RELATIONAL DATABASE DESIGN AND SQL

1. Which of the following is/are true with reference to 'view' in DBMS?
   (a) A 'view' is a special stored procedure executed when certain event occurs.
   (b) A 'view' is a virtual table, which occurs after executing a pre-compiled query.
   
   **Code:**
   (1) Only (a) is true
   (2) Only (b) is true
   (3) Both (a) and (b) are true
   (4) Neither (a) nor (b) are true
   
   **Answer:** 2

2. In SQL, ................. is an Aggregate function.
   (1) SELECT
   (2) CREATE
   (3) AVG
   (4) MODIFY
   
   **Answer:** 3

3. Match the following with respect to RDBMS:
   
   **List - I**
   (a) Entity integrity
   (b) Domain integrity
   (c) Referential integrity
   (d) Userdefined integrity
   
   **List - II**
   (i) enforces some specific business rule that do not fall into entity or domain
   (ii) Rows can't be deleted which are used by other records
   (iii) enforces valid entries for a column
   (iv) No duplicate rows in a table
   
   **Code:**
   (a) (b) (c) (d)
   (1) (iii) (iv) (i) (ii)
   (2) (iv) (iii) (ii) (i)
   (3) (iv) (ii) (iii) (i)
   (4) (ii) (iii) (iv) (i)
   
   **Answer:** 2

4. In RDBMS, different classes of relations are created using ................. technique to prevent modification anomalies.
   (1) Functional Dependencies
   (2) Data integrity
   (3) Referential integrity
   (4) Normal Forms
   
   **Answer:** 4

5. ................. SQL command changes one or more fields in a record.
   (1) LOOK-UP
   (2) INSERT
   (3) MODIFY
6. An attribute A of datatype varchar(20) has value 'Ram' and the attribute B of datatype char(20) has value 'Sita' in oracle. The attribute A has .......... memory spaces and B has .......... memory spaces.
   (1) 20, 20
   (2) 3, 20
   (3) 3, 4
   (4) 20, 4
   Answer: 2

7. Integrity constraints ensure that changes made to the database by authorized users do not result into loss of data consistency. Which of the following statement(s) is (are) true w.r.t. the examples of integrity constraints?
   (A) An instructor Id. No. cannot be null, provided Instructor Id. No. being primary key.
   (B) No two citizens have same Adhar-Id.
   (C) Budget of a company must be zero.
   (1) (A), (B) and (C) are true.
   (2) (A) false, (B) and (C) are true.
   (3) (A) and (B) are true; (C) false.
   (4) (A), (B) and (C) are false.
   Answer: 3

8. Let M and N be two entities in an E-R diagram with simple single value attributes. R₁ and R₂ are two relationship between M and N, whereas R₁ is one-to-many and R₂ is many-to-many.
   The minimum number of tables required to represent M, N, R₁ and R₂ in the relational model are ..........
   (1) 4
   (2) 6
   (3) 7
   (4) 3
   Answer: 4

9. Consider a schema R(MNPQ) and functional dependencies M→N, P→Q. Then the decomposition of R into R₁(MN) and R₂(PQ) is ............
   (1) Dependency preserving but not lossless join.
   (2) Dependency preserving and lossless join
   (3) Lossless join but not dependency preserving
   (4) Neither dependency preserving nor lossless join.
   Answer: 1

10. DBMS provides the facility of accessing data from a database through
    (A) DDL  (B) DML
    (C) DBA  (D) Schema
    Answer: B

11. Relational database schema normalization is NOT for:
    (A) reducing the number of joins required to satisfy a query.
    (B) eliminating uncontrolled redundancy of data stored in the database.
12. Consider the following statements regarding relational database model:
(a) NULL values can be used to opt a tuple out of enforcement of a foreign key.
(b) Suppose that table T has only one candidate key. If Q is in 3NF, then it is also in BCNF.
(c) The difference between the project operator (P) in relational algebra and the SELECT keyword in SQL is that if the resulting table/set has more than one occurrences of the same tuple, then P will return only one of them, while SQL SELECT will return all.

One can determine that:
(A) (a) and (b) are true. (B) (a) and (c) are true.
(C) (b) and (c) are true. (D) (a), (b) and (c) are true.
Answer: D

13. Consider the following Entity-Relationship (E-R) diagram and three possible relationship sets (I, II and III) for this E-R diagram:

If different symbols stand for different values (e.g., t₁ is definitely not equal to t₂), then which of the above could not be the relationship set for the E-R diagram?
(A) I only (B) I and II only
(C) II only (D) I, II and III
Answer: A

14. Consider a database table R with attributes A and B. Which of the following SQL queries is illegal?
(A) SELECT A FROM R;
(B) SELECT A, COUNT(*) FROM R;
(C) SELECT A, COUNT(*) FROM R GROUP BY A;
(D) SELECT A, B, COUNT(*) FROM R GROUP BY A, B;
Answer: B

15. In RDBMS, the constraint that no key attribute (column) may be NULL is referred to as:
(A) Referential integrity (B) Multi-valued dependency
(C) Entity Integrity (D) Functional dependency
Answer: C

16. Which of the following statement(s) is/are FALSE in the context of Relational DBMS?
I. Views in a database system are important because they help with access control by allowing users to see only a particular subset of the data in the database.
II. E-R diagrams are useful to logically model concepts.
III. An update anomaly is when it is not possible to store information unless some other, unrelated information is stored as well.
IV. SQL is a procedural language.
   (A) I and IV only  (B) III and IV only
   (C) I, II and III only  (D) II, III and IV only
Answer: D

17. In a relational database model, NULL values can be used for all but which one of the following?
   (A) To allow duplicate tuples in the table by filling the primary key column(s) with NULL.
   (B) To avoid confusion with actual legitimate data values like 0 (zero) for integer columns and ‘’ (the empty string) for string columns.
   (C) To leave columns in a tuple marked as “unknown” when the actual value is unknown.
   (D) To fill a column in a tuple when that column does not really “exist” for that particular tuple.
Answer: A

18. Consider the following two commands C1 and C2 on the relation R from an SQL database:
   C1: drop table R;
   C2: delete from R;
Which of the following statements is TRUE?
   I. Both C1 and C2 delete the schema for R.
   II. C2 retains relation R, but deletes all tuples in R.
   III. C1 deletes not only all tuples of R, but also the schema for R.
   (A) I only  (B) I and II only
   (C) II and III only  (D) I, II and III
Answer: C

19. Consider the following database table having A, B, C and D as its four attributes and four possible candidate keys (I, II, III and IV) for this table:

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>a1</td>
<td>b1</td>
<td>c1</td>
<td>d1</td>
</tr>
<tr>
<td>a2</td>
<td>b3</td>
<td>c3</td>
<td>d1</td>
</tr>
<tr>
<td>a1</td>
<td>b2</td>
<td>c1</td>
<td>d2</td>
</tr>
</tbody>
</table>

I: {B}  II: {B, C}  III: {A, D}  IV: {C, D}
If different symbols stand for different values in the table (e.g., d1 is definitely not equal to d2), then which of the above could not be the candidate key for the database table?
   (A) I and III only  (B) III and IV only
   (C) II only  (D) I only
Answer: C

20. Consider a “CUSTOMERS” database table having a column “CITY” filled with all the names of Indian cities (in capital letters). The SQL statement that finds all cities that have “GAR” somewhere in its name, is:
   (A) Select *from customers where city='%GAR%';
   (B) Select *from customers where city='$GAR$';
   (C) Select *from customers where city like '%GAR%';
   (D) Select *from customers where city as '%GAR';
Answer: C
21. Match the following database terms to their functions:

<table>
<thead>
<tr>
<th>List-I</th>
<th>List-II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Normalization</td>
<td>(i) Enforces match of primary key to foreign key</td>
</tr>
<tr>
<td>(b) Data Dictionary</td>
<td>(ii) Reduces data redundancy in a database</td>
</tr>
<tr>
<td>(c) Referential Integrity</td>
<td>(iii) Define view(s) of the database for particular user(s).</td>
</tr>
<tr>
<td>(d) External Schema</td>
<td>(iv) Contains metadata describing database structure.</td>
</tr>
</tbody>
</table>

