

**Question 1** *(20 points)*

ENCIRCLE THE BEST OPTION FOR EACH OF THE FOLLOWING:

**1.** When we map from an E/R diagram to a set of relations, Which of the following is incorrect?

1. Each weak entity type becomes a relation
2. Each relationship type becomes a relation
3. Key attributes of an entity type become the key of a relation
4. The key of a many-to-many relationship type is the combined key of all the participating relations
5. None of the above

**2.** Which of the following update operations may cause a violation of the primary key constraint?

1. A deletion of one tuple from the relation
2. An insertion of one tuple into the relation
3. An update of one tuple in the relation
4. Both (b) and (c)
5. Both (a) and (b)

**3.** Given the relational schema consisting of Course(Cnumber, Cname, Dept) and Enroll(RollNo, Cnumber, Grade), which SQL query retrieves the courses for each department in which students are not enrolled?

1. SELECT Dept, Cname FROM Course

WHERE Cnumber NOT IN (SELECT Cnumber FROM Enroll) ORDER BY Dept;

1. SELECT Dept, Cname FROM Course

WHERE Cnumber IN (SELECT Cnumber FROM Enroll) ORDER BY Dept;

1. SELECT Dept, Cname FROM Course, Enroll

WHERE Course.Cnumber = Enroll.Cnumber ORDER BY Dept;

1. SELECT Dept, Cname FROM Course ORDER BY Dept;
2. All of the above

**4.** What is the result of the SQL query SELECT C, F FROM R, S WHERE B = D AND A = E;

given the following two tables, R and S?

**R** **S**

**A B C** **D E F**

41 21 32 20 41 4

42 22 32 22 42 5

43 24 32 23 43 6

43 21 31 24 43 6

45 21 31

41 20 31

1. A table with columns C and F whose 3 rows are (32,4), (32,5) and (32,6)
2. A table with columns C and F whose 3 rows are (32,5), (32,6) and (31,4)
3. A table with columns C and F whose 1 rows is (31,6)
4. A table with columns C and F whose 2 rows are (32,5) and (31,6)
5. None of the above

**5.** Specialization in the Enhanced Entity-Relationship model is

1. The process of defining a set of superclasses of an entity type
2. The process of defining an entity type that contains the common features of a set of entity types
3. The process of defining a set of subclasses of an entity type
4. The process of defining a set of weak entity types of an entity type
5. None of the above

**6.** The data in a database at a particular moment in time is called

1. A database state or snapshot
2. The current set of occurrences
3. The current set of instances
4. All of the above
5. None of the above

**7.** What constraint does the one functional dependency DeptNo → Dname define for the relation schema DeptSales(DeptNo, Dname, Month, Year, Sales)?

* 1. If two tuples have the same value for Dname then they have the same value for DeptNo
  2. If two tuples have the same value for DeptNo then they have the same value for Dname
  3. DeptNo must be a primary key for DeptSales
  4. DeptNo must be a superkey for DeptSales
  5. All of the above

**8.** Given the relation schema, DeptSales(DeptNo, Dname, Month, Year, Sales) and the set of FDs, F = {DeptNo→Dname, {DeptNo,Month,Year}→Sales }, then which of the following FDs is a valid inference?

1. {DeptNo,Month,Year}→Dname
2. {Month,Year}→Dname
3. DeptNo→Sales
4. Dname→Sales
5. None of the above

**9.** Two sets of functional dependencies, F1 and F2 are equivalent if

1. F1 and F2 contain no redundant functional dependencies
2. F2 is a subset of F1
3. F1 and F2 have the same number of functional dependencies
4. F1 and F2 have the different number of functional dependencies
5. None of the above

**10.** If an attribute defined specialization is disjoint-total then which of the following statement is false.

1. The defining attribute is a multivalued attribute.
2. There exists a defining attribute in subclasses, which defines the type of the entity instances.
3. Defining attribute can have a null value.
4. The defining attribute must be a primary key of superclass.
5. All of the above

**11.** Given the relation R(A,B,C,D) with FDs F = {AB→C, A→D} shown below.

What values could be inserted for the missing D and A column values. The domain for D is {d1,d2,d3,d4,d5,d6,d7} and the domain for A is {a1,a2,a3,a4}.

A B C D

|  |  |  |  |
| --- | --- | --- | --- |
| a1 | b1 | c1 | d1 |
| a1 | b2 | c2 |  |
|  | b1 | c1 | d3 |
| a4 | b1 | c4 | d4 |

1. d1 and a1
2. d5 and a4
3. d5 and either a2 or a3
4. d1 and either a2 or a3
5. None of the above

**12.** Given the functional dependencies (AB → C, C → D) for the relation schema R(A,B,C,D), the dependency A → D can be inferred by

1. The reflexive rule
2. The augmentation rule
3. The transitve rule
4. The decomposition rule
5. None of the above

**13.** We have the set of FDs, (B → C, C → A, B → D), for the relation schema R(A,B,C,D). Which of the following decomposition is lossless and dependency preserving?

1. A decomposition with relation schemas (B, D) and (A, C, D)
2. A decomposition with relation schemas (C, A) and (B, C, D)
3. A decomposition with relation schemas (C, A) and (A, B, D)
4. A decomposition with relation schemas (B, C) and (A, B, D)
5. None of the above

**14.** A weak entity type can be modeled as a complex attribute (i.e. composite and multivalued attribute) of strong entity type only if

1. The weak entity type does not participate in a relationship type other than identifying relationship.
2. The weak entity type has only one attribute.
3. The relationship type between weak entity type and strong entity type is one to one.
4. The weak entity type does not have any key attribute.
5. None of the above

**15.** Suppose we have a relationship type R between two entity types, E1 and E2, where each one consists of 4 entities. If the relationship set consists of 4 instances, then what can we positively conclude about E1, E2 and R?

1. E1 and E2 have total participation and the relationship type R has a cardinality ratio of 1 to 1
2. E1 has total participation while E2 has partial participation and the relationship type R has a cardinality ratio of 1:N
3. E1 has partial participation while E2 has total participation and the relationship type R has a cardinality ratio of 1:N
4. All of the above
5. None of the above

**16.** 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?

1. A min of 2 and a max of 3
2. A min of 0 and a max of 6
3. A min of 0 and a max of 3
4. A min of 2 and a max of 6
5. None of the above

Consider the following EER diagram, for the next four questions.



MANAGES

**17.** Which of the following statements is false?

1. An employee may work on many projects.
2. An employee may have no dependents.
3. An employee must be either an engineer or manager.
4. An employee must be a manager to manage a project.
5. None of the above

**18.** Which of the following statements is false?

1. If an employee is a manager, then he/she must manage at least one project.
2. An employee works on a project only if he/she is an engineer.
3. A manager may manage one specific project and work on another project.
4. All of the above
5. None of the above

**19**. Which of the following statements is false?

1. A dependent's name uniquely identifies a dependent.
2. A dependent's name along with the related employee's ssn uniquely identifies a dependent.
3. A manager has no attributes other than those inherited from employee.
4. All of the above
5. None of the above

**20.** Which of the following statements is false?

1. A given dependent can be related to multiple employees.
2. Employees do not have to work on a project.
3. A project is not required to have a manager.
4. All of the above
5. None of the above