

100 Intermediate Level MCQ Questions on Database Concepts

Database Management Systems: Components and Advantages

1. Which of the following is NOT a component of a DBMS?

- a) Data Dictionary
- b) Query Language Processor
- c) File Manager
- d) Machine Learning Engine

Answer: d) Machine Learning Engine

2. The component of DBMS responsible for authorization and authentication of users is:

- a) Query Processor
- b) Security Manager
- c) Storage Manager
- d) Data Dictionary Manager

Answer: b) Security Manager

3. Which DBMS component maintains metadata about the database objects?

- a) File Manager
- b) Buffer Manager
- c) Data Dictionary
- d) Transaction Manager

Answer: c) Data Dictionary

4. Which of the following is NOT an advantage of using a DBMS?

- a) Data integrity
- b) Data independence
- c) Reduced development time
- d) Decreased system performance

Answer: d) Decreased system performance

5. The DBMS component that translates SQL queries into low-level instructions is:

- a) Query Processor
- b) Transaction Manager
- c) Storage Manager
- d) Data Dictionary Manager

Answer: a) Query Processor

6. Which of the following best describes data independence in a DBMS?

- a) The ability to modify data without affecting the application programs
- b) The ability to access data without authentication
- c) The ability to store data across multiple locations
- d) The ability to modify database structure without affecting application programs

Answer: d) The ability to modify database structure without affecting application programs

7. The DBMS component responsible for ensuring the atomicity of transactions is:

- a) Security Manager
- b) Transaction Manager
- c) Query Processor
- d) Buffer Manager

Answer: b) Transaction Manager

8. Which of the following is an advantage of using a DBMS for data management?

- a) Simplified backup and recovery
- b) Increased storage requirements
- c) Limited access control capabilities
- d) Mandatory programming knowledge for end users

Answer: a) Simplified backup and recovery

9. The purpose of a buffer manager in a DBMS is to:

- a) Optimize network traffic between clients and the database
- b) Manage data transfers between disk storage and main memory
- c) Handle user authentication and authorization
- d) Compile and optimize SQL queries

Answer: b) Manage data transfers between disk storage and main memory

10. Which component of a DBMS handles concurrent access to the database?

- a) Query Processor
- b) Transaction Manager
- c) Storage Manager
- d) Data Dictionary Manager

****Answer: b) Transaction Manager****

Database Models: Flat-File, Hierarchical, and XML

11. Which database model organizes data in a tree-like structure with one-to-many relationships?

- a) Relational model
- b) Network model

- c) Hierarchical model
- d) Object-oriented model

****Answer: c) Hierarchical model****

12. A key limitation of the flat-file database model is:

- a) Complex query processing
- b) Data redundancy
- c) Limited storage capacity
- d) Inability to handle textual data

****Answer: b) Data redundancy****

13. Which of the following is a characteristic of XML as a database model?

- a) Fixed schema structure
- b) Self-describing data
- c) Inability to represent hierarchical relationships
- d) Required normalization

****Answer: b) Self-describing data****

14. In a hierarchical database model, what is the relationship between a parent node and child nodes?

- a) Many-to-many
- b) One-to-one
- c) One-to-many
- d) Many-to-one

****Answer: c) One-to-many****

15. A flat-file database model is best suited for:

- a) Complex enterprise applications
- b) Simple data storage with minimal relationships
- c) Distributed database systems
- d) Real-time transaction processing

****Answer: b) Simple data storage with minimal relationships****

16. Which of the following is NOT a feature of XML databases?

- a) Support for semi-structured data
- b) Schema flexibility
- c) Native handling of hierarchical data
- d) Efficient storage of large numerical datasets

****Answer: d) Efficient storage of large numerical datasets****

17. A key advantage of hierarchical databases over flat-file databases is:

- a) Better support for many-to-many relationships
- b) More efficient representation of one-to-many relationships
- c) Simpler implementation
- d) No need for indexes

****Answer: b) More efficient representation of one-to-many relationships****

18. Which statement about flat-file databases is FALSE?

- a) They store data in plain text files
- b) They typically store each record on a separate line
- c) They efficiently handle complex relationships
- d) They are prone to data redundancy