Codes:
(a) (b) (c) (d)
(A) (iv) (iii) (i) (ii)
(B) (ii) (iv) (i) (iii)
(C) (ii) (iv) (iii) (i)
(D) (iv) (iii) (ii) (i)

Answer: B

22. Which of the following provides the best description of an entity type?
(A) A specific concrete object with a defined set of processes (e.g. Jatin with diabetes)
(B) A value given to a particular attribute (e.g. height-230 cm)
(C) A thing that we wish to collect data about zero or more, possibly real world examples of it may exist.
(D) A template for a group of things with the same set of characteristics that may exist in the real world

Answer: D

23. Data which improves the performance and accessibility of the database are called:
(A) Indexes
(B) User Data
(C) Application Metadata
(D) Data Dictionary

Answer: A

24. A relation R={A,B,C,D,E,F,G} is given with following set of functional dependencies:
F={AD→E, BE→F, B→C, AF→G}
Which of the following is a candidate key?
(A) A
(B) AB
(C) ABC
(D) ABD

Answer: D

25. An Assertion is a predicate expressing a condition we wish database to always satisfy. The correct syntax for Assertion is:
(A) CREATE ASSERTION ‘ASSERTION Name’ CHECK ‘Predicate’
(B) CREATE ASSERTION ‘ASSERTION NAME’
(C) CREATE ASSERTION, CHECK Predicate
(D) SELECT ASSERTION

Answer: A

17. Which of the following concurrency protocol ensures both conflict serializability and freedom from deadlock?
(a) 2-phase Locking
(b) Time stamp - ordering

Answer: (A) Both (a) and (b)
18. Drop Table cannot be used to drop a Table referenced by ................ constraint.
   (a) Primary key    (b) Sub key    (c) Super key    (d) Foreign key
   (A) (a)           (B) (a), (b) and (c)  (C) (d)        (D) (a) and (d)
   Answer: C

19. Database applications were built directly on top of file system to overcome the following
drawbacks of using file-systems
   (a) Data redundancy and inconsistency
   (b) Difficulty in accessing Data
   (c) Data isolation
   (d) Integrity problems
   (A) (a)           (B) (a) and (d)  (C) (a), (b) and (c)  (D) (a), (b), (c) and (d)
   Answer: D

20. For a weak entity set to be meaningful, it must be associated with another entity set in
    combination with some of their attribute values, is called as :
    (A) Neighbour Set    (B) Strong Entity Set
    (C) Owner entity set    (D) Weak Set
    Answer: C

16. Division operation is ideally suited to handle queries of the type :
    (A) customers who have no account in any of the branches in Delhi.
    (B) customers who have an account at all branches in Delhi.
    (C) customers who have an account in atleast one branch in Delhi.
    (D) customers who have only joint account in any one branch in Delhi
    Answer: B

17. Which of the following is true ?
    I. Implementation of self-join is possible in SQL with table alias.
    II. Outer-join operation is basic operation in relational algebra.
    III. Natural join and outer join operations are equivalent.
    (A) I and II are correct.    (B) II and III are correct.
    (C) Only III is correct.    (D) Only I is correct.
    Answer: D

18. What kind of mechanism is to be taken into account for converting a weak entity set into
    strong entity set in entity-relationship diagram ?
    (A) Generalization    (B) Aggregation
    (C) Specialization    (D) Adding suitable attributes
    Answer: D

19. The best normal form of relation scheme R(A, B, C, D) along with the set of functional
dependencies F = \{AB\rightarrow C, AB\rightarrow D, C\rightarrow A, D\rightarrow B\} is
    (A) Boyce-Codd Normal form    (B) Third Normal form
    (C) Second Normal form    (D) First Normal form
    Answer: B

20. Identify the minimal key for relational scheme R(A, B, C, D, E) with functional dependencies F
    = \{A\rightarrow B, B\rightarrow C, AC\rightarrow D\}
46. Manager’s salary details are hidden from the employee. This is called as
   (A) Conceptual level data hiding
   (B) Physical level data hiding
   (C) External level data hiding
   (D) Local level data hiding
   Answer: C

47. Which of the following statements is false?
   (A) Any relation with two attributes is in BCNF.
   (B) A relation in which every key has only one attribute is in 2NF.
   (C) A prime attribute can be transitively dependent on a key in 3NF relation.
   (D) A prime attribute can be transitively dependent on a key in BCNF relation.
   Answer: D

48. A clustering index is created when .................
   (A) primary key is declared and ordered
   (B) no key ordered
   (C) foreign key ordered
   (D) there is no key and no order
   Answer: A

49. Let R = {A, B, C, D, E, F} be a relation schema with the following dependencies
   C→F, E→A, EC→D, A→B
   Which of the following is a key for R?
   (A) CD  (B) EC  
   (C) AE  (D) AC
   Answer: B

50. Match the following:
   List-I                     List-II
   a. DDL                      i. LOCK TABLE
   b. DML                      ii. COMMIT
   c. TCL                      iii. Natural Difference
   d. BINARY Operation        iv. REVOKE
   Codes:
   a   b   c   d
   (A) ii  i  iii  iv
   (B) i  ii  iv  iii
   (C) iii  ii  i  iv
   (D) iv  i  ii  iii
   Answer: D

11. The student marks should not be greater than 100. This is
   (A) Integrity constraint  (B) Referential constraint
   (C) Over-defined constraint  (D) Feasible constraint
   Answer: A
12. GO BOTTOM and SKIP-3 commands are given one after another in a database file of 30 records. It shifts the control to
   (A) 28th record   (B) 27th record
   (C) 3rd record    (D) 4th record
   Answer: B

13. An ER Model includes
   I. An ER diagram portraying entity types.
   II. Attributes for each entity type
   III. Relationships among entity types.
   IV. Semantic integrity constraints that reflects the business rules about data not captured in the ER diagram.
   (A) I, II, III & IV   (B) I&IV
   (C) I, II & IV       (D) I & III
   Answer: A

14. Based on the cardinality ratio and participation .............. associated with a relationship type, choose either the Foreign Key Design, the Cross Referencing Design or Mutual Referencing Design.
   (A) Entity    (B) Constraints
   (C) Rules     (D) Keys
   Answer: B

15. Data Integrity control uses ..............
   (A) Upper and lower limits on numeric data.
   (B) Passwords to prohibit unauthorised access to files.
   (C) Data dictionary to keep the data
   (D) Data dictionary to find last access of data
   Answer: B

37. Usage of Preemption and Transaction Rollback prevents ..............
   (A) Unauthorised usage of data file
   (B) Deadlock situation
   (C) Data manipulation
   (D) File pre-emption
   Answer: B

41. Cross_tab displays permit users to view ............... of multidimensional data at a time.
   (A) One dimension   (B) Two dimensions
   (C) Three dimensions (D) Multidimensions
   Answer: B

43. Thoma’s-write rule is ..............
   (A) Two phase locking protocol   (B) Timestamp ordering protocol
   (C) One phase locking protocol   (D) Sliding window protocol
   Answer: B

10. Which of the following is not a type of Database Management System?
   (A) Hierarchical    (B) Network
   (C) Relational      (D) Sequential
   Answer: D

11. Manager's salary details are to be hidden from Employee Table. This Technique is called as
(A) Conceptual level Datahiding
(B) Physical level Datahiding
(C) External level Datahiding
(D) Logical level Datahiding
Answer: C

12. A Network Schema
   (A) restricts to one to many relationship
   (B) permits many to many relationship
   (C) stores Data in a Database
   (D) stores Data in a Relation
Answer: B

13. Which normal form is considered as adequate for usual database design?
   (A) 2NF    (B) 3NF
   (C) 4NF    (D) 5NF
Answer: B

14. If D₁, D₂,..., Dₙ are domains in a relational model, then the relation is a table, which is a subset of
   (A) D₁+D₂+.... +Dₙ
   (B) D₁x D₂x... xDₙ
   (C) D₁ U D₂ U....UDₙ
   (D) D₁- D₂-.....-Dₙ
Answer: B

31. Repository of information gathered from multiple sources, storing under unified scheme at a single site is called as
   (A) Data mining      (B) Meta data
   (C) Data warehousing  (D) Database
Answer: C

32. The task of correcting and pre processing data is called as
   (A) Data streaming     (B) Data cleaning
   (C) Data mining        (D) Data storming
Answer: B

34. The relation "divides" on a set of positive integers is .................
   (A) Symmetric and transitive
   (B) Anti symmetric and transitive
   (C) Symmetric only
   (D) Transitive only
Answer: B
Explanation:
The ‘divide’ operation is antisymmetric because if a divides b does not necessarily implies that b divides a. If a divides b and b divides c then a divides c. So, it is transitive as well.

