3. Recovery is typical and additional burden on DBMS server to handle concurrency control.
4. Programming cost is high.
5. The implementation is more complex since one needs to deal with the middle ware and the network.

## 1.10 COMPARISON BETWEEN CLIENT/SERVER AND DISTRIBUTED DATABASE SYSTEM

| Client/Server Database System | Distributed Database System |
|---|---|
| 1. In this, different platforms are often difficult to manage. | 1. In this, different platforms can be managed easily. |
| 2. Here, application is usually distributed across clients. | 2. Here, application is distributed across sites. |
| 3. In this database system, whole system comes to a halt if server crashes. | 3. Here, failure of one site doesn't bring the entire system down as system may be able to reroute the one site's request to another site. |
| 4. Maintenance cost is low. | 4. Maintenance cost is much higher. |
| 5. In this system, access to data can be easily controlled. | 5. In DDS not only does the access to replicate the data has to be controlled at multiple locations but also the network has to be made secure. |
| 6. In this, new sites can not be added easily. | 6. In this, new sites can be added with little or no problem. |
| 7. Speed of database access is good. | 7. Speed of database access is much better. |

## TEST YOUR KNOWLEDGE

### True/False

1. A database actually consists of three parts: information, the logical structure of that information, and tables.
2. A data dictionary, or relation, is a two-dimensional table used to store data within a relational database.
3. A database management system (DBMS) allows you to specify the logical organization for a database and access and use the information within a database.
4. A physical view represents how the users view the data.
5. A database may have numerous physical views.
6. Fixed length record sometimes wastes space while variable length record does not waste space.
7. A database is any collection of related data.
8. A DBMS is a software system to facilitate the creation and maintenance of a computerized database.
9. End-users can be categorized into casual, designer, or parametric users.

10. Data redundancy exists when the same data is stored at multiple places.
11. A database always maintains a collection of unrelated data.
12. A database system is a software system to enable users to create and maintain a computerized database.
13. End-users can be categorized into casual, naïve, sophisticated, or stand-alone users.
14. Typical DBMS functionality is to define and create a particular database in terms of its data types, structures, and constraints.
15. Data redundancy exists when the same data is stored at one place.
16. A database is a very large software system used for processing related data.
17. The DBMS stores definitions of the data elements and their relationships (metadata) in a data dictionary.
18. Data about data is metadata.
19. One of the main functions of a database system is to provide timely answers to end users.
20. To work with data, the DBMS must retrieve the data from permanent storage and place it in RAM.

## Fill in the Blanks

1. A(n) _____ contains the logical structure for the information.
2. A(n)_____ represents how data is physically stored on a storage device.
3. A(n)_____ represents how knowledge users see information.
4. A data model is a collection of concepts that can be used to describe the _____ of a database.
5. _____ schema describes physical storage structures and access paths.
6. In three-schema architecture, user views are defined at _____ schema.
7. _____ data model provides concepts that are close to the way many users perceive data.
8. External schema describes the various user _____.
9. A _____ is a collection of concepts that can be used to describe the structure of a database.
10. _____ data models use concepts such entities, attributes, and relationships.
11. Data stored in database at a particular moment in time is a database _____.
12. A _____ is a unit of work that includes one or more reads or updates of database records.
13. The description of schema constructs and constraints is called _____ .
14. The description of a database is called database _____.
15. The database state is called _____ of the schema.

## Multiple Choice Questions

1. Manager's salary details are to be hidden from Employees Table. This technique is called as (*UGC-NET*)

(*a*) Conceptual level datahiding
(*b*) Physical level datahiding
(*c*) External level datahiding
(*d*) Logical level datahiding.

