Unit 1: Introduction and Applications of DBMS MCQs

Introduction and Applications of DBMS

1. **What is the primary purpose of a database management system (DBMS)?**

   - a) Store and manage large volumes of data
   - b) Perform complex calculations
   - c) Provide entertainment options
   - d) Ensure security in an organization
     Answer: a) Store and manage large volumes of data

2. **Which of the following is NOT a characteristic of a database?**

   - a) Persistent storage of data
   - b) Organized data management
   - c) Easy retrieval of data
   - d) Temporary data storage
     Answer: d) Temporary data storage

3. **What is meant by data independence in DBMS?**

   - a) Data is independent of the operating system
   - b) The structure of data is independent of the application programs
   - c) Data can be stored anywhere in a database
   - d) Data can be accessed freely by users
     Answer: b) The structure of data is independent of the application programs

4. **Which of the following is an application of DBMS?**

   - a) Banking systems
   - b) Airline reservation systems
   - c) E-commerce websites
   - d) All of the above
     Answer: d) All of the above

Database System Architecture

5. **Which level in DBMS architecture is responsible for describing the physical storage of data?**

   - a) Internal Level
   - b) Conceptual Level
   - c) External Level

- d) Logical Level
    Answer: a) Internal Level
6. **What is the role of a Database Administrator (DBA)?**

    - a) Design the database schema
    - b) Define user access rights
    - c) Ensure data security and integrity
    - d) All of the above
    Answer: d) All of the above
7. **Which of the following mappings is involved in the DBMS architecture?**

    - a) Physical Mapping
    - b) Conceptual Mapping
    - c) External Mapping
    - d) All of the above
    Answer: d) All of the above
8. **What is the external level in DBMS architecture?**

    - a) Represents the user view of the database
    - b) Describes the internal structure of the database
    - c) Describes the logical organization of the data
    - d) None of the above
    Answer: a) Represents the user view of the database
9. **Which of the following is the correct order of levels in DBMS architecture?**

    - a) Internal → Conceptual → External
    - b) External → Conceptual → Internal
    - c) Conceptual → External → Internal
    - d) External → Internal → Conceptual
    Answer: b) External → Conceptual → Internal
10. **What does the term 'data abstraction' refer to in DBMS?**

    - a) Hiding the complexity of the data storage from users
    - b) Allowing users to directly interact with the database
    - c) Providing a simplified view of the database
    - d) Both a and c
    Answer: d) Both a and c

Structure of Relational Databases

11. **In a relational database, a domain refers to:**

- ○ a) A set of attributes
- ○ b) A set of possible values for an attribute
- ○ c) A set of relations
- ○ d) A set of tables
  - **Answer: b) A set of possible values for an attribute**

12. **Which of the following is NOT a valid relational database structure?**

- ○ a) Table
- ○ b) Row
- ○ c) Column
- ○ d) Tree
  - **Answer: d) Tree**

13. **A relation in a relational database is a:**

- ○ a) Set of tables
- ○ b) Set of rows and columns
- ○ c) Set of domains
- ○ d) Set of keys
  - **Answer: b) Set of rows and columns**

14. **What does the primary key of a relation do?**

- ○ a) Uniquely identifies each tuple in a relation
- ○ b) Allows null values in a relation
- ○ c) Stores foreign key references
- ○ d) None of the above
  - **Answer: a) Uniquely identifies each tuple in a relation**

15. **In relational databases, what is a foreign key?**

- ○ a) A key that uniquely identifies a record
- ○ b) A key that links two relations
- ○ c) A key that allows multiple values
- ○ d) A key for efficient data retrieval
  - **Answer: b) A key that links two relations**

16. **What is a tuple in a relational database?**

- ○ a) A set of attributes
- ○ b) A single row in a relation
- ○ c) A column in a table
- ○ d) A set of relations
  - **Answer: b) A single row in a relation**

17. **What is a domain in the context of a relational database?**

- ○ a) A set of valid values for an attribute
- ○ b) A unique identifier for a table

○ c) A collection of related relations
○ d) A query language
   Answer: a) A set of valid values for an attribute

Relational Algebra - Fundamental Operators and Syntax

18. **Which of the following is NOT a fundamental operator in relational algebra?**

   ○ a) Select
   ○ b) Project
   ○ c) Join
   ○ d) Insert
   Answer: d) Insert

19. **The 'Select' operator in relational algebra is used to:**

   ○ a) Select specific columns
   ○ b) Select specific rows
   ○ c) Combine two relations
   ○ d) Remove duplicate rows
   Answer: b) Select specific rows

20. **What is the purpose of the 'Project' operator in relational algebra?**

   ○ a) Select specific rows
   ○ b) Select specific columns
   ○ c) Join two relations
   ○ d) Union two relations
   Answer: b) Select specific columns

21. **Which relational algebra operator is used to combine two relations and eliminate duplicate rows?**