13. Which of the following is true?
   (A) A relation in BCNF is always in 3NF.
   (B) A relation in 3NF is always in BCNF.
   (C) BCNF and 3NF are same.
   (D) A relation in BCNF is not in 3NF.
Answer: A
22. In DML, RECONNCT command cannot be used with
   (A) OPTIONAL Set  (B) FIXED Set
   (C) MANDATOR Set  (D) All of the above
   Answer: B

32. The User Work Area (UWA) is a set of Program variables declared in the host program to
    communicate the contents of individual records between
   (A) DBMS & the Host record
   (B) Host program and Host record
   (C) Host program and DBMS
   (D) Host program and Host language
   Answer: C

50. Given a Relation POSITION (Posting-No, Skill), then query to retrieve all distinct pairs of
    posting-nos. requiring skill is
   (A) Select p.posting-No, p.posting-No
      from position p
      where p.skill = p.skill
      and p.posting-No < p.posting-No
   (B) Select p1.posting-No, p2.posting-No
      from position p1, position p2
      where p1.skill = p2.skill
   (C) Select p1.posting-No, p2.posting-No
      from position p1, position p2
      where p1.skill = p2.skill
      and p1.posting-No < p2.posting-No
   (D) Select p1.posting-No, p2.posting-No
      from position p1, position p2
      where p1.skill = p2.skill
      and p1.posting-No = p2.posting-No
   Answer: C

7. In multiuser database if two users wish to update the same record at the same time, they are
   prevented from doing so by
   (A) Jamming  (B) Password
   (C) Documentation  (D) Record lock
   Answer: D

9. What deletes the entire file except the file structure ?
   (A) ERASE  (B) DELETE
   (C) ZAP  (D) PACK
   Answer: C

10. Which command is the fastest among the following ?
    (A) COPY TO <NEW FILE>
    (B) COPY STRUCTURE TO <NEW FILE>
    (C) COPY FILE <FILE 1> <FILE 2>
    (D) COPY TO MFILE-DAT DELIMITED
    Answer: B

12. A Transaction Manager is which of the following ?
    (A) Maintains a log of transactions
(B) Maintains before and after database images
(C) Maintains appropriate concurrency control
(D) All of the above
Answer: D

21. What deletes the entire file except the file structure?
(A) ERASE  (B) DELETE
(C) ZAP     (D) PACK
Answer: C

22. Which command classes text file, which has been created using “SET ALTERNATIVE”<FILE NAME> “Command”?
(A) SET ALTERNATE OFF
(B) CLOSE DATABASE
(C) CLOSE ALTERNATE
(D) CLEAR ALL
Answer: A

23. Data security threats include
(A) privacy invasion
(B) hardware failure
(C) fraudulent manipulation of data
(D) encryption and decryption
Answer: C

24. Which of the following statements is true, when structure of database file with 20 records is modified?
(A) ? EOF ( ) Prints T
(B) ? BOF ( ) Prints F
(C) ? BOF ( ) Prints T
(D) ? EOF ( ) Prints F
Answer: A

25. The SQL Expression
Select distinct T. branch name from branch T, branch S where T. assets > S. assets and S. branch-city = DELHI, finds the name of
(A) all branches that have greater asset than any branch located in DELHI.
(B) all branches that have greater assets than allocated in DELHI.
(C) the branch that has the greatest asset in DELHI.
(D) any branch that has greater asset than any branch located in DELHI.
Answer: A

16. Which of the following is the recovery management technique in DDBMS?
(A) 2PC (Two Phase Commit)    (B) Backup
(C) Immediate update           (D) All of the above
Answer: D

17. Which of the following is the process by which a user’s privileges ascertained?
(A) Authorization              (B) Authentication
(C) Access Control             (D) None of these
Answer: A

18. The basic variants of time-stamp based method of concurrency control are
19. A transaction can include following basic database access operations:
   (A) Read_item(X)  (B) Write_item(X)
   (C) Both (A) and (B)  (D) None of these
   Answer: C

20. Decomposition help in eliminating some of the problems of bad design
   (A) Redundancy  (B) Inconsistencies
   (C) Anomalies  (D) All of the above
   Answer: D

16. In generalisation, the differences between members of an entity is
   (A) maximized  (B) minimized
   (C) both (A) & (B)  (D) None of these
   Answer: A

17. The dependency preservation decomposition is a property to decompose database schema D,
    in which each functional dependency X → Y specified in F,
    (A) appeared directly in one of the relation schemas Ri in the decomposed D.
    (B) could be inferred from dependencies that appear in some Ri.
    (C) both (A) and (B)
    (D) None of these
    Answer: C

18. Which of the following is an optimistic concurrency control method?
   (A) Validation based  (B) Time stamp ordering
   (C) Lock-based  (D) None of these
   Answer: A

19. Optical storage is a
   (A) high-speed direct access storage device.
   (B) low-speed direct access storage device.
   (C) medium-speed direct access storage device.
   (D) high-speed sequential access storage device.
   Answer: C

20. Which of the following is the process by which a user’s access to physical data in the application
    is limited, based on his privileges?
   (A) Authorization  (B) Authentication
   (C) Access Control  (D) All of these
   Answer: C

16. An entity instance is a single occurrence of an ……………
17. Generalization is ............ process.
   (A) top-down
   (B) bottom up
   (C) both (A) & (B)
   (D) None of these
   Answer: B

18. Match the following:
    Set-I
    I. 2 NF
    II. 3 NF
    III. 4 NF
    IV. 5 NF
    Set-II
    (a) transitive dependencies eliminated
    (b) multivalued attribute removed
    (c) contain no partial functional dependencies
    (d) contains no join dependency
    Codes :
    I  II III IV
    (A) (a) (c) (b) (d)
    (B) (d) (a) (b) (c)
    (C) (c) (d) (a) (b)
    (D) (d) (b) (a) (c)
    Answer: B

19. Which data management language component enabled the DBA to define the schema components?
    (A) DML
    (B) Sub-schema DLL
    (C) Schema DLL
    (D) All of these
    Answer: C

20. The PROJECT Command will create new table that has
    (A) more fields than the original table
    (B) more rows than original table
    (C) both (A) & (B)
    (D) none of these
    Answer: D

16. The E-R model is expressed in term of
    I. Entities
    II. The relationship among entities.
    III. The attributes of the entities.
IV. Functional relationship.
(A) I, II
(B) I, II, IV
(C) II, II, IV
(D) I, II, III
Answer: D

17. Specialization is ............... process.
(A) top-down
(B) bottom up
(C) both (A) and (B)
(D) none of these
Answer: A

18. Match the following :

<table>
<thead>
<tr>
<th>List-I</th>
<th>List-II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Determinants</td>
<td></td>
</tr>
<tr>
<td>(2) Candidate key</td>
<td></td>
</tr>
<tr>
<td>(3) Non-redundancy</td>
<td></td>
</tr>
<tr>
<td>(4) Functional dependency</td>
<td></td>
</tr>
</tbody>
</table>

(a) No attribute can be added
(b) Uniquely identified a row
(c) A constraint between two attribute
(d) Group of attributes on the left hand side of arrow of function dependency.