****Answer: c) They efficiently handle complex relationships****

19. In XML databases, elements can have:

- a) Only attributes
- b) Only child elements
- c) Both attributes and child elements
- d) Neither attributes nor child elements

****Answer: c) Both attributes and child elements****

20. The hierarchical database model was popularized by:

- a) IBM's IMS
- b) Oracle
- c) Microsoft Access
- d) PostgreSQL

****Answer: a) IBM's IMS****

DBMS Architecture Levels

21. How many levels are in the ANSI/SPARC DBMS architecture?

- a) Two

- b) Three
- c) Four
- d) Five

****Answer: b) Three****

22. Which level of DBMS architecture is concerned with how data is physically stored?

- a) External level
- b) Conceptual level
- c) Internal level
- d) View level

****Answer: c) Internal level****

23. The conceptual level of DBMS architecture focuses on:

- a) User interface design
- b) Physical storage structures
- c) Complete logical structure of the entire database
- d) Individual user views

****Answer: c) Complete logical structure of the entire database****

24. Which level of DBMS architecture is closest to the end users?

- a) External level
- b) Conceptual level
- c) Internal level
- d) Physical level

****Answer: a) External level****

25. Data independence between the conceptual and internal levels is known as:

- a) Logical data independence
- b) Physical data independence
- c) External data independence
- d) View data independence

****Answer: b) Physical data independence****

26. The mapping between external and conceptual levels in DBMS architecture is managed by:

- a) Storage Definition Language (SDL)
- b) Data Definition Language (DDL)
- c) External Level Mapping (ELM)
- d) View Definition Language (VDL)

****Answer: d) View Definition Language (VDL)****

27. Which level of DBMS architecture deals with indexes, access methods, and storage structures?

- a) External level
- b) Conceptual level
- c) Internal level
- d) Application level

****Answer: c) Internal level****

28. The conceptual schema in DBMS architecture is defined using:

- a) Data Manipulation Language (DML)
- b) Data Definition Language (DDL)
- c) Query Language (QL)
- d) Data Control Language (DCL)

****Answer: b) Data Definition Language (DDL)****

29. In the three-level DBMS architecture, which level provides data abstraction?

- a) Only the external level
- b) Only the conceptual level
- c) Only the internal level
- d) All three levels

****Answer: d) All three levels****

30. The internal level of DBMS architecture is concerned with:

- a) How different users view the data
- b) How data is represented to end users
- c) How data is stored on storage media
- d) How applications interact with the database

****Answer: c) How data is stored on storage media****

Types of Constraints

31. Which constraint ensures that each value in a column is unique?

- a) Primary key constraint

- b) Unique constraint
- c) Check constraint
- d) Foreign key constraint

****Answer: b) Unique constraint****

32. A constraint that can span multiple columns is:

- a) Domain constraint
- b) Entity integrity constraint
- c) Check constraint
- d) Referential integrity constraint

****Answer: c) Check constraint****

33. Which constraint prevents the entry of NULL values in a column?

- a) Default constraint
- b) Not NULL constraint
- c) Primary key constraint
- d) Unique constraint

****Answer: b) Not NULL constraint****

34. The constraint that enforces entity integrity is:

- a) Foreign key constraint
- b) Check constraint
- c) Primary key constraint
- d) Unique constraint

****Answer: c) Primary key constraint****

35. Which constraint establishes a relationship between two tables?

- a) Primary key constraint
- b) Foreign key constraint
- c) Check constraint
- d) Unique constraint

****Answer: b) Foreign key constraint****

36. Domain constraints specify:

- a) Relationships between tables
- b) Valid values for a column
- c) Uniqueness of rows
- d) Primary key definitions

****Answer: b) Valid values for a column****

37. Which of the following is NOT a type of integrity constraint?

- a) Entity integrity
- b) Referential integrity
- c) Domain integrity
- d) Functional integrity

****Answer: d) Functional integrity****

38. A constraint that provides a default value when no value is specified is:

- a) Default constraint
- b) Not NULL constraint
- c) Check constraint
- d) Foreign key constraint

****Answer: a) Default constraint****

39. Referential integrity ensures that:

- a) Primary keys contain unique values
- b) Foreign key values match existing primary key values or are NULL
- c) All columns have valid domain values
- d) No duplicate rows exist in a table