2. Which of the following is not a type of database management system? (*UGC-NET*)
   (*a*) Hierarchical (*b*) Network
   (*c*) Relational (*d*) Sequential.
3. A schema describes (*UGC-NET*)
   (*a*) Data elements (*b*) Records and files
   (*c*) Record relationship (*d*) All of the above.
4. Which data management language component enabled the DBA to define schema components? (*UGC-NET*)
   (*a*) DML (*b*) Subschema DLL
   (*c*) Schema DLL (*d*) All of these.
5. Which statement is false regarding data independence? (*UGC-NET*)
   (*a*) Hierarchical data model suffers from data independence.
   (*b*) Network model suffers from data independence.
   (*c*) Relational model suffers from logical data independence.
   (*d*) Relational model suffers from physical data independence.
6. Databases may be more expensive to maintain than files because of
   (*a*) backup and recovery needs
   (*b*) the complexity of the database environment
   (*c*) the need for specialized personnel
   (*d*) all of the above.
7. Typically, a database consists _____ but can support mul _____.
   (*a*) table, queries (*b*) information, data
   (*c*) physical view, logical view (*d*) information view, data view.
8. Which view of information deals with how the information is physically arranged, stored, and accessed?
   (*a*) Physical view (*b*) Logical view
   (*c*) Information view (*d*) None of the above
9. A mail order database has the following conceptual schemas:

   Employees (Eno,ename,zip,hDate)

   Parts(Pno,Pname,Price)

   Customers(Cno,Cname,Street,Zip,Phone)

   Orders(Ono,Cno,Eno,Received,Shipped)

   Odetails(Ono,Pno,Qty)

   ZipCodes(Zip,City)

   and has the following External View Schemas:

   Order_Report(Ono,Cno,Eno,Total Price)

   Consider the following statements

   (*a*) Adding a column zip to the orders schema to keep track of the zip code of each order does not affect the schema of Order_Report.

   (*b*) To improve query processing, a new index was created on the column Cno of Orders table.

(*i*) Which of these statements represent logical data independence?

(*a*) Both (*a*) and (*b*) (*b*) (*a*)

(*c*) (*b*) (*d*) None of (*a*) and (*b*)

(*ii*) Which of these statements represent physical data independence?

(*a*) Both (*a*) and (*b*) (*b*) (*a*)

(*c*) (*b*) (*d*) None of (*a*) and (*b*)

(*iii*) Which of the following is an example of controlled redundancy?

(*a*) Adding a column Ono to the Employees table.

(*b*) Adding a column Ono to the Employees table and making sure that the Ono value in an Employee record matches a value in the Ono column in the Orders table.

(*c*) Removing the column HDate from the Employees table.

(*d*) Both (*a*) and (*b*).

10. By redundancy in a file based system we mean that

(*a*) unnecessary data is stored

(*b*) same data is duplicated in many files

(*c*) data is unavailable

(*d*) files have redundant data.

11. Data integrity in a file based system may be lost because

(*a*) the same variable may have different values in different files

(*b*) files are duplicated

(*c*) unnecessary data is stored in files

(*d*) redundant data is stored in files.

12. Data availability is often difficult in file based system

(*a*) as files are duplicated

(*b*) as unnecessary data are stored in files

(*c*) as one has to search different files and these files may be in different update states

(*d*) redundant data are stored in files.

13. Some of the objectives of a database management system are to

(*i*) minimize duplication of data

(*ii*) ensure centralized management control of data

(*iii*) ease retrieval of data

(*iv*) maintain a data dictionary

(*a*) (*i*) and (*ii*) (*b*) (*i*), (*ii*) and (*iv*)

(*c*) (*i*) and (*iii*) (*d*) (*i*), (*ii*) and (*iii*)

14. A database is a

(*a*) collection of files

(*b*) collection of inputs and outputs of application

(*c*) collection of related data necessary to manage an organization

(*d*) data resource of an organization.

15. One of the main objectives of a DBMS is to

(*a*) create a database for an organization

(*b*) facilitate sharing of a database by current and future applications
(*c*) allow sharing application programs
(*d*) replace file based systems.

16. By data independence we mean application programs
(*a*) do not need data
(*b*) may be developed independent of data
(*c*) may be developed without knowing the organization of data
(*d*) may be developed with independent data.

17. Data independence allows
(*i*) no changes in application programs
(*ii*) change in database without affecting application programs
(*iii*) hardware to be changed without affecting application programs
(*iv*) system software to be changed without affecting application programs
(*a*) (*i*), (*ii*) (*b*) (*ii*), (*iii*)
(*c*) (*ii*), (*iii*), (*iv*) (*d*) (*i*), (*ii*), (*iv*)

18. Data independence allows
(*a*) sharing the same database by several applications
(*b*) extensive modification of applications
(*c*) no data sharing between applications
(*d*) elimination of several application programs.