(A) 1 – d, 2 – b, 3 – a, 4 – c
(B) 2 – d, 3 – a, 1 – b, 4 – c
(C) 4 – a, 3 – b, 2 – c, 1 – d
(D) 3 – a, 4 – b, 1 – c, 2 – d
Answer: A

19. A function that has no partial functional dependencies is in ............... form.
(A) 3 NF
(B) 2 NF
(C) 4 NF
(D) BCNF
Answer: B

20. Which of the following statement is wrong?
I. 2-phase locking protocol suffer from dead lock.
II. Time stamp protocol suffer from more aborts.
III. A block hole in a DFD is a data store with only inbound flows.
IV. Multivalued dependency among attribute is checked at 3 NF level.
V. An entity-relationship diagram is a tool to represent event model.

(A) I, II, II
(B) II, III, IV
(C) III, IV, V
(D) II, IV, V
Answer: C

(i) DML includes a query language based on both relation algebra and tuple calculus
(ii) DML includes a query language based on tuple calculus
(iii) DML includes a query language based on relational algebra
(iv) DML includes a query language based on none of the relational algebra and tuple calculus

Which one is correct?

(A) (i) only
(B) (ii) only
(C) (iii) only
(D) (iv) only

**Answer: A**

19. Suppose it takes 100 ns to access a page table and 20 ns to access associative memory with a 90% hit rate, the average access time equals:

(A) 20 ns
(B) 28 ns
(C) 90 ns
(D) 100 ns

**Answer: B**

20. There exists a construct which returns a value ‘true’ if the argument subquery is:

(A) empty
(B) non-empty
(C) in error
(D) none of the above

**Answer: B**

21. Which construct in SQL is used to test whether a subquery has any tuples in its result?

(A) UNIQUE
(B) EXISTS
(C) GROUP BY
(D) EXCEPT

**Answer: B**

22. ORACLE supports:

(A) inner join and outer join only
(B) outer join and semi join only
(C) inner join, outer join , semi join only
(D) inner join, outer join, semi join and anti join

**Answer:**

30. An entity has:

(i) a set of properties
(ii) a set of properties and values for all the properties
(iii) a set of properties and the values for some set of properties may non-uniquely identify an entity
(iv) a set of properties and the values for some set of properties may uniquely identify an entity

Which of the above are valid?

(A) (i) only
(B) (ii) only
(C) (iii) only
(D) (iv) only

**Answer: D**
31. Aggregation is:
(A) an abstraction through which relationships are treated as lower level entities
(B) an abstraction through which relationships are treated as higher level entities
(C) an abstraction through which relationships are not treated at all as entities
(D) none of the above

Answer: B

32. Suppose R is a relation schema and F is a set of functional dependencies on R. Further, suppose R₁ and R₂ form a decomposition of R. Then the decomposition is a lossless join decomposition of R provided that:
(A) R₁∩R₂→R₁ is in F⁺
(B) R₁∩R₂→R₂ is in F⁺
(C) both R₁∩R₂→R₁ and R₁∩R₂→R₂ functional dependencies are in F⁺
(D) at least one from R₁∩R₂→R₁ and R₁∩R₂→R₂ is in F⁺

Answer: D

16. A superkey for an entity consists of:
(A) one attribute only
(B) at least two attributes
(C) at most two attributes
(D) one or more attributes

Answer: D

17. Which of the following set of keywords constitutes a mapping in SQL?
(A) SELECT, FROM, TABLE
(B) SELECT, FROM, WHERE
(C) CONNECT, TABLE, CREATE
(D) SELECT, TABLE, INSERT

Answer: B

18. If a relation is in 2NF then:
(A) every candidate key is a primary key
(B) every non-prime attribute is fully functionally dependent on each relation key
(C) every attribute is functionally independent
(D) every relational key is a primary key

Answer: B

19. Which of the following is true?
(A) A relation in 3NF is always in BCNF
(B) A relation in BCNF is always in 3NF
(C) BCNF and 3NF are totally different
(D) A relation in BCNF is in 2NF but not in 3NF

Answer: B

20. Consider the query: SELECT student_name FROM student_data WHERE rollno (SELECT rollno FROM student_marks WHERE SEM1_MARK=SEM2_MARK);
Which of the following is true?
(A) It gives the name of the student whose marks in semester 1 and semester 2 are same.
(B) It gives all the names and roll nos of those students whose marks in semester 1 and semester 2 are same.
(C) It gives the names of all the students whose marks in semester 1 and semester 2 are same.
(D) It gives roll numbers of all students whose marks in semester 1 and semester 2 are same.
16. A primary key for an entity is:
   (A) a candidate key    (B) any attribute
   (C) a unique attribute (D) a super key
   Answer: C

17. Aggregate functions in SQL are:
   (A) GREATEST, LEAST and ABS
   (B) SUM, COUNT and AVG
   (C) UPPER, LOWER and LENGTH
   (D) SQRT, POWER and MOD
   Answer: C

18. If a relation is in 2NF and 3NF forms then:
   (A) no non-prime attribute is functionally dependent on other non-prime attributes
   (B) no non-prime attribute is functionally dependent on prime attributes
   (C) all attributes are functionally independent
   (D) prime attribute is functionally independent of all non-prime attributes
   Answer: A

19. The end of an SQL command is denoted by:
   (A) an end-of-line character
   (B) an ‘enter-key’ marker
   (C) entering F4 key
   (D) a semicolon (;)
   Answer: D

20. Consider the query : SELECT student_name FROM students WHERE class_name=(SELECT class_name FROM students WHERE math_marks=100); what will be the output ?
   (A) the list of names of students with 100 marks in mathematics
   (B) the names of all students of all classes in which at least one student has 100 marks in mathematics
   (C) the names of all students in all classes having 100 marks in mathematics
   (D) the names and class of all students whose marks in mathematics is 100
   Answer: B

16. Which of the following statements is wrong?
   (A) 2-phase Locking Protocols suffer from deadlocks
   (B) Time-Stamp Protocols suffer from more aborts
   (C) Time-Stamp Protocols suffer from cascading roll back where as 2-Phase locking Protocol do not
   (D) None of these
   Answer: C

17. A recursive foreign key is a:
   (A) references a relation
   (B) references a table
   (C) references its own relation
   (D) references a foreign key
   Answer: C

18. A sub class having more than one super class is called:
19. A relation \( R = \{A,B,C,D,E,F\} \) is given with following set of functional dependencies: 
\( F = \{A \rightarrow B, AD \rightarrow C, B \rightarrow F, A \rightarrow E\} \). Which of the following is Candidate Key?

(A) A  
(B) AC  
(C) AD  
(D) None of these  

Answer: C

20. Which statement is false regarding data independence?

(A) Hierarchical data model suffers from data Independence  
(B) Network model suffers from data Independence  
(C) Relational model suffers only from logical data Independence  
(D) Relational model suffers only from physical data Independence  

Answer: C

16. Which possibility among the following is invalid in case of a Data Flow Diagram?

(A) A process having in-bound data flows more than out-bound data flows  
(B) A data flow between two processes  
(C) A data flow between two data stores  
(D) A data store having more than one in-bound data flows  

Answer: C

17. In DBMS, deferred update means:

(A) All the updates are done first but the entries are made in the log file later  
(B) All the log files entries are made first but the actual updates are done later  
(C) Every update is done first followed by a writing on the log file  
(D) Changes in the views are deferred till a query asks for a view  

Answer: B

18. Which statement is false regarding data independence?

(A) Hierarchical data model suffers from data independence  
(B) Network model suffers from data independence  
(C) Relational model suffers only from logical data independence  
(D) Relational model suffers only from physical data independence  