****Answer: b) Foreign key values match existing primary key values or are NULL****

40. Which constraint is automatically enforced when you define a primary key?

- a) Default constraint
- b) Check constraint
- c) Not NULL constraint
- d) Domain constraint

****Answer: c) Not NULL constraint****

Normalization in Database Design

41. The primary purpose of normalization in database design is to:

- a) Improve query performance

- b) Reduce storage requirements
- c) Eliminate data redundancy
- d) Simplify database backup procedures

****Answer: c) Eliminate data redundancy****

42. Which normal form addresses transitive dependencies?

- a) First Normal Form (1NF)
- b) Second Normal Form (2NF)
- c) Third Normal Form (3NF)
- d) Boyce-Codd Normal Form (BCNF)

****Answer: c) Third Normal Form (3NF)****

43. A table is in First Normal Form (1NF) if:

- a) It has no partial dependencies
- b) It has no transitive dependencies
- c) It has no multi-valued attributes
- d) All non-key attributes are functionally dependent on the primary key

****Answer: c) It has no multi-valued attributes****

44. Which normal form deals with partial dependencies?

- a) First Normal Form (1NF)
- b) Second Normal Form (2NF)
- c) Third Normal Form (3NF)
- d) Boyce-Codd Normal Form (BCNF)

****Answer: b) Second Normal Form (2NF)****

45. A table is in BCNF if:

- a) It is in 3NF and every determinant is a candidate key
- b) It is in 2NF and has no transitive dependencies
- c) It is in 1NF and has no partial dependencies
- d) It has no multi-valued attributes or composite keys

****Answer: a) It is in 3NF and every determinant is a candidate key****

46. Denormalization is the process of:

- a) Converting a database to a higher normal form
- b) Deliberately introducing redundancy for performance
- c) Removing all functional dependencies
- d) Creating additional tables to eliminate redundancy

****Answer: b) Deliberately introducing redundancy for performance****

47. Which normal form ensures that non-prime attributes are not transitively dependent on the primary key?

- a) First Normal Form (1NF)
- b) Second Normal Form (2NF)
- c) Third Normal Form (3NF)
- d) Fourth Normal Form (4NF)

****Answer: c) Third Normal Form (3NF)****

48. A functional dependency $X \rightarrow Y$ is a partial dependency when:

- a) X is not a proper subset of a candidate key
- b) X is a proper subset of a candidate key
- c) Y is a candidate key
- d) Y determines X

****Answer: b) X is a proper subset of a candidate key****

49. What's the minimum normal form that ensures no update anomalies in a relation with a single candidate key?

- a) 1NF
- b) 2NF
- c) 3NF
- d) BCNF

****Answer: c) 3NF****

50. Which of the following is NOT a potential problem addressed by normalization?

- a) Update anomalies
- b) Deletion anomalies
- c) Insertion anomalies
- d) Query performance issues

****Answer: d) Query performance issues****

First Normal Form (1NF)

51. Which of the following violates First Normal Form?

- a) A table with composite primary key
- b) A table with NULL values
- c) A table with a column containing comma-separated values
- d) A table with redundant data

****Answer: c) A table with a column containing comma-separated values****

52. To convert a table to 1NF, you need to:

- a) Remove partial dependencies
- b) Remove transitive dependencies
- c) Eliminate repeating groups
- d) Make all determinants candidate keys

****Answer: c) Eliminate repeating groups****

53. Which of the following is a characteristic of a relation in 1NF?

- a) No partial dependencies
- b) No transitive dependencies
- c) Atomic attributes
- d) No redundant data

****Answer: c) Atomic attributes****

54. Consider a table with a column "Phone_Numbers" that can store multiple phone numbers. To convert this to 1NF, you would:

- a) Create a separate table for phone numbers with a foreign key reference
- b) Allow NULL values in the Phone_Numbers column

- c) Create additional columns like Phone1, Phone2, etc.
- d) Add a check constraint to limit the number of phone numbers

****Answer: a) Create a separate table for phone numbers with a foreign key reference****

55. A table is in 1NF if:

- a) It has a primary key
- b) It has no repeating groups
- c) It has no partial dependencies
- d) It has no duplicate rows

****Answer: b) It has no repeating groups****

56. Which of the following statements about 1NF is FALSE?

- a) Each cell must contain a single value
- b) Each column must have a unique name
- c) Each row must have a primary key
- d) No redundancy is allowed in the table