19. By data integrity we mean
(*a*) maintaining consistent data values (*b*) integrated data values
(*c*) banning improper access to data (*d*) not leaking data values.

20. By data security in DBMS we mean
(*a*) preventing access to data
(*b*) allowing access to data only to authorized users
(*c*) preventing changing data
(*d*) introducing integrity constraints.

21. A subset of logical data model accessed by programmers is called a
(*a*) conceptual data model (*b*) external data model
(*c*) internal data model (*d*) an entity-relation data model.

22. When a logical model is mapped into a physical storage such as a disk store the resultant data model is known as
(*a*) conceptual data model (*b*) external data model
(*c*) internal data model (*d*) disk data model.

23. A DBMS has the following components
(*i*) a data definition language
(*ii*) a query language
(*iii*) a security system
(*iv*) audit trail.
(*a*) (*i*), (*i*) (*b*) (*i*), (*ii*), (*iii*)
(*c*) (*i*), (*ii*), (*iii*), (*iv*) (*d*) (*i*), (*ii*), (*iv*)

24. A database administrator
    (*a*) administers data in an organization
    (*b*) controls all inputs and all outputs of programs
    (*c*) is controller of data resources of an organization
    (*d*) controls all data entry operators.
25. The responsibilities of a database administrator includes
    (*i*) maintenance of data dictionary
    (*ii*) ensuring security of database
    (*iii*) ensuring privacy and integrity of data
    (*iv*) obtain an E-R model
    (*a*) (*i*), (*ii*) (*b*) (*i*), (*ii*), (*iii*)
    (*c*) (*i*), (*ii*), (*iii*), (*iv*) (*d*) (*ii*), (*iii*), (*iv*)
26. The sequence followed in designing a DBMS are
    (*a*) physical model conceptual model logical model
    (*b*) logical model physical model conceptual model
    (*c*) conceptual model logical model physical model
    (*d*) conceptual model physical model logical model.
27. What is data integrity?
    (*a*) It is the data contained in database that is non redundant.
    (*b*) It is the data contained in database that is accurate and consistent.
    (*c*) It is the data contained in database that is secured.
    (*d*) It is the data contained in database that is shared.
28. The metadata is created by the
    (*a*) DML compiler
    (*b*) DML pre-processor
    (*c*) DDL interpreter
    (*d*) Query interpreter
29. Which of the following statement is correct?
    Logical data independence provides following without changing application programs:
    (*i*) Changes in access methods.
    (*ii*) Adding new entities in database
    (*iii*) Splitting an existing record into two or more records
    (*iv*) Changing storage medium
    (*a*) (*i*) and (*ii*) (*b*) (*iv*) only,
    (*c*) (*i*) and (*iv*) (*d*) (*ii*) and (*iii*)
30. Manager salary details are hidden from the employee. This is
    (*a*) Conceptual level data hiding. (*b*) External level data hiding.
    (*c*) Physical level data hiding. (*d*) None of these.
31. A logical schema
    (*a*) is the entire database.
    (*b*) is a standard way of organizing information into accessible parts.

(*c*) describes how data is actually stored on disk.

(*d*) both (*a*) and (*c*)

32. The database environment has all of the following components except:

(*a*) users. (*b*) separate files.

(*c*) database. (*d*) database administrator.

33. A subschema expresses

(*a*) the logical view. (*b*) the physical view.

(*c*) the external view. (*d*) all of the above.

34. Which one of the following statements is false?

(*a*) The data dictionary is normally maintained by the database administrator.

(*b*) Data elements in the database can be modified by changing the data dictionary.

(*c*) The data dictionary contains the name and description of each data element.

(*d*) The data dictionary is a tool used exclusively by the database administrator.

35. Data independence means

(*a*) data is defined separately and not included in programs.

(*b*) programs are not dependent on the physical attributes of data.

(*c*) programs are not dependent on the logical attributes of data.

(*d*) both (*b*) and (*c*).

36. DBMS helps achieve

(*a*) Data independence (*b*) Centralized control of data

(*c*) Neither (*a*) nor (*b*) (*d*) Both (*a*) and (*b*)

37. It is better to use files than a DBMS when there are

(*a*) Stringent real-time requirements. (*b*) Multiple users wish to access the data.

(*c*) Complex relationships among data. (*d*) All of the above.