Answer: C

19. Which of the following tools is not required during system analysis phase of system development life cycle?

(A) Case tool  
(B) RAD tool  
(C) Reverse engineering  
(D) None of these  

Answer: C

20. Two phase protocol in a database management system is:

(A) a concurrency mechanism that is not deadlock free  
(B) a recovery protocol used for restoring a database after a crash  
(C) Any update to the system log done in 2-phases  
(D) not effective in Database
16. A relation $R = \{A, B, C, D, E, F\}$ is given with following set of functional dependencies:
   \[ F = \{A \rightarrow B, AD \rightarrow C, B \rightarrow F, A \rightarrow E\} \]
   Which of the following is candidate key?
   (A) A
   (B) AC
   (C) AD
   (D) None of these
   Answer: C

17. Immediate updates as a recovery protocol is preferable, when:
   (A) Database reads more than writes
   (B) Writes are more than reads
   (C) It does not matter as it is good in both the situations
   (D) There are only writes
   Answer: B

18. Which of the following statement is wrong?
   (A) 2-phase locking protocol suffers from deadlocks
   (B) Time-Stamp protocol suffers from more abort
   (C) Time stamp protocol suffers from cascading rollbacks where as 2-phase locking protocol do not
   (D) None of these
   Answer: C

19. Which data management language component enabled the DBA to define the schema components?
   (A) DML
   (B) Subschema DLL
   (C) Schema DLL
   (D) All of these
   Answer: C

20. A subclass having more than one super class is called
   (A) Category
   (B) Classification
   (C) Combination
   (D) Partial Participation
   Answer: A
19. An embedded pointer provides:
   (A) Physical record key
   (B) An inserted Index
   (C) A secondary access path
   (D) All the above
   **Answer:** C

20. A locked file can be:
   (A) accessed by only one user
   (B) modified by users with the correct password
   (C) is used to hide sensitive information
   (D) both (B) and (C)
   **Answer:** A

16. An Entity - relationship diagram is a tool to represent:
   (A) Data model
   (B) Process model
   (C) Event model
   (D) Customer model
   **Answer:** A

17. Which of the following tools is not required during system analysis phase of system development Life cycle?
   (A) CASE Tool
   (B) RAD Tool
   (C) Reverse engineering tool
   (D) None of these
   **Answer:** C

18. A black hole in a DFD is a:
   (A) A data store with no inbound flows
   (B) A data store with only inbound flows
   (C) A data store with more than one inbound flow
   (D) None of these.
   **Answer:** B

19. Multi-valued dependency among attribute is checked at which level?
   (A) 2 NF
   (B) 3 NF
   (C) 4 NF
   (D) 5 NF
   **Answer:** C

20. A WINDOW into a portion of a data base is:
   (A) Schema
   (B) View
   (C) Query
   (D) Data Dictionary
   **Answer:** B

16. The E-R model is expressed in terms of:
   (i) Entities
   (ii) The relationship among entities
   (iii) The attributes of the entities
   Then
   (A) (i) and (iii)
   (B) (i), (ii) and (iii)
   (C) (ii) and (iii)
17. Specialization is a ............... process.
   (A) Top - down        (B) Bottom - Up
   (C) Both (A) and (B)  (D) None of the above
   Answer: A

18. The completeness constraint has rules:
   (A) Supertype, Subtype
   (B) Total specialization, Partial specialization
   (C) Specialization, Generalization
   (D) All of the above
   Answer: B

19. The entity type on which the ............... type depends is called the identifying owner.
   (A) Strong entity       (B) Relationship
   (C) Weak entity         (D) E - R
   Answer: C

20. Match the following:
   (i) 5 NF       (a) Transitive dependencies eliminated
   (ii) 2 NF      (b) Multivalued attribute removed
   (iii) 3 NF     (c) Contains no partial functional dependencies
   (iv) 4 NF      (d) Contains no join dependency
   (A) i-a, ii-c, iii-b, iv-d
   (B) i-d, ii-c, iii-a, iv-b
   (C) i-d, ii-c, iii-b, iv-a
   (D) i-a, ii-b, iii-c, iv-d
   Answer: B

7. Consider following schedules involving two transactions:
   S1: r1(X); r1(Y); r2(X); r2(Y); w2(Y); w1(X)
   S2: r1(X); r2(X); r2(Y); w2(Y); r1(Y); w1(X)
   Which of the following statement is true?
   (1) Both S1 and S2 are conflict serializable.
   (2) S1 is conflict serializable and S2 is not conflict serializable.
   (3) S1 is not conflict serializable and S2 is conflict serializable.
   (4) Both S1 and S2 are not conflict serializable.
   Answer: 3

8. Which one is correct w.r.t. RDBMS?
   (1) primary key \(\subseteq\) super key \(\subseteq\) candidate key
   (2) primary key \(\subseteq\) candidate key \(\subseteq\) super key
   (3) super key \(\subseteq\) candidate key \(\subseteq\) primary key
   (4) super key \(\subseteq\) primary key \(\subseteq\) candidate key
9. Let pk(R) denotes primary key of relation R. A many-to-one relationship that exists between two relations R1 and R2 can be expressed as follows:
   (1) pk(R2) → pk(R1)
   (2) pk(R1) → pk(R2)
   (3) pk(R2) → R1 ∩ R2
   (4) pk(R1) → R1 ∩ R2
   Answer: 2

10. 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 are:
    A → C
    B → D
    The relation R is in ..............
    (1) First normal form but not in second normal form
    (2) Both in first normal form as well as in second normal form
    (3) Second normal form but not in third normal form
    (4) Both in second normal form as well as in third normal form
    Answer: 1

11. Consider the following relation:
    Works (emp_name, company_name, salary)
    Here, emp_name is primary key.
    Consider the following SQL query
    Select emp_name
    From Works T
    where salary > (select avg (salary) from Works S where T.company_name =
    S. Company_name)
    The above query is for following:
    (1) Find the highest paid employee who earns more than the average salary of all employees of his company.
    (2) Find the highest paid employee who earns more than the average salary of all the employees of all the companies.
    (3) Find all employees who earn more than the average salary of all employees of all the companies.
    (4) Find all employees who earn more than the average salary of all employees of their company.
    Answer: 4

7. Which of the following statements is/are True regarding some advantages that an object-oriented DBMS (OODBMS) offers over a relational database?
I. An OODBMS avoids the “impedance mismatch” problem.
II. An OODBMS avoids the “phantom” problem.
III. An OODBMS provides higher performance concurrency control than most relational databases.
IV. An OODBMS provides faster access to individual data objects once they have been read from disk.
   (A) II and III only       (B) I and IV only
   (C) I, II, and III only  (D) I, III and IV only
   Answer: B

8. The Global conceptual Schema in a distributed database contains information about global relations. The condition that all the data of the global relation must be mapped into the fragments, that is, it must not happen that a data item which belongs to a global relation does not belong to any fragment, is called :
   (A) Disjointness condition       (B) Completeness condition
   (C) Reconstruction condition     (D) Aggregation condition
   Answer: B

9. Suppose database table T1(P, R) currently has tuples { (10, 5), (15, 8), (25, 6) } and table T2 (A, C) currently has { (10, 6), (25, 3), (10, 5) }. Consider the following three relational algebra queries RA1, RA2 and RA3:

   RA1: T1  T2
   RA2: T1  T2
   RA3: T1  T2
   where  is natural join symbol
   where  is left outer join symbol

   The number of tuples in the resulting table of RA1, RA2 and RA3 are given by:
   (A) 2, 4, 2 respectively       (B) 2, 3, 2 respectively
   (C) 3, 3, 1 respectively       (D) 3, 4, 1 respectively
   Answer: D

10. Consider the table R with attributes A, B and C. The functional dependencies that hold on R are : A → B, C → AB. Which of the following statements is/are True?
    I. The decomposition of R into R1(C, A) and R2(A, B) is lossless.
    II. The decomposition of R into R1(A, B) and R2(B, C) is lossy.
    (A) Only I       (B) Only II
    (C) Both I and II  (D) Neither I nor II
    Answer: C

11. Consider the following ORACLE relations:
One (x, y) = { <2, 5>, <1, 6>, <1, 6>, <1, 6>, <4, 8>, <4, 8> }
Two (x, y) = { <2, 55>, <1, 1>, <4, 4>, <1, 6>, <4, 8>, <4, 8>, <9, 9>, <1, 6> }
Consider the following two SQL queries SQ1 and SQ2:
SQ1 : SELECT * FROM One
     EXCEPT
     (SELECT * FROM Two);
SQ2 : SELECT * FROM One
     EXCEPT ALL
     (SELECT * FROM Two);
For each of the SQL queries, what is the cardinality (number of rows) of the result obtained when applied to the instances above?
12. Which one of the following pairs is correctly matched in the context of database design?