****Answer: d) No redundancy is allowed in the table****

57. To convert a table with multi-valued attributes to 1NF, you must:

- a) Remove all NULL values
- b) Replace multi-valued attributes with atomic values
- c) Remove all duplicate rows
- d) Add a unique constraint to all columns

****Answer: b) Replace multi-valued attributes with atomic values****

58. A table with the following structure violates 1NF: Student(StudentID, Name, Course1, Course2, Course3). To fix this, you should:

- a) Add more Course columns
- b) Make Course columns nullable
- c) Create a separate Courses table with a foreign key to Student
- d) Add a check constraint to validate course names

****Answer: c) Create a separate Courses table with a foreign key to Student****

59. Which of the following is required for a table to be in 1NF?

- a) No partial dependencies
- b) No transitive dependencies
- c) Row order is not significant
- d) No derived attributes

****Answer: c) Row order is not significant****

60. In the process of converting to 1NF, if you have a column containing comma-separated values, you would typically:

- a) Split the values into multiple columns
- b) Create a new table with a foreign key relationship
- c) Use a CHECK constraint to validate the format
- d) Convert the column to a TEXT data type

****Answer: b) Create a new table with a foreign key relationship****

Second Normal Form (2NF)

61. A relation is in 2NF if it is in 1NF and:

- a) Has no multi-valued attributes
- b) Has no partial dependencies
- c) Has no transitive dependencies
- d) Has no composite key

****Answer: b) Has no partial dependencies****

62. Which of the following tables is automatically in 2NF?

- a) Any table in 1NF
- b) Any table with a composite primary key
- c) Any table in 1NF with a single-attribute primary key
- d) Any table without NULL values

****Answer: c) Any table in 1NF with a single-attribute primary key****

63. To convert a table to 2NF, you must:

- a) Remove all transitive dependencies
- b) Remove all partial dependencies
- c) Remove all multi-valued attributes
- d) Make all functional dependencies depend on the full key

****Answer: b) Remove all partial dependencies****

64. A partial dependency occurs when:

- a) A non-key attribute depends on all attributes of the composite key

- b) A non-key attribute depends on a non-key attribute
- c) A non-key attribute depends on part of the composite key
- d) A key attribute depends on a non-key attribute

****Answer: c) A non-key attribute depends on part of the composite key****

65. Consider a table Order(OrderID, ProductID, CustomerName, ProductName, Quantity) with a composite key (OrderID, ProductID). If ProductName is determined by ProductID alone, this violates:

- a) 1NF
- b) 2NF
- c) 3NF
- d) BCNF

****Answer: b) 2NF****

66. Which of the following would NOT be a step in converting a table to 2NF?

- a) Identify the primary key
- b) Determine if the primary key is composite
- c) Create new tables for attributes that depend on part of the key
- d) Remove all NULL values

****Answer: d) Remove all NULL values****

67. A table with attributes (A, B, C, D) and functional dependencies $A \rightarrow B$, $C \rightarrow D$ is in 2NF if:

- a) (A, C) is the primary key
- b) A is the primary key

- c) C is the primary key
- d) (A, D) is the primary key

****Answer: b) A is the primary key****

68. In the table Student_Course(StudentID, CourseID, StudentName, CourseName, Grade) with primary key (StudentID, CourseID), which attribute likely causes a 2NF violation?

- a) Grade
- b) StudentName
- c) CourseName
- d) Both StudentName and CourseName

****Answer: d) Both StudentName and CourseName****

69. To convert the table Orders(OrderID, CustomerID, OrderDate, CustomerName, CustomerAddress) with primary key OrderID to 2NF, you would:

- a) Do nothing, as it's already in 2NF
- b) Create separate tables for Customer and Order information
- c) Add more attributes to the primary key
- d) Remove the CustomerID attribute

****Answer: a) Do nothing, as it's already in 2NF****

70. Which normal form focuses specifically on eliminating dependencies on part of a candidate key?

- a) 1NF
- b) 2NF

- c) 3NF
- d) BCNF

****Answer: b) 2NF****

Third Normal Form (3NF)

71. A relation is in 3NF if it is in 2NF and:

- a) Has no multi-valued attributes
- b) Has no partial dependencies
- c) Has no transitive dependencies
- d) Has a primary key