38. A data dictionary is a special file that contains:

(*a*) The name of all fields in all files. (*b*) The width of all fields in all files.

(*c*) The data type of all fields in all files. (*d*) All of the above.

39. Which of the following is incorrect?

(*a*) Database state is the actual data stored in a database at a particular moment in time.

(*b*) Database state is called database intension.

(*c*) Database state is called database instance.

(*d*) Database schema is a description of the structure of the data in a database.

40. Which of the following is correct?

(*a*) Database schema changes frequently, but database state does not change.

(*b*) Database schema is specified during database design.

(*c*) Database schema changes frequently.

(*d*) The database schema changes more often than the database state.

41. A DBMS that supports a database located at multiple sites is called _____ DBMS.

(*a*) centralized (*b*) multi-user

(*c*) distributed (*d*) single-user

42. Select the incorrect statement about database.
    (*a*) It represents some aspect of the real world.
    (*b*) It is a random assortment of data.
    (*c*) It is designed, built, and populated with data for a specific purpose.
    (*d*) It is a collection of related data.
43. Using DBMS has many advantages , except _____.
    (*a*) Increases redundancy
    (*b*) Restricts unauthorized access
    (*c*) Provides backup and recovery
    (*d*) Enforces integrity constraints
44. Consider the following schema for an investment portfolio database
    (*a*) Member (MemberId, Password,FName,LName)
    Security (SId,SName, CurrentPrice, AskPrice,BidPrice)
    Transaction (MemberId, SId, Tdate, Ttype,Qty,Price)
    (*b*) Member_Transaction(MemberId,Fname,LName,Tdate,Type,Qty,Price) seen by Members and Administrators
    Member_Password(MemberId,Password) seen only by Members
    (*c*) Data_Layout(Table_Name,Data_Item_Name, Starting_Position,Length_In_Bytes)
    (*i*) Which of the above schemas is an Internal Schema?
        (*a*) Only (*a*)
        (*b*) Only (*b*)
        (*c*) Only (*c*)
        (*d*) All of the above
    (*ii*) Which of the above schemas is a Conceptual Schema?
        (*a*) Only (*a*)
        (*b*) Only (*b*)
        (*c*) Only (*c*)
        (*d*) All of the above
    (*iii*) Which of the above schemas is an External Schema?
        (*a*) Only (*a*)
        (*b*) Only (*b*)
        (*c*) Only (*c*)
        (*d*) All of the above
45. Match the following:
    1. DDL (*a*) Manipulates the data base
    2. SDL (*b*) Specifies user views and their mappings
    3. VDL (*c*) Specifies internal schema
    4. DML (*d*) Specifies conceptual and internal schema both or conceptual schema only
        (*a*) 1-*a*, 2-*c*, 3-*d*, 4-*b*
        (*b*) 1-*d*, 2-*c*, 3-*b*, 4-*a*
        (*c*) 1-*b*, 2-*d*, 3-*a*, 4-*c*
        (*d*) 1-*c*, 2-*d*, 3-*a*, 4-*b*
46. Match the following:
    1. Relational data model
    2. Network model
    3. Hierarchical model
    (*a*) Represents database as collection of tables
    (*b*) Represents data as tree structures
    (*c*) Represents data as record types
        (*a*) 1-*c*, 2-*a*, 3-*b*
        (*b*) 1-*b*, 2-*c*, 3-*a*
        (*c*) 1-*b*, 2-*a*, 3-*c*
        (*d*) 1-*a*, 2-*c*, 3-*b*
47. Match the following:
    1. View level (*a*) Describes the part of database for a particular user group
    2. Conceptual level (*b*) Describes the structure of whole database for community of users

3. Internal level (*c*) Describes the part of database for a particular user group

(*a*) 1-*c*, 2-*b*, 3-*a* (*b*) 1-*b*, 2-*c*, 3-*a*

(*c*) 1-*b*, 2-*a*, 3-*c* (*d*) 1-*a*, 2-*c*, 3-*b*

48. Program-data dependence is caused by

(*a*) data descriptions being stored on a server.

(*b*) data cohabiting with programs.

(*c*) file descriptors being stored in each application.

(*d*) data descriptions being written into programming code.