   ○ a) Union
   ○ b) Intersection
   ○ c) Difference
   ○ d) Cartesian Product
   Answer: a) Union

22. **The 'Join' operator in relational algebra is used to:**

   ○ a) Combine rows from two relations based on a common attribute
   ○ b) Select specific rows
   ○ c) Project columns from multiple relations
   ○ d) Sort relations
   Answer: a) Combine rows from two relations based on a common attribute

23. **Which operator is used in relational algebra to find the difference between two relations?**

- ○ a) Select
- ○ b) Union
- ○ c) Difference
- ○ d) Intersection

   Answer: c) Difference

24. **Which of the following is a valid relational algebra expression?**

- ○ a) σ Age > 25 (Students)
- ○ b) π Name, Age (Students)
- ○ c) σ Name = 'John' (Students)
- ○ d) All of the above

   Answer: d) All of the above

25. **In relational algebra, the symbol σ represents which operation?**

- ○ a) Select
- ○ b) Project
- ○ c) Join
- ○ d) Union

   Answer: a) Select

26. **In relational algebra, the symbol π represents which operation?**

- ○ a) Select
- ○ b) Project
- ○ c) Join
- ○ d) Difference

   Answer: b) Project

27. **Which of the following represents the Cartesian Product in relational algebra?**

- ○ a) ×
- ○ b) ∪
- ○ c) ∩
- ○ d) −

   Answer: a) ×

28. **In relational algebra, which operator is used to find rows common to two relations?**

- ○ a) Union
- ○ b) Difference
- ○ c) Intersection
- ○ d) Join

   Answer: c) Intersection

Relational Algebra Queries

29. **Which of the following relational algebra queries will retrieve all students with an Age greater than 18?**

    ○ a) σ Age > 18 (Student)
    ○ b) π Age > 18 (Student)
    ○ c) σ Age < 18 (Student)
    ○ d) π Age > 18, Name (Student)
       Answer: a) σ Age > 18 (Student)

30. **How do you retrieve the names of all students who have a GPA higher than 3.5 using relational algebra?**

    ○ a) π Name (σ GPA > 3.5 (Student))
    ○ b) σ Name (GPA > 3.5 (Student))
    ○ c) π GPA (σ Name = 'John' (Student))
    ○ d) σ GPA > 3.5 (Name) (Student)
       Answer: a) π Name (σ GPA > 3.5 (Student))

Tuple Relational Calculus

31. **Tuple Relational Calculus is based on which type of logic?**

    ○ a) Propositional logic
    ○ b) Predicate logic
    ○ c) Fuzzy logic
    ○ d) Modal logic
       Answer: b) Predicate logic

32. **In Tuple Relational Calculus, what does the symbol t represent?**

    ○ a) An attribute in a relation
    ○ b) A tuple variable representing a row in a relation
    ○ c) A domain in a relation
    ○ d) A query condition
       Answer: b) A tuple variable representing a row in a relation

33. **Which of the following is an example of a Tuple Relational Calculus query?**

    ○ a) { t.Name | Student(t) AND t.Age > 20 }
    ○ b) SELECT Name FROM Student WHERE Age > 20
    ○ c) π Name (σ Age > 20 (Student))

- d) σ Age > 20 (Student)
    - **Answer: a) { t.Name | Student(t) AND t.Age > 20 }**
34. **In Tuple Relational Calculus, what does the quantifier ∃ mean?**

    - a) For all
    - b) There exists at least one
    - c) None of the above
    - d) Both a and b
    - **Answer: b) There exists at least one**
35. **In Tuple Relational Calculus, which operator is used to specify that a tuple must satisfy a given condition?**

    - a) AND
    - b) OR
    - c) ∃ (Existential quantifier)
    - d) ∀ (Universal quantifier)
    - **Answer: c) ∃ (Existential quantifier)**
36. **Which of the following queries is an example of a universal quantifier (∀) in Tuple Relational Calculus?**

    - a) { t.Name | ∀ x (x > 10 AND t.Age > x) }
    - b) { t.Name | ∃ x (x > 10 AND t.Age > x) }
    - c) { t.Name | t.Age > 20 }
    - d) None of the above
    - **Answer: a) { t.Name | ∀ x (x > 10 AND t.Age > x) }**
37. **Which of the following queries returns students whose age is greater than 21 using Tuple Relational Calculus?**

    - a) { t.Name | Student(t) AND t.Age > 21 }
    - b) { t.Name | ∀ t (Student(t) AND t.Age > 21) }
    - c) { t.Name | ∃ t (Student(t) AND t.Age > 21) }
    - d) None of the above
    - **Answer: a) { t.Name | Student(t) AND t.Age > 21 }**
38. **In Tuple Relational Calculus, which of the following operators is used to specify the condition for a tuple variable?**

    - a) ⊕
    - b) ≠
    - c) →
    - d) AND
    - **Answer: d) AND**