****Answer: c) Has no transitive dependencies****

72. A transitive dependency in a relation occurs when:

- a) $A \rightarrow B$ and $B \rightarrow C$, where A is the primary key and C is a non-key attribute
- b) $A \rightarrow B$, where A is part of the primary key
- c) $A \rightarrow B$, where B is part of the primary key
- d) $A \rightarrow B$ and $B \rightarrow A$, creating a circular dependency

****Answer: a) $A \rightarrow B$ and $B \rightarrow C$, where A is the primary key and C is a non-key attribute****

73. To convert a table to 3NF, you must remove:

- a) All functional dependencies
- b) All partial dependencies
- c) All transitive dependencies
- d) All multi-valued attributes

****Answer: c) All transitive dependencies****

74. Consider a table Employee(EmplID, DeptID, DeptName, Salary) with EmplID as the primary key. The functional dependency DeptID → DeptName creates:

- a) A multi-valued dependency
- b) A partial dependency
- c) A transitive dependency
- d) A join dependency

****Answer: c) A transitive dependency****

75. Which of the following tables is guaranteed to be in 3NF?

- a) Any table in 2NF
- b) Any table in 2NF where non-key attributes are only dependent on the primary key
- c) Any table with a single attribute
- d) Any table without NULL values

****Answer: b) Any table in 2NF where non-key attributes are only dependent on the primary key****

76. In the context of 3NF, a non-prime attribute is an attribute that:

- a) Cannot be NULL
- b) Is not part of any candidate key
- c) Is part of the primary key
- d) Has unique values

****Answer: b) Is not part of any candidate key****

77. To convert the table Order(OrderID, CustomerID, CustomerName, OrderDate) with primary key OrderID to 3NF, you would:

- a) Remove the CustomerName attribute
- b) Create a separate Customer table and reference it from Order
- c) Add CustomerName to the primary key
- d) No changes needed as it's already in 3NF

****Answer:** b) Create a separate Customer table and reference it from Order**

78. Which statement about 3NF is FALSE?

- a) All attributes depend directly on the primary key
- b) It eliminates insert, update, and delete anomalies
- c) A table in 3NF is always in 2NF
- d) A table with a single-column primary key and no other functional dependencies is automatically in 3NF

****Answer:** b) It eliminates insert, update, and delete anomalies**

79. A determinant in the context of normalization is:

- a) Any attribute that functionally determines another attribute
- b) Only the primary key attributes
- c) Only foreign key attributes
- d) Only attributes that are part of a composite key

****Answer:** a) Any attribute that functionally determines another attribute**

80. The formal definition of 3NF states that a table is in 3NF if for every functional dependency $X \rightarrow Y$:

- a) X is a superkey, or Y is a prime attribute
- b) X is the primary key, or Y is a non-key attribute
- c) X is a candidate key, or Y is not a subset of X
- d) X contains the primary key, or Y is part of a candidate key

****Answer: a) X is a superkey, or Y is a prime attribute****

Boyce-Codd Normal Form (BCNF)

81. BCNF is a stronger version of:

- a) 1NF
- b) 2NF
- c) 3NF
- d) 4NF

****Answer: c) 3NF****

82. A relation is in BCNF if for every functional dependency $X \rightarrow Y$:

- a) X is a superkey
- b) Y is a prime attribute
- c) X is a proper subset of a candidate key
- d) Y is functionally dependent on X

****Answer: a) X is a superkey****

83. A table is in BCNF if and only if every determinant is a:

- a) Non-key attribute
- b) Candidate key

- c) Foreign key
- d) Prime attribute

****Answer: b) Candidate key****

84. When would a relation that is in 3NF not be in BCNF?

- a) When it has multiple candidate keys
- b) When it has a non-key attribute that determines part of the primary key
- c) When it has a non-key attribute that determines another non-key attribute
- d) When it has partial dependencies

****Answer: b) When it has a non-key attribute that determines part of the primary key****

85. Consider a relation $R(A, B, C)$ with functional dependencies $A \rightarrow B$ and $B \rightarrow C$. The primary key is A. This relation is:

- a) In 1NF but not in 2NF
- b) In 2NF but not in 3NF
- c) In 3NF but not in BCNF
- d) In BCNF

