and durability.

## SQL Syntax

SQL (Structured Query Language) syntax includes commands for:

- **Data Definition Language (DDL):** Defines database structure (CREATE, ALTER, DROP).
- **Data Manipulation Language (DML):** Manipulates data (SELECT, INSERT, UPDATE, DELETE).
- **Data Control Language (DCL):** Manages access rights (GRANT, REVOKE).

## ERD (Entity-Relationship Diagram)

ERD is a visual representation of:

- Entities (objects or concepts).
- Attributes (properties or characteristics).
- Relationships (associations between entities).

## Project Management

Involves planning, organizing, and controlling resources to achieve specific goals:

- **Phases:** Initiation, planning, execution, monitoring, and closure.
- **Tools:** Gantt charts, PERT charts, and critical path analysis.

## Design Phase

In system development, the design phase:

- Translates requirements into detailed specifications.
- Includes architectural, logical, and physical design.

## System Testing

Types of system testing:

- **Unit testing:** Tests individual components or modules.

- **Integration testing:** Tests combined modules or subsystems.
- **System testing:** Tests the entire system as a whole.

## System Maintenance

Types of system maintenance:

- **Corrective:** Fixes errors or defects.
- **Adaptive:** Adapts the system to new hardware or software environments.
- **Perfective:** Improves system performance or functionality.
- **Preventive:** Proactively avoids future issues.

## Normalization

Normalization eliminates redundancy and ensures data integrity in databases:

- **1NF:** Ensures atomicity of data.
- **2NF:** Eliminates partial dependencies.
- **3NF:** Removes transitive dependencies.

## Database Using Object-Oriented Model

Object-Oriented Database Management Systems (OODBMS):

- Store data as objects, with attributes and methods.
- Support inheritance, encapsulation, and polymorphism.

## Security Measures of Implemented Systems

Security measures include:

- **Authentication:** Verifies user identity.
- **Authorization:** Controls user access rights.
- **Encryption:** Secures data transmission and storage.
- **Auditing:** Monitors and records system activities.

These topics provide a comprehensive overview of System Analysis and Design, covering key concepts and principles essential for your exam preparation.

## SECTION A (20 Marks)

1. What is the purpose of output design in a system development process?
  - To provide a clear and organized presentation of data output.
2. Describe two types of reports commonly generated by a DBMS.
  - Summary reports and detail reports.
3. List three key characteristics of an effective leader for UI design.
  - Vision, communication skills, and empathy.
4. Explain the importance of ergonomics in software design.
  - To enhance user comfort and efficiency.
5. What are the primary components of a data structure?
  - Arrays, linked lists, stacks, queues, trees, graphs.
6. Define data design concept.
  - It outlines how data is organized, stored, and managed.
7. Name and briefly describe three main components of a DBMS.
  - Database engine, database schema, query processor.
8. Write an example of a simple SQL query to select all records from a table named "Employees".
  - `SELECT * FROM Employees;`
9. What is an ERD and why is it useful in database design?
  - Entity-Relationship Diagram; it represents data relationships.
10. Outline the main phases of project management.
  - Initiation, planning, execution, monitoring, closing.

11. Describe the design phase in system development.
  - Requirement analysis, system design.
12. List the three types of system testing and provide a brief description of each.
  - Unit testing, integration testing, system testing.
13. What are the different types of system maintenance?
  - Corrective, adaptive, perfective, preventive.
14. Explain the concept of normalization in database design.
  - Organizing data to minimize redundancy.
15. What are the advantages of using an object-oriented model for database design?
  - Reusability, encapsulation, inheritance.
16. List three common security measures implemented in database systems.
  - Authentication, encryption, access controls.
17. What is the role of a DBMS in managing data integrity?
  - Ensures data is accurate, consistent, and reliable.
18. Describe how SQL syntax is used to manipulate data in a database.
  - Through commands like SELECT, INSERT, UPDATE, DELETE.
19. What is the significance of an ERD in the system development life cycle?
  - It visually represents system components and relationships.
20. Explain the role of project management in system development.
  - It ensures projects are completed on time, within budget, and meet requirements.

