Chapter **12**

Database Management Systems

1. Which normal form is considered adequate for relational database design?
   - (a) 2 NF
   - (b) 3 NF
   - (c) 4 NF
   - (d) BCNF

2. The concept of locking can be used to solve the problem of
   - (a) lost update
   - (b) uncommitted dependency
   - (c) inconsistent data
   - (d) deadlock

3. Given relations R(w,x) and S(y,z), the result of

   SELECT DISTINCT w, x
   FROM R, S

   is guaranteed to be same as R, if
   - (a) R has no duplicates and S is non-empty
   - (b) R and S have no duplicates
   - (c) S has no duplicates and R is non-empty
   - (d) R and S have the same number of tuples

4. A functional dependency of the form $X \rightarrow Y$ is trivial if
   - (a) $Y \subseteq X$
   - (b) $Y \subset X$
   - (c) $X \subseteq Y$
   - (d) $X \subset Y$ and $Y \subset X$

5. If every non-key attribute is functionally dependent on the primary key, then the relation will be in
   - (a) first normal form
   - (b) second normal form
   - (c) third normal form
   - (d) fourth normal form

6. The column of a table is referred to as the

    (a) tuple   (b) attribute   (c) entity   (d) degree

The next four questions are based on the following details. Consider the given schemes.

> Branch_scheme = (Branch_name, assets, Branch_city)
> Customer_scheme = (Customer_name, street, Customer_city)
> Deposit_scheme = (Branch_name, account_number, Customer_name, balance)
> Borrow_scheme = (Branch_name, loan_number, Customer_name, amount)
> Client_scheme = (Customer_name, banker_name)

7. Using relational algebra, the query that finds customers who have a balance of over 1000 is

    (a) $\pi_{customer\_name}$ $(\sigma_{balance\ >\ 1000}$ (Deposit))

    (b) $\sigma_{customer\_name}$ $(\pi_{balance\ >\ 1000}$ (Deposit))

    (c) $\pi_{customer\_name}$ $(\sigma_{balance\ >\ 1000}$ (Borrow))

    (d) $\sigma_{customer\_name}$ $(\pi_{balance\ >\ 1000}$ (Borrow))

8. Which of the following queries finds the clients of banker Agassi and the city they live in?

    (a) $\pi_{Client.Customer\_name.Customer\_City}$ $(\sigma_{client.Customer\_name=Customer.Customer\_name}$
    $(\sigma_{Banker\_name=\text{"Agassi"}}$ (Client × Customer))

    (b) $\pi_{Customer\_name.Customer\_City}$ $(\sigma_{Banker\_name=\text{"Agassi"}}$ (Client × Customer))

    (c) $\pi_{Client.Customer\_name.Customer\_City}$ $(\sigma_{Banker\_name=\text{"Agassi"}}$
    $(\sigma_{client.Customer\_name=Customer.Customer\_name}$ (Client × Customer))

    (d) $\pi_{Customer\_name.Customer\_City}$ $(\sigma_{Banker\_name=\text{"Agassi"}}$ (Client × Customer))

9. Which of the following tuple relational calculus finds all customers who have a loan amount of more than 1200?

    (a) {t(Customer_name) | t ε borrow Λ t[amount] > 1200}

    (b) {t | t(Customer_name) ε borrow Λ t[amount] > 1200}

    (c) {t | ∃ s ε borrow (t[Customer_name] = s[Customer_name] Λ s[amount] > 1200}

    (d) None of the above

10. Which of the following Domain relational calculus finds all customers who have a loan amount of over 1200?

    (a) {<c>| ∃ b, 1, a (<b, 1, c, a> ε borrow V a > 1200)}

    (b) {<c>| ∃ b, 1, a (<b, 1, c, a> ε borrow Λ a > 1200)}

    (c) {<c>| ∃ <b, 1, c, a> ε borrow Λ a > 1200)}

    (d) {<c>| <b, 1, c, a> ε borrow Λ a > 1200)}

11. Given the functional dependencies

$X \to W$; $X \to Y$; $Y \to Z$ and $Z \to PQ$

which of the following does not hold good?

    (a) $X \to Z$ (b) $W \to Z$ (c) $X \to WY$ (d) None of the above

12. What are the potential problems when a DBMS executes multiple transactions concurrently?
    - (a) The lost update problem
    - (b) The dirty read problem
    - (c) The unrepeatable read problem
    - (d) The phantom problem

13. The data flow model of an application mainly shows
    - (a) the underlying data and the relationships among them
    - (b) processing requirements and the flow of data
    - (c) decision and control information
    - (d) communication network structure

14. Consider the set of relations given below and the SQL query that follows:
    Students: (Roll_number, Name, Date_of_birth)
    Courses: (Course_number, Course_name, Instructor)
    Grades: (Roll_number, Course_number, Grade)

    SELECT DISTINCT Name
    FROM   Students, Courses, Grades
    WHERE Students.Roll_number = Grades.Roll_number
        AND Courses.Instructor = Korth
        AND Courses.Course_number = Grades.Course_number
        AND Grades.Grade = A

    Which of the following sets is computed by the above query?
    - (a) Names of students who have got an A grade in all courses taught by Korth
    - (b) Names of students who have got an A grade in all courses
    - (c) Names of students who have got an A grade in at least one of the courses taught by Korth
    - (d) None of the above

15. Which of the following desired features are beyond the capability of relational algebra?
    - (a) Aggregate computation
    - (b) Multiplication
    - (c) Finding transitive closure
    - (d) None of the above

16. In airline reservation system, the entities are date, flight number, place of departure, destination, type of plane and seats available. The primary key is
    - (a) flight number
    - (b) flight number + place of departure
    - (c) flight number + date
    - (d) flight number + destination

17. For a database relation $R(a,b,c,d)$ where the domains of $a,b,c,$ and d include only atomic values, only the following functional dependencies and those that can be inferred from them hold.

    $$a \rightarrow c$$
    $$b \rightarrow d$$

    The relation is in
    - (a) first normal form but not in second normal form
    - (b) second normal form but not in third normal form
    - (c) third normal form
    - (d) none of the above

The canonical cover for this set is

(a) $A \rightarrow BC$ and $B \rightarrow C$

(b) $A \rightarrow BC$ and $AB \rightarrow C$

(c) $A \rightarrow BC$ and $A \rightarrow B$

(d) $A \rightarrow B$ and $B \rightarrow C$

50. Assume transaction A holds a shared lock R. If transaction B also requests for a shared lock on R, it will

(a) result in a deadlock situation

(b) immediately be granted

(c) immediately be rejected

(d) be granted as soon as it is released by A

Answers

1. b	2. a, b, c	3. a	4. a	5. c
6. b	7. a	8. a, c	9. c	10. b
11. b	12. a,b,c,d	13. b	14. c	15. a,b,c
16. c	17. a	18. d	19. c	20. c
21. c	22. c	23. d	24. c	25. c, d
26. d	27. c	28. a	29. a	30. a, b, c
31. a, b	32. a, b, c, d	33. a	34. a	35. a
36. a	37. c	38. a	39. d	40. b
41. b	42. b	43. a, b, c, d	44. d	45. a, b, c
46. a, b, c	47. b	48. a,b,c	49. a	50. b

Explanations

18. The maximum number of tuples results when each of the 120 students enrolls for each of the 8 courses, giving $120 \times 8 = 960$ tuples. The minimum number of tuples results when all the 120 students enroll for the same course, giving $120 \times 1 = 120$ tuples.