****Answer: b) In 2NF but not in 3NF****

86. Consider a relation $R(A, B, C)$ with functional dependencies $A \rightarrow B$, $B \rightarrow A$, and $B \rightarrow C$. The candidate keys are A and B. This relation is:

- a) In 1NF but not in 2NF
- b) In 2NF but not in 3NF
- c) In 3NF but not in BCNF
- d) In BCNF

****Answer: d) In BCNF****

87. To convert a table to BCNF, you would typically:

- a) Remove all functional dependencies
- b) Decompose the relation based on offending functional dependencies
- c) Add more columns to the primary key
- d) Remove all non-key attributes that are determinants

****Answer: b) Decompose the relation based on offending functional dependencies****

88. A drawback of BCNF decomposition can be:

- a) Increased data redundancy
- b) Loss of information
- c) Loss of dependency preservation
- d) Decreased query performance

****Answer: c) Loss of dependency preservation****

89. Consider a relation with attributes (CourseID, StudentID, Professor) where professors teach courses and students enroll in courses. If a professor teaches only one course but a course can have multiple professors, and the functional dependency Professor \rightarrow CourseID exists, this relation is:

- a) In 1NF but not in 2NF
- b) In 2NF but not in 3NF
- c) In 3NF but not in BCNF
- d) In BCNF

****Answer: c) In 3NF but not in BCNF****

90. Which statement about BCNF is TRUE?

- a) BCNF is always lossless and dependency preserving
- b) Every relation in BCNF is also in 3NF
- c) A relation with only one functional dependency is always in BCNF
- d) BCNF eliminates all types of data redundancy

****Answer: b) Every relation in BCNF is also in 3NF****

Additional Database Concepts and Review

91. Which of the following best describes the relationship between normalization levels?

- a) $BCNF \subset 3NF \subset 2NF \subset 1NF$
- b) $1NF \subset 2NF \subset 3NF \subset BCNF$
- c) $BCNF \subset 2NF \subset 3NF \subset 1NF$
- d) $1NF \subset 3NF \subset 2NF \subset BCNF$

****Answer: a) $BCNF \subset 3NF \subset 2NF \subset 1NF$ ****

92. Which of the following normal forms deals with multi-valued dependencies?

- a) 3NF
- b) BCNF
- c) 4NF
- d) 5NF

****Answer: c) 4NF****

93. The process of combining normalized tables to improve query performance is called:

- a) Normalization
- b) Denormalization
- c) Decomposition
- d) Aggregation

****Answer: b) Denormalization****

94. In which normal form are all non-key attributes fully functionally dependent on the primary key?

- a) 1NF
- b) 2NF
- c) 3NF
- d) BCNF

****Answer: b) 2NF****

95. A table with a single-column primary key is automatically in:

- a) Only 1NF
- b) 1NF and 2NF
- c) 1NF, 2NF, and 3NF
- d) 1NF, 2NF, 3NF, and BCNF

****Answer: b) 1NF and 2NF****

96. Which normalization form focuses on eliminating attributes that are functionally determined by non-candidate keys?

- a) 1NF

- b) 2NF
- c) BCNF
- d) 4NF

****Answer: c) BCNF****

97. The key difference between 3NF and BCNF is:

- a) BCNF addresses partial dependencies that 3NF doesn't
- b) 3NF addresses transitive dependencies that BCNF doesn't
- c) BCNF requires every determinant to be a candidate key, while 3NF allows non-key determinants for prime attributes
- d) 3NF requires atomic attributes while BCNF doesn't

****Answer: c) BCNF requires every determinant to be a candidate key, while 3NF allows non-key determinants for prime attributes****

98. What type of constraint would you use to ensure that a product price is greater than zero?

- a) Foreign key constraint
- b) Unique constraint
- c) Check constraint
- d) Default constraint

****Answer: c) Check constraint****

99. In the context of database architecture, which level provides a way to achieve logical data independence?

- a) External level

- b) Conceptual level
- c) Internal level
- d) Physical level

****Answer: b) Conceptual level****

100. Which database model would be most appropriate for storing and managing complex documents with nested elements and attributes?

- a) Relational model
- b) Flat-file model
- c) Network model
- d) XML model

****Answer: d) XML model****