Example MCQ question

### Output Design

1. What is the primary goal of output design?

- ☐ A. Ensure data is stored correctly
- ☒ B. Present information to users in a meaningful and useful manner
- ☐ C. Validate data input
- ☐ D. Manage system memory

### Reports

2. Which type of report summarizes large volumes of data?

- ☐ A. Detail report
- ☒ B. Summary report
- ☐ C. Exception report
- ☐ D. Analytical report

3. What is the purpose of an exception report?

- ☐ A. To provide detailed information on transactions
- ☐ B. To summarize data trends
- ☒ C. To highlight deviations from expected conditions
- ☐ D. To track system performance

### Leaders for UI

4. Which principle emphasizes uniformity in design elements?

- ☐ A. Efficiency
- ☐ B. Clarity
- ☒ C. Consistency
- ☐ D. Feedback

5. What is essential for providing timely responses to user actions?

- ☐ A. Consistency
- ☐ B. Clarity
- ☐ C. Efficiency
- ☒ D. Feedback

## Ergonomics

6. Ergonomics in system design primarily aims to:

- ☐ A. Improve software performance
- ☒ B. Enhance user comfort and efficiency
- ☐ C. Ensure data security
- ☐ D. Simplify database design

## Data Structure

7. Which data structure uses nodes and pointers?

- ☐ A. Array
- ☒ B. Linked list
- ☐ C. Hash table
- ☐ D. Queue

8. Trees and graphs are examples of:

- ☐ A. Linear data structures
- ☒ B. Non-linear data structures
- ☐ C. Simple data structures
- ☐ D. Primitive data structures

## Data Design Concept

9. An Entity-Relationship Diagram (ERD) represents:

- ☐ A. Program flow
- ☒ B. Database schema
- ☐ C. User interface layout
- ☐ D. Network topology

10. Normalization is used to:

- ☐ A. Increase data redundancy
- ☒ B. Improve data integrity
- ☐ C. Simplify data input
- ☐ D. Enhance user interaction

## DBMS Components

11. Which DBMS component handles storage allocation and retrieval?

- ☐ A. Query Processor
- ☒ B. Storage Manager
- ☐ C. Concurrency Control
- ☐ D. Recovery Manager

12. The Query Processor is responsible for:

- ☐ A. Data encryption
- ☒ B. Executing user queries
- ☐ C. Managing data backups
- ☐ D. Controlling access rights

## SQL Syntax

13. The SQL command to create a table is:

- ☐ A. INSERT
- ☐ B. UPDATE
- ☒ C. CREATE
- ☐ D. SELECT

14. Which SQL command is used to remove a table from a database?

- ☐ A. DELETE
- ☒ B. DROP
- ☐ C. TRUNCATE
- ☐ D. ALTER

## ERD

15. In an ERD, entities are typically represented by:

- ☐ A. Circles
- ☐ B. Squares
- ☐ C. Diamonds
- ☒ D. Rectangles



**16. In an ERD, relationships between entities are represented by:**

- ☐ A. Circles
- ☒ B. Diamonds
- ☐ C. Rectangles
- ☐ D. Lines

### **Project Management**

**17. Which phase in project management involves defining project scope and objectives?**

- ☒ A. Initiation
- ☐ B. Planning
- ☐ C. Execution
- ☐ D. Closure

**18. Gantt charts are primarily used for:**

- ☐ A. Defining project scope
- ☒ B. Scheduling project tasks
- ☐ C. Managing project budget
- ☐ D. Conducting risk analysis

### **Design Phase**

**19. The design phase in system development translates requirements into:**

- ☐ A. Data models
- ☒ B. Detailed specifications
- ☐ C. User feedback
- ☐ D. Test cases

## System Testing

### 20. Unit testing focuses on testing:

- A. Entire systems
- B. Integrated subsystems
- C. Individual components
- D. User interfaces

### 21. Integration testing is performed to test:

- A. Individual modules
- B. Combined modules
- C. Complete systems
- D. User acceptance

### 22. System testing evaluates:

- A. Individual components
- B. Database performance
- C. The entire system
- D. Development processes

## System Maintenance

### 23. Corrective maintenance involves:

- A. Enhancing system features
- B. Fixing software defects
- C. Adapting to new environments
- D. Preventing future issues

### 24. Adaptive maintenance is required when:

- A. Bugs need fixing
- B. The system needs optimization
- C. The environment changes
- D. Users need training

## Normalization

25. Which normal form eliminates partial dependencies?

- ☐ A. 1NF
- ☒ B. 2NF
- ☐ C. 3NF
- ☐ D. BCNF

26. Transitive dependencies are removed in:

- ☐ A. 1NF
- ☐ B. 2NF
- ☒ C. 3NF
- ☐ D. 4NF

## Database Using Object-Oriented Model

27. In an object-oriented database, data is stored as:

- ☐ A. Records
- ☐ B. Tables
- ☒ C. Objects
- ☐ D. Fields

28. Which feature of OODBMS supports code reuse?

- ☐ A. Encapsulation
- ☒ B. Inheritance
- ☐ C. Polymorphism
- ☐ D. Abstraction

## Security Measures of Implemented Systems

### 29. Authentication ensures:

- A. Data encryption
- B. User identity verification
- C. Access right control
- D. System performance monitoring

### 30. Encryption is primarily used to:

- A. Control user access
- B. Ensure data integrity
- C. Secure data transmission
- D. Monitor system usage

## Entity Relationship Diagram - Internet Sales Model