<table>
<thead>
<tr>
<th>List – I</th>
<th>List – II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Database term)</td>
<td>(Definition)</td>
</tr>
<tr>
<td>I. Specialization</td>
<td>A. Result of taking the union of two or more disjoint (lower-level) entity sets to produce a higher-level entity set.</td>
</tr>
<tr>
<td>II. Generalization</td>
<td>B. Express the number of entities to which another entity can be associated via a relationship set.</td>
</tr>
<tr>
<td>III. Aggregation</td>
<td>C. Result of taking a subset of a higher-level entity set to form a lower-level entity set.</td>
</tr>
<tr>
<td>IV. Mapping cardinalities</td>
<td>D. An abstraction in which relationship sets (along with their associated entity sets) are treated as higher-level entity sets, and can participate in relationships.</td>
</tr>
</tbody>
</table>

**Codes:**

- (A) D A B C
- (B) D C B A
- (C) C D A B
- (D) C A D B

**Answer: D**

7. Which of the following statements concerning Object-Oriented databases is FALSE?

- (A) Objects in an object-oriented database contain not only data but also methods for processing the data.
- (B) Object-oriented databases store computational instructions in the same place as the data.
- (C) Object-oriented databases are more adapted at handling structures (analytical) data than relational databases.
- (D) Object-oriented databases store more types of data than relational databases and access that data faster.

**Answer: C**

8. In distributed databases, location transparency allows for database users, programmers and administrators to treat the data as if it is at one location. A SQL query with location transparency needs to specify:

- (A) Inheritances
- (B) Fragments
- (C) Locations
- (D) Local formats

**Answer: B**
9. Consider the relations R(A,B) and S(B,C) and the following four relational algebra queries over R and S:
I. \( \pi_{A,B}(R \bowtie S) \)
II. \( R \bowtie \pi_B(S) \)
III. \( R \cap (\pi_A(R) \times \pi_B(S)) \)
IV. \( \pi_{A,R,B}(R \times S) \) where R.B refers to the column B in table R.

One can determine that:
(A) I, III and IV are the same query.
(B) II, III and IV are the same query.
(C) I, II and IV are the same query.
(D) I, III and III are the same query.

Answer: D

10. Which of the following statements is TRUE?
D_1: The decomposition of the schema R(A,B,C) into R_1(A,B) and R_2(A,C) is always lossless.
D_2: The decomposition of the schema R(A,B,C,D,E) having AD \( \rightarrow \) B, C \( \rightarrow \) DE, B \( \rightarrow \) AE, AE \( \rightarrow \) C into R_1(A,B,D) and R_2(A,C,D,E) is lossless.

(A) Both D_1 and D_2
(B) Neither D_1 and D_2
(C) Only D_1
(D) Only D_2

Answer: D

11. Consider the following ORACLE relations:
\( R(A,B,C) = \{<1,2,3>, <1,2,0>, <1,3,1>, <6,2,3>, <1,4,2>, <3,1,4>\} \)
\( S(B,C,D) = \{<2,3,7>, <1,4,5>, <1,2,3>, <2,3,4>, <3,1,4>\} \)
Consider the following two SQL queries SQ_1 and SQ_2:
SQ_1: SELECT R.B, AVG(S.B)
FROM R, S
WHERE R.A = S.C AND S.D < 7
GROUP BY R.B;
SQ_2: SELECT DISTINCT S.B, MIN(S.C)
FROM S
GROUP BY S.B
HAVING COUNT(DISTINCT S.D) > 1;

If M is the number of tuples returned by SQ_1 and N is the number of tuples returned by SQ_2 then
(A) M=4, N=2
(B) M=5, N=3
(C) M=2, N=2
(D) M=3, N=3

Answer: A

12. Semi-join strategies are techniques for query processing in distributed database system. Which of the following is a semi-join technique?
(A) Only the joining attributes are sent from one site to another and then all of the rows are returned.
(B) All of the attributes are sent from one site to another and then only the required rows are returned.
(C) Only the joining attributes are sent from one site to another and then only the required rows are returned.
(D) All of the attributes are sent from one site to another and then only the required rows are returned.
Answer: C

58. Which of the following statements regarding the features of the object-oriented approach to databases are true?
(a) The ability to develop more realistic models of the real world.
(b) The ability to represent the world in a non-geometric way.
(c) The ability to develop databases using natural language approaches.
(d) The need to split objects into their component parts.
(e) The ability to develop database models based on location rather than state and behaviour.

Codes:
(A) (a), (b) and (c)
(B) (b), (c) and (d)
(C) (a), (d) and (e)
(D) (c), (d) and (e)
Answer: A

59. Consider the following database table:
Create table test(
one integer,
two integer,
primary key(one),
unique(two),
check(one>=1 and <=10),
check(two>=1 and <=5);
How many data records/tuples atmost can this table contain?
(A) 5  (B) 10  (C) 15  (D) 50
Answer: A

60. Suppose ORACLE relation R(A, B) currently has tuples {(1, 2), (1, 3), (3, 4)} and relation S(B, C) currently has {(2, 5), (4, 6), (7, 8)}. Consider the following two SQL queries SQ1 and SQ2:
SQ1 : Select *
From R Full Join S
On R.B=S.B;
SQ2 : Select *
From R Inner Join S
On R.B=S.B;
The numbers of tuples in the result of the SQL query SQ1 and the SQL query SQ2 are given by:
(A) 2 and 6 respectively  (B) 6 and 2 respectively
(C) 2 and 4 respectively  (D) 4 and 2 respectively
Answer: D

61. Consider the following three SQL queries (Assume the data in the people table):
(a) Select Name from people where Age>21;
(b) Select Name from people where Height>180;
(c) Select Name from people where (Age>21) or (Height>180);
If the SQL queries (a) and (b) above, return 10 rows and 7 rows in the result set respectively, then what is one possible number of rows returned by the SQL query (c) ? (A) 3    (B) 7  
(C) 10    (D) 21  
Answer: C

8. The STUDENT information in a university is stored in the relation STUDENT (Name, Sex, Marks, DEPT_Name)  
Consider the following SQL Query SELECT DEPT_Name from STUDENT where SEX='M' group by DEPT_Name having avg (Marks)>(SELECT avg (Marks) from STUDENT). It returns the Name of the Department for which:  
(A) The Average marks of Male students is more than the average marks of students in the same Department  
(B) The average marks of male students is more than the average marks of the students in the University  
(C) The average marks of male students is more than the average marks of male students in the University  
(D) The average marks of students is more than the average marks of male students in the University  
Answer: B

9. Select the ‘False’ statement from the following statements about Normal Forms:  
   (A) Lossless preserving decomposition into 3NF is always possible  
   (B) Lossless preserving decomposition into BCNF is always possible  
   (C) Any relation with two attributes is in BCNF  
   (D) BCNF is stronger than 3NF  
Answer: B

10. The Relation  
Vendor Order (V_no, V_ord_no, V_name, Qty_sup, unit_price)  
is in 2NF because :  
   (A) Non key attribute V_name is dependent on V_no which is part of composite key  
   (B) Non key attribute V_name is dependent on Qty_sup  
   (C) key attribute Qty_sup is dependent on primary_key unit price  
   (D) key attribute V_ord_no is dependent on primary_key unit price  
Answer: A

11. The relation schemas R₁ and R₂ form a Lossless join decomposition of R if and only if:  
(a) R₁∩R₂→(R₁-R₂)  
(b) R₁→R₂
7. Let $E_1$ and $E_2$ be two entities in E-R diagram with simple single valued attributes. $R_1$ and $R_2$ are two relationships between $E_1$ and $E_2$ where $R_1$ is one-many and $R_2$ is many-many. $R_1$ and $R_2$ do not have any attributes of their own. How many minimum number of tables are required to represent this situation in the Relational Model?

