

**Encircle the best option for each of the following:**

1. Which of the following statements are true?
2. Each super key is a superset of some candidate key.
3. Each primary key is also a candidate key, but there may be candidate keys that are not primary keys.
4. The referential integrity constraint states that no primary key value can be NULL
5. I
6. II
7. I and II
8. II and III
9. I, II and III
10. Which of the following update operations may cause a violation of the key constraint?
11. A deletion of one tuple from the relation
12. An insertion of one tuple into the relation
13. An update of one tuple in the relation
14. Both (b) and (c)
15. Both (a) and (b)
16. Suppose relation R(A,B,C) has the following tuples. How many tuples appear in the result of

πA,B(R) R.B<S.B (ρS(A,B)(πB,C(R))) ?

|  |  |  |
| --- | --- | --- |
| **A** | **B** | **C** |
| 1 | 2 | 3 |
| 1 | 2 | 3 |
| 3 | 2 | 1 |

1. 2
2. 4
3. 6
4. 9
5. 3
6. Consider the following relation 'Grades' and the query given below:

|  |  |  |
| --- | --- | --- |
| **Student** | **DB\_grade** | **Algo\_grade** |
| A | 45 | NULL |
| B | NULL | 90 |
| C | 100 | 80 |

SELECT student FROM Grades   
WHERE (DB\_grade>Algo\_grade AND Algo\_grade>75 AND DB\_grade>90) OR (DB\_grade<50)  
  
Which students' tuples are returned?

1. A
2. B
3. B and C
4. A and C
5. A, B, and C
6. Consider the relation **Grade** given in the last question and the query given below:

SELECT COUNT(DB\_grade) from Grades

What does the above query returns?

1. 145
2. NULL
3. 3
4. 2
5. None of the Above
6. Which of the following anomalies result from a transitive dependency?
7. Insertion
8. Deletion
9. Modification
10. All of the above
11. None of the above
12. A relation R(a,b) may have duplicate tuples. Which of the following queries has a result that is **guaranteed** not to have duplicates, regardless of what tuples R contains?

I) SELECT a FROM R WHERE a = 1

II) SELECT MAX(b) FROM R GROUP BY a

III) SELECT a, b FROM R GROUP BY a, b

IV) SELECT a FROM R WHERE a NOT IN (SELECT a FROM R)

1. III and IV
2. I and II
3. III only
4. I and III
5. I, II and III
6. Consider a relation R with attributes R(A, B, C, D, E). The following FDs hold on R:*AB → C*, *BC→ AD*, and *D → E* hold. Which of the following is the key of R?
7. A
8. AB
9. ABD
10. ABC
11. BCD
12. Let R(A, B, C) satisfy the following FDs: AB *→* C, BC *→* A, and AC *→* B. The closure of A (i.e., A+) is
13. A
14. AB
15. AC
16. BC
17. ABC
18. Two sets of FDs, FD1 and FD2 are equivalent if
19. FD1 and FD2 contain no redundant FDs
20. FD2 is a subset of FD1
21. FD1 and FD2 have the same number of FDs
22. FD1 and FD2 have the different number of FDs
23. FD1 covers FD2 and FD2 covers FD1
24. Given the relation SalesOrder(ONo, Oname, Date, Items) with FDs F = {ONo→Oname, {ONo, Date}→Items }, then SalesOrder could suffer from
25. Insertion anomalies
26. Redundancy and inconsistency
27. Deletion anomalies
28. Updation anomalies
29. All of the above
30. Which of the following statements are correct?

I. All relations in 3NF are also in BCNF.

II. All relations with only two attributes are in BCNF.

III. For any relation schema, there is a dependency-preserving decomposition into 3NF.

a) I

b) III

c) II and III

d) I and III

e) I, II and III

1. For which of the following normal forms there is always a lossless-join decomposition for any relation schema?
2. BCNF
3. 3NF
4. 4NF
5. All of the above
6. None of the above
7. Which of the following statements about ER models are correct?
8. Many-to-many relationships cannot be represented in ER diagrams
9. Relationship sets can have attributes of their own
10. All many-to-one relationships are represented by a relationship between a weak and a non-weak entity set

a) II

b) III

c) II and III.

d) I and II

e) I, II and III

1. Which of the following statements are true about weak entity sets:
2. A weak entity set cannot have a primary key.
3. A weak entity set must have a local attribute in primary key
4. A weak entity must borrow an attribute from another entity set to form a primarykey.
5. None of them
6. I and II
7. II and III
8. III
9. I, II and III
10. Suppose we have a relationship type, R that has a cardinality ratio of M: N, where the entity types involved are E1 with 2 instances and E2 with 3 instances. Also E1 and E2 have partial participation in R. What is the minimum and the maximum number of instances of the relationship type R?
11. A min of 2 and a max of 3
12. A min of 0 and a max of 6
13. A min of 0 and a max of 3
14. A min of 2 and a max of 6
15. None of the above
16. Consider the following schedule of two transactions T1 and T2 on two data items X and Y.

S: r1(x), r2(x), w1(X), r1(Y), w2(X), w(Y)

The above schedule suffers from

1. Lost Update
2. Temporary Update
3. Incorrect Summary
4. All of the above
5. None of the above
6. Which of the following is not true?
7. The System log keeps track of all transaction operations that affect the values of database items
8. The System log is kept on disk, so it is not affected by any type of failure except for disk failure.
9. The effect of write operations of a transaction T can be undone or redone using the System
10. The roll back of a transaction is needed if there is no commit entry [commit,T] in the log.
11. None of the above
12. Consider the following schedule of three transactions T1, T2 and T3

S: w1(X), r3(Y), w2(X), w3(Y), abort1

1. Schedule S is strict
2. Schedule S is cascadeless
3. Schedule S is cascadeless and not strict
4. Schedule S is strict and cascadeless
5. None of the above
6. Two operations Op1 and Op2 in a schedule are said to be in conflict if
7. Op1 and Op2 belong to different transactions
8. Op1 and Op2 access the same item X
9. At least one of the operations Op1 or Op2 is a write operation
10. All of the above
11. None of the above