1. Which normal form is considered adequate for normal relational database design?  
a) 2NF  
b) 5NF  
c) 4NF  
d) 3NF

Answer: d  
Explanation: A relational database table is often described as “normalized” if it is in the Third Normal Form because most of the 3NF tables are free of insertion, update, and deletion anomalies.

2. Consider a schema R(A, B, C, D) and functional dependencies A -> B and C -> D. Then the decomposition of R into R1 (A, B) and R2(C, D) is  
a) dependency preserving and lossless join  
b) lossless join but not dependency preserving  
c) dependency preserving but not lossless join  
d) not dependency preserving and not lossless join

Answer: d  
Explanation: While decomposing a relational table we must verify the following properties:  
i) Dependency Preserving Property  
ii) Lossless-Join Property.

3. Relation R with an associated set of functional dependencies, F, is decomposed into BCNF. The redundancy (arising out of functional dependencies) in the resulting set of relations is  
a) Zero  
b) More than zero but less than that of an equivalent 3NF decomposition  
c) Proportional to the size of F+  
d) Indeterminate

Answer: b  
Explanation: Redundancy in BCNF is low when compared to 3NF.

4. Which one of the following statements about normal forms is FALSE?  
a) BCNF is stricter than 3NF  
b) Lossless, dependency-preserving decomposition into 3NF is always possible  
c) Lossless, dependency-preserving decomposition into BCNF is always possible  
d) Any relation with two attributes is in BCNF

Answer: c  
Explanation: Achieving Lossless and dependency-preserving decomposition property into BCNF is difficult.

5. A table has fields F1, F2, F3, F4, and F5, with the following functional dependencies:

F1->F3

F2->F4

(F1,F2)->F5

in terms of normalization, this table is in  
a) 1NF  
b) 2NF  
c) 3NF  
d) None of the mentioned

Answer: a  
Explanation: Since the primary key is not given we have to derive the primary key of the table. Using the closure set of attributes we get the primary key as (F1,F2). From functional dependencies, “F1->F3, F2->F4”, we can see that there is partial functional dependency therefore it is not in 1NF. Hence the table is in 1NF.

6. Which of the following is TRUE?  
a) Every relation in 2NF is also in BCNF  
b) A relation R is in 3NF if every non-prime attribute of R is fully functionally dependent on every key of R  
c) Every relation in BCNF is also in 3NF  
d) No relation can be in both BCNF and 3NF

Answer: c  
Explanation: A relational database table is often described as “normalized” if it is in the Third Normal Form because most of the 3NF tables are free of insertion, update, and deletion anomalies.

7. Consider the following functional dependencies in a database.

Date\_of\_Birth->Age Age->Eligibility

Name->Roll\_number Roll\_number->Name

Course\_number->Course\_name Course\_number->Instructor

(Roll\_number, Course\_number)->Grade

The relation (Roll\_number, Name, Date\_of\_birth, Age) is  
a) In second normal form but not in third normal form  
b) In third normal form but not in BCNF  
c) In BCNF  
d) None of the mentioned

Answer: d  
Explanation: For the given relation only some of the above FDs are applicable. The applicable FDs are given below:  
Date\_of\_Birth->Age  
Name->Roll\_number  
Roll\_number->Name  
Finding the closure set of attributes we get the candidate keys:(Roll\_number,Date\_of\_Birth), and (Name,Date\_of\_Birth) .  
On selecting any one of the candidate key we can see that the FD Date\_of\_Birth->Age is a partial dependency. Hence the relation is in 1NF.

8. The relation schema Student\_Performance (name, courseNo, rollNo, grade) has the following FDs:

name,courseNo->grade

rollNo,courseNo->grade

name->rollNo

rollNo->name

The highest normal form of this relation scheme is  
a) 2NF  
b) 3NF  
c) BCNF  
d) 4NF

Answer: b  
Explanation: A super key is a combination of prime attributes and one or more non-prime key attribute(s). It also uniquely identifies a record in a table. Primary key can be defined as super key with minimal attributes.

9. The relation EMPDT1 is defined with attributes empcode(unique), name, street, city, state, and pincode. For any pincode, there is only one city and state. Also, for any given street, city and state, there is just one pincode. In normalization terms EMPDT1 is a relation in  
a) 1NF only  
b) 2NF and hence also in 1NF  
c) 3NF and hence also in 2NF and 1NF  
d) BCNF and hence also in 3NF, 2NF and 1NF

Answer: b  
Explanation: Empcode is unique, therefore it is the primary key. Since the primary key consists of a single attribute there will be no partial dependency, hence the relation is in 2NF.  
From the question we get the FDs as below:  
pincode -> city, state  
street,city,state -> pincode  
From the FDs we can see that there are transitive dependencies, hence the table is not in 3NF.

10. Which one 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 a 3 NF relation  
d) A prime attribute can be transitively dependent on a key in a BCNF relation

Answer: d  
Explanation: A table is in 3NF if and only if, for each of its functional dependencies X -> A, at least one of the following conditions holds:  
\* X contains A (that is, X -> A is trivial functional dependency), or  
\* X is a superkey, or  
\* A should be prime attribute.