## ANSWERS

### True/False

1. False
2. False
3. True
4. False
5. False
6. False
7. True
8. True
9. False
10. True
11. False
12. True
13. True
14. True
15. False
16. False
17. True
18. True
19. True
20. True

### Fill in the Blanks

1. Data dictionary
2. Physical view
3. Logical view
4. structure
5. Conceptual
6. external
7. External
8. views
9. data model
10. conceptual
11. state
12. Transaction
13. Meta data
14. Schema
15. Extension

### Multiple Choice Questions

1. (*c*)
2. (*d*)
3. (*d*)
4. (*d*)
5. (*d*)
6. (*d*)
7. (*c*)
8. (*a*)
9. (*i*) (*b*) (*ii*) (*c*) (*iii*) (*b*)
10. (*b*)
11. (*a*)
12. (*c*)
13. (*d*)
14. (*c*)
15. (*b*)
16. (*c*)
17. (*c*)
18. (*a*)
19. (*a*)
20. (*b*)
21. (*b*)
22. (*c*)
23. (*c*)
24. (*c*)
25. (*b*)
26. (*c*)
27. (*b*)
28. (*c*)
29. (*d*)
30. (*a*)
31. (*a*)
32. (*a*)
33. (*c*)
34. (*b*)
35. (*d*)
36. (*d*)
37. (*b*)
38. (*d*)
39. (*b*)

40. (*b*) 41. (*c*) 42. (*b*)
43. (*a*) 44. (*i*) (*c*) (*ii*) (*a*) (*iii*) (*b*) 45. (*b*)
46. (*d*) 47. (*a*) 48. (*c*)

## EXERCISES

### Short Answer Questions

1. What is data?
2. What is Information?
3. What is the difference between data and information?
4. What is Metadata?
5. Explain various types of Metadata?
6. What is data dictionary?
7. What is active data dictionary?
8. What is passive data dictionary?
9. What is the difference between active and passive data dictionary?
10. What is data base?
11. What are the main characteristics of a database?
12. What are the capabilities of a database?
13. Define database management system?
14. What are the various functions of DBMS?
15. What are the criteria of classifying DBMS?
16. What is a field?
17. What is record?
18. What is a file?
19. Differentiate between field, record and file?
20. Give names of components of database?
21. What are the main components of DBMS?
22. What is traditional file system?
23. How traditional file system is different from database system?
24. What are the disadvantages of traditional file system?
25. What is database system?
26. What are the components of database system?
27. What are the advantages of database system?
28. What are the disadvantages of database system?
29. What are various users of DBMS?
30. List the people associated with the database.
31. What is DBA?
32. What are the responsibilities of DBA?

**33.** List 5 DBA Activities in the order that they are most performed.

**Ans.** Backup/Restore, Startup/Shutdown, Capacity Planning (Disk Space), Performance, Connectivity, Transactional Problems (Concurrency, etc.)

**34.** What are the various languages of DBMS?

**35.** What is DDL?

**36.** What is SDL?

**37.** What is VDL?

**38.** What is DML?

**39.** What is 4GL?

**40.** What is the difference between DDL and DML?

**41.** What is an instance?

**42.** What is schema?

**43.** What is subschema?

**44.** What is the difference between schema and subschema?

**45.** What is the difference between schema and instance?

**46.** What is physical schema?

**47.** What is logical schema?

**48.** What is conceptual schema?

**49.** What are the three levels of three-tier architecture?

**50.** What is conceptual/Internal mapping?

**51.** What is external/conceptual mapping?

**52.** What are the advantages of three level architecture?

**53.** What is data independence?

**54.** What is physical data independence?

**55.** What is logical data independence?

**56.** What is the difference between physical and logical data independence?

**57.** Give some applications of DBMS.

**58.** What are the advantages of using a DBMS?

**59.** What are the criteria of classifying DBMS?

**60.** Give the levels of data abstraction?

**61.** What is storage manager?

**62.** What is an entity relationship model?

**63.** Define data model?

**64.** What are the categories of data models?

## Long Answer Questions

**1.** What do you mean by data? How is it different from information, explain by example?

**2.** What are the four major components of database system? Explain.

**3.** What are the advantages of database systems? Explain in detail.

**4.** What is DBMS? What are the advantages and disadvantages offered by such systems as compared to file processing system? Explain.