(A) 4  
(B) 3  
(C) 2  
(D) 1

Answer: B

7. Location transparency allows:

I. Users to treat the data as if it is done at one location.
II. Programmers to treat the data as if it is at one location.
III. Managers to treat the data as if it is at one location.

Which one of the following is correct?

(A) I, II and III  
(B) I and II only  
(C) II and III only  
(D) II only

Answer: A

8. Which of the following is correct?

I. Two phase locking is an optimistic protocol.
II. Two phase locking is pessimistic protocol
III. Time stamping is an optimistic protocol.
IV. Time stamping is pessimistic protocol.

(A) I and III  
(B) II and IV  
(C) I and IV  
(D) II and III

Answer: D

9. .............. rules used to limit the volume of log information that has to be handled and processed in the event of system failure involving the loss of volatile information.

(A) Write-ahead log  
(B) Check-pointing  
(C) Log buffer  
(D) Thomas

Answer: B
10. Let $R = ABCDE$ is a relational scheme with functional dependency set $F = \{A \rightarrow B, B \rightarrow C, AC \rightarrow D\}$. The attribute closures of $A$ and $E$ are

(A) $ABCD$, $\Box$

(B) $ABCD$, $E$

(C) $\Box$, $\Box$

(D) $ABC$, $E$

Answer: B

11. Consider the following statements:

I. Re-construction operation used in mixed fragmentation satisfies commutative rule.

II. Re-construction operation used in vertical fragmentation satisfies commutative rule.

Which of the following is correct?

(A) I

(B) II

(C) Both are correct

(D) None of the statements are correct.

Answer: D

12. Which of the following is false?

(A) Every binary relation is never be in BCNF.

(B) Every BCNF relation is in 3NF.

(C) 1 NF, 2 NF, 3 NF and BCNF are based on functional dependencies.

(D) Multivalued Dependency (MVD) is a special case of Join Dependency (JD).

Answer: A

31. Any decision tree that sorts $n$ elements has height

(A) $\Omega(n)$

(B) $\Omega(lgn)$

(C) $\Omega(n^{1/2})$

(D) $\Omega(n^2)$

Answer: C

22. Consider the following relational schemas for a library database:

- Book (Title, Author, Catalog_no, Publisher, Year, Price)
- Collection(Title, Author, Catalog_no)

with the following functional dependencies:

I. Title, Author $\rightarrow$ Catalog_no

II. Catalog_no $\rightarrow$ Title, Author, Publisher, Year

III. Publisher, Title, Year $\rightarrow$ Price

Assume (Author, Title) is the key for both schemas. Which one of the following is true?

(A) Both Book and Collection are in BCNF.

(B) Both Book and Collection are in 3NF.

(C) Book is in 2NF and Collection in 3NF.

(D) Both Book and Collection are in 2NF.

Answer: C

23. Specialization Lattice stands for

(A) An entity type can participate as a subclass in only one specialization.

(B) An entity type can participate as a subclass in more than one specialization.

(C) An entity type that can participate in one specialization.

(D) An entity type that can participate in one generalization.

Answer: B

24. Match the following:
List – I
a. Timeout ordering protocol
b. Deadlock prevention
c. Deadlock detection
d. Deadlock recovery

List – II
i. Wait for graph
ii. Roll back
iii. Wait-die scheme
iv. Thomas Write Rule

Codes:

a
b
c
d
(A) iv  iii  i  ii
(B) iii  ii  iv  i
(C) ii  i  iv  iii
(D) iii  i  iv  iii

Answer: A

26. Which one of the following is not a Client-Server application?
(A) Internet chat
(B) Web browser
(C) E-mail
(D) Ping

Answer: B

20. Which one of the following is not a definition of error?
(A) It refers to the discrepancy between a computed, observed or measured value and the true, specified or theoretically correct value.
(B) It refers to the actual output of a software and the correct output.
(C) It refers to a condition that causes a system to fail.
(D) It refers to human action that results in software containing a defect or fault.

Answer: C

25. Consider the schema R = {S, T, U, V} and the dependencies S → T, T → U, U → V and V → S. If R = (R₁ and R₂) be a decomposition such that R₁ ⊓ R₂ = ⊙ then the decomposition is

(A) not in 2NF
(B) in 2NF but not in 3NF
(C) in 3NF but not in 2NF
(D) in both 2NF and 3NF

Answer: D

27. Which of the following concurrency protocol ensures both conflict serializability and freedom from deadlock?
I. 2-phase locking
II. Time phase ordering

(A) Both I & II
(B) II only
(C) I only
(D) Neither I nor II

Answer: B

55. Consider the following ER diagram:
The minimum number of tables required to represent $M, N, P, R_1, R_2$ is
(A) 2
(B) 3
(C) 4
(D) 5
Answer: A

Explanation:
Since $R_1$ is many to one and participation of $M$ is total, $M$ and $R_1$ can be combined to form the table $\{M_1, M_2, M_3, P_1\}$. $N$ is a week entity set, so it can be combined with $P$.

56. Consider the following schemas:
- **Branch** = (Branch-name, Assets, Branch-city)
- **Customer** = (Customer-name, Bank-name, Customer-city)
- **Borrow** = (Branch-name, loan-number, customer account-number)
- **Deposit** = (Branch-name, Account-number, Customer-name, Balance)

Using relational Algebra, the query that finds customers who have balance more than 10,000 is

\[ \pi_{\text{customer-name}}(\sigma_{\text{balance}>10000}(\text{Deposit})) \]

(A) $\pi_{\text{customer-name}}(\sigma_{\text{balance}>10000}(\text{Deposit}))$
(B) $\sigma_{\text{customer-name}}(\sigma_{\text{balance}>10000}(\text{Deposit}))$
(C) $\pi_{\text{customer-name}}(\sigma_{\text{balance}>10000}(\text{Borrow}))$
(D) $\sigma_{\text{customer-name}}(\sigma_{\text{balance}>10000}(\text{Borrow}))$

Answer: A

57. Find the false statement:
(A) The relationship construct known as the weak relationship type was defined by Dey, Storey & Barron (1999).
(B) A weak relationship occurs when two relationship types are linked by either Event-Precedent sequence or Condition-Precedent sequence
(C) Conceptual model is not accurate representation of "Universe of interest".
(D) Ternary, Quaternary and Quintary relationships are shown through a series of application scenario's and vignette's

Answer: C

58. Consider the table
**Student**(stuid, name, course, marks). Which one of the following two queries is correct to find the highest marks student in course 5?

Q.1. Select S.stuid
    From student S
    Where not exists
    (select * from student e where e course='5' and e marks ≥ s marks)

Q.2. Select S.stuid
    From student S
    Where s.marks > any (select distinct marks from student S where s.course = 5)

(A) Q.1
(B) Q.2
47. Consider the following schemas:
   - Branch_Schema = (branch_name, assets, city)
   - Customer_Schema = (cutstomer_name, street, city)
   - Deposit_Schema = (branch_name, account_number, customer_name, balance)
   - Borrow_Schema = (branch_name, loan_number, customer_name, amount)

Which of the following tuple relational calculus finds all customers who have loan amount more than Rs 12,000?

