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

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

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

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

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

(a) $\{t[Customer\_name] \mid t \in borrow \wedge t[amount] > 1200\}$

(b) $\{t \mid t[Customer\_name] \in borrow \wedge t[amount] > 1200\}$

(c) $\{t \mid \exists s \in borrow\ (t[Customer\_name] = s[Customer\_name] \wedge s[amount] > 1200)\}$

(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) $\{<c> \mid \exists b, l, a\ (<b, l, c, a> \in borrow \vee a > 1200)\}$

(b) $\{<c> \mid \exists b, l, a\ (<b, l, c, a> \in borrow \wedge a > 1200)\}$

(c) $\{<c> \mid \exists <b, l, c, a> \in borrow \wedge a > 1200)\}$

(d) $\{<c> \mid <b, l, c, a> \in borrow \wedge a > 1200)\}$

11. Given the functional dependencies

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

which of the following does not hold good?

(a) $X \rightarrow Z$ (b) $W \rightarrow Z$ (c) $X \rightarrow WY$ (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.