(A) \{t(customer_name) | t \in borrow[?] t[amount]>12000\}
(B) \{t[customer_name] | t \in borrow[?] t[amount]>12000\}
(C) \{t[?] \in borrow (t(customer_name=s(customer_ name))[?] [amount]>12000\}
(D) \{t[?] \in borrow (t(customer_name)[?] s[amount] >12000\}

Answer: C

48. Match the following:
   (a) Create
   (b) Select
   (c) Rectangle
   (d) Record

Codes:
   (a) (b) (c) (d)

(A) (iii) (iv) (i) (ii)
(B) (iv) (iii) (ii) (i)
(C) (iv) (iii) (i) (ii)
(D) (iii) (iv) (ii) (i)

Answer: A

49. Match the following:

Codes:
   (a) (b) (c) (d)

(A) (iii) (iv) (ii) (i)
(B) (iv) (iii) (ii) (i)
(C) (ii) (iii) (iv) (i)
(D) (iii) (iv) (i) (ii)

Answer: C

25. The SQL expression
   Select distinct T, branch_name from branch T, branch S where T.assets>S.assets and S.branch_city="Mumbai" finds the names of
24. ................. constraints ensure that a value that appears in one relation for a given set of attributes also appears for a certain set of attributes in another relation.
   (A) Logical Integrity
   (B) Referential Integrity
   (C) Domain Integrity
   (D) Data Integrity
   Answer: B

56. If a relation with a Schema R is decomposed into two relations R₁ and R₂ such that (R₁∩R₂)=R₁ then which one of the following is to be satisfied for a lossless joint decomposition (→ indicates functional dependency)
   (A) (R₁∩R₂)→R₁ or R₁∩R₂→R₂
   (B) R₁∩R₂→R₁
   (C) R₁∩R₂→R₂
   (D) R₁∩R₂→R₁ and R₁∩R₂→R₂
   Answer: A

Explanation:
Let R be a relation schema.
Let F be a set of functional dependencies on R.
Let R₁ and R₂ form a decomposition of R.
The decomposition is a lossless-join decomposition of R if at least one of the following functional dependencies are in F⁺
   1. R₁∩R₂→R₁
   2. R₁∩R₂→R₂

59. Which level of Abstraction describes how data are stored in the data base?
   (A) Physical level
   (B) View level
   (C) Abstraction level
   (D) Logical level
   Answer: A

47. Analysis of large database to retrieve information is called
   (A) OLTP
   (B) OLAP
   (C) OLDP
   (D) OLPP
   Answer: B

7. The “PROJECT” operator of a relational algebra creates a new table that has always
   (A) More columns than columns in original table
   (B) More rows than original table
   (C) Same number of rows as the original table
(D) Same number of columns as the original table

Answer: C

Explanation:
If the user is interested in selecting the values of a few attributes, rather than selecting all attributes of the table, then one should go for **PROJECT** operation. **PROJECT** eliminates columns while **SELECT** eliminates rows.

8. The employee information of an Organization is stored in the relation:
   Employee (name, sex, salary, deptname)

   Consider the following SQL query
   ```sql
   Select deptname from Employee Where sex = 'M' group by deptname having avg (salary) >
   {select avg (salary) from Employee}
   ```

   Output of the given query corresponds to
   (A) Average salary of employee more than average salary of the organization.
   (B) Average salary less than average salary of the organization.
   (C) Average salary of employee equal to average salary of the organization.
   (D) Average salary of male employees in a department is more than average salary of the organization.

   Answer: D

9. For a database relation R(a, b, c, d) where the domains of a, b, c, d include only the atomic values. The functional dependency a → c, b → d holds in the following relation
   (A) In 1NF not in 2NF
   (B) In 2NF not in 3NF
   (C) In 3NF
   (D) In 1NF

   Answer: A

47. Match the following:
   List - I
   a. Foreign keys
   b. Private key
   c. Event control action model
   d. Data security
   List - II
   i. Domain constraint
   ii. Referential integrity
   iii. Encryption
   iv. Trigger
60. Match the following:

**List – I**
- a. Secondary Index
- b. Non-procedural Query
- c. Closure of set of Attributes
- d. Natural JOIN

**List - II**
- i. Functional Dependency
- ii. B-tree
- iii. Relational Algebraic Operation
- iv. Domain Calculus

**Codes:**
- a b c d
- (A) i ii iv iii
- (B) ii i iv iii
- (C) i iii iv ii
- (D) ii iv i iii

**Answer: D**

70. Referential integrity is directly related to
- (A) Relation key
- (B) Foreign key
- (C) Primary key
- (D) Candidate key

**Answer: B**

63. Third normal form is based on the concept of ...........
- (A) Closure Dependency
- (B) Transitive Dependency
- (C) Normal Dependency
- (D) Functional Dependency

**Answer: B**

38. How to express that some person keeps animals as pets?

(A) ![Diagram](A)  
(B) ![Diagram](B)  
(C) ![Diagram](C)  
(D) ![Diagram](D)
9. The problem that occurs when one transaction updates a database item and then the transaction fails for some reason is …………….
   (A) Temporary Select Problem
   (B) Temporary Modify Problem
   (C) Dirty Read Problem
   (D) None
   Answer: C

18. Consider a schema R(A, B, C, D) and functional dependencies A→B and C→D. Then the decomposition R₁(A, B) and R₂(C, D) is
   (A) Dependency preserving but not lossless join
   (B) Dependency preserving and lossless join
   (C) Lossless Join but not dependency preserving
   (D) Lossless Join
   Answer: A

44. Which diagram provides a formal graphic notation for modelling objects, classes and their relationships to one another?
   (A) Object diagram
   (B) Class diagram
   (C) Instance diagram
   (D) Analysis diagram
   Answer: A

4. What is Granularity?
   (A) The size of database
   (B) The size of data item
   (C) The size of record
   (D) The size of file
   Answer: B

63. Consider the following three tables R, S and T. In this question, all the join operations are natural joins (⋈). (π) is the projection operation of a relation:
Possible answer tables for this question are also given as below :

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
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<tr>
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<td>8</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>8</td>
<td>3</td>
</tr>
</tbody>
</table>

What is the resulting table of $\pi_{A,B}(R \bowtie T) \bowtie \pi_{B,C}(S \bowtie T)$ ?

(A) (a)  (B) (b)  (C) (c)  (D) (d)

Answer: A

7. Consider the following four schedules due to three transactions (indicated by the subscript) using read and write on a data item X, denoted by r(X) and w(X) respectively. Which one of them is conflict serializable?

- $S_1 : r_1(X); r_2(X); w_1(X); r_3(X); w_2(X)$
- $S_2 : r_2(X); r_1(X); w_2(X); r_3(X); w_1(X)$
- $S_3 : r_3(X); r_2(X); r_1(X); w_2(X); w_1(X)$
- $S_4 : r_2(X); w_2(X); r_3(X); r_1(X); w_1(X)$

(1) $S_1$
(2) $S_2$
(3) $S_3$
(4) $S_4$

Answer: 4

8. Suppose a database schedule $S$ involves transactions $T_1, T_2, \ldots, T_n$. Consider the precedence graph of $S$ with vertices representing the transactions and edges representing the conflicts. If $S$ is serializable, which one of the following orderings of the vertices of the precedence graph is guaranteed to yield a serial schedule?
9. If every non-key attribute is functionally dependent on the primary key, then the relation is in
   .....................
   (1) First normal form
   (2) Second normal form
   (3) Third normal form
   (4) Fourth normal form
   Answer: 3

10. Consider a relation R (A, B, C, D, E, F, G, H), where each attribute is atomic, and following
    functional dependencies exist.
    CH \rightarrow G
    A \rightarrow BC
    B \rightarrow CFH
    E \rightarrow A
    F \rightarrow EG
    The relation R is ....................
    (1) in 1NF but not in 2NF
    (2) in 2NF but not in 3NF
    (3) in 3NF but not in BCNF
    (4) in BCNF
    Answer: 1

33. Which of the following permanent database that has an entry for each terminal symbol?
    (A) Literal table          (B) Identifier table
    (C) Terminal table        (D) Source table
    Answer: C

12. In the indexed scheme of blocks to a file, the maximum possible size of the file depends on:
    (A) The number of blocks used for index, and the size of index
    (B) Size of Blocks and size of Address
    (C) Size of Index
    (D) Size of Block
    Answer: A

48. Analysis of large database to retrieve information is called:
    (A) OLTP          (B) OLAP
    (C) OLDP          (D) TLPP
    Answer: B