

**Question 1**  
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Consider the following log sequence of two transactions on a bank account, with initial balance 12000, that transfer 2000 to a mortgage payment and then apply a 5% interest.

1. T1 start
2. T1 B old=12000 new=10000
3. T1 M old=0 new=2000
4. T1 commit
5. T2 start
6. T2 B old=10000 new=10500
7. T2 commit

Suppose the database system crashes just before log record 7 is written. When the system is restarted, which one statement is true of the recovery procedure?

Select one:

- ☐ a. We need not redo log records 2 and 3 because transaction T1 has committed.
- ☒ b. We must undo log record 6 to set B to 10000 and then redo log records 2 and 3.
- ☐ c. We can apply redo and undo operations in arbitrary order because they are idempotent
- ☐ d. We must redo log record 6 to set B to 10500

B (<https://www.geeksforgeeks.org/gate-gate-cs-2006-question-20/>)

**Question 2**  
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Consider the following relational schemes for a library database: Book (Title, Author, Catalog\_no, Publisher, Year, Price) Collection (Title, Author, Catalog\_no) with in the following functional dependencies:

- I. Title Author --> Catalog\_no
- II. Catalog\_no --> Title, Author, Publisher, Year
- III. Publisher Title Year --> Price

Assume {Author, Title} is the key for both schemes. Which of the following statements is true?

Select one:

- ☒ a. Book is in 2NF and Collection is in 3NF
- ☐ b. Both Book and Collection are in 3NF only
- ☐ c. Both Book and Collection are in BCNF
- ☐ d. Both Book and Collection are in 2NF only

A (<https://www.geeksforgeeks.org/gate-gate-cs-2008-question-69/>)

**Question 3**  
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Evaluate the statements issued by the DBA in the given sequence if OE and SCOTT are the users in the database and the ORDERS table is owned by OE.

```
CREATE ROLE r1;
GRANT SELECT, INSERT ON oe. orders TO r1;
GRANT r1 TO scott;
GRANT SELECT ON oe. orders TO scott;
REVOKE SELECT ON oe.orders FROM scott;
```

What would be the outcome after executing the statements?

Select one:

- ☐ a. The REVOKE statement would remove the SELECT privilege from SCOTT as well as from the role R1
- ☐ b. The REVOKE statement would give an error because the SELECT privilege has been granted to the role R1
- ☒ c. SCOTT would be able to query the OE.ORDERS table
- ☐ d. SCOTT would not be able to query the OE.ORDERS table

C (<https://compsciedu.com/DBMS/Concurrency-Control/discussion/64714>)

**Question 4**  
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Relation R has eight attributes ABCDEFGH. Fields of R contain only atomic values.  $F = \{CH \rightarrow G, A \rightarrow BC, B \rightarrow CFH, E \rightarrow A, F \rightarrow EG\}$  is a set of functional dependencies (FDs). The relation R is ----- NF

Select one:

- ☒ a. in 1NF, but not in 2NF.
- ☐ b. in 3NF, but not in BCNF
- ☐ c. in BCNF
- ☐ d. in 2NF, but not in 3NF.

A (<https://www.techtud.com/example/relation-r-has-eight-attributes-abcdefgh-fields-r-contain-only-ato>)

**Question 5**  
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Which of the following is TRUE?

Select one:

- ☐ a. Every relation in 3NF is also in BCNF
- ☐ b. relation R is in 3NF if every non-prime attribute of R is fully functionally dependent on every key of R
- ☐ c. No relation can be in both BCNF and 3NF
- ☒ d. Every relation in BCNF is also in 3NF

D (<https://www.geeksforgeeks.org/gate-gate-cs-2012-question-8/>)

**Question 6**  
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Which one of the following statements about normal forms is FALSE?

Select one:

- ☒ a. Lossless, dependency-preserving decomposition into BCNF is always possible
- ☐ b. Lossless, dependency-preserving decomposition into 3NF is always possible
- ☐ c. Any relation with two attributes is in BCNF
- ☐ d. BCNF is stricter than 3NF

A (<https://gateoverflow.in/1365/Gate-cse-2005-question-29-ugcnet-june2015-iii-9>)

**Question 7**  
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Assume that  $T_i$  requests a lock held by  $T_j$ . The following table summarizes the actions taken for wait-die and wound-wait scheme:

	Wait – die scheme	Wound – wait scheme
$T_i$ is younger than $T_j$	W	X
$T_i$ is older than $T_j$	Y	Z

Fill correct status of  $T_i$  and  $T_j$  at W, Y, X, and Z respectively.

Select one:

- ☐ a.  $T_i$  waits,  $T_i$  dies,  $T_i$  waits, and  $T_j$  aborts respectively.
- ☒ b.  $T_i$  dies,  $T_i$  waits,  $T_i$  waits, and  $T_j$  aborts respectively.
- ☐ c.  $T_i$  dies,  $T_i$  waits,  $T_i$  waits, and  $T_j$  aborts respectively
- ☐ d. None of these

B (<https://www.geeksforgeeks.org/gate-gate-cs-mock-2018-question-46>)

**Question 8**  
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Consider the following:

**Suppliers**(sid:integer, sname:string, city:string, street:string)

**Parts**(pid:integer, pname:string, color:string)

**Catalog**(sid1:integer, pid:integer, cost:real)

Now if the suppliers relation above, each supplier and each street within a city has a unique name, and (sname, city) forms a candidate key. No other functional dependencies are implied other than those implied by primary and candidate keys.

Which one below is correct?

Select one:

- ☐ a. The schema is in 3NF but not in BCNF
- ☐ b. The schema is in 2NF but not in 3NF
- ☐ c. The schema is not in 2NF
- ☒ d. The schema is in BCNF

D (<https://www.geeksforgeeks.org/gate-gate-cs-2009-question-56/>)

**Question 9**  
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Assume the following information: Original timestamp value = 46 Receive timestamp value = 59 Transmit timestamp value = 60 Timestamp at arrival of packet = 69 Which of the following statements is correct?

Select one:

- ☐ a. Receive clock should go ahead by 1 milliseconds
- ☐ b. Transmit clock should go back by 3 milliseconds
- ☐ c. Transmit and Receive clocks are synchronized
- ☒ d. Receive clock should go back by 3 milliseconds

D (<https://www.geeksforgeeks.org/isro-isro-cs-2014-question-58/>)

Question 10

Answer saved

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For the schedule given below, which of the following is Correct?

1	Read A	
2		Read B
3	Write A	
4		Read A
5		Write A
6		Write B
7	Read B	
8	Write B	

Select one:

- ☐ a. This schedule is serializable but cannot occur in a scheme using 2PL protocol.
- ☐ b. This schedule is not serialisable but can occur in a scheme using 2PL protocol.
- ☒ c. This schedule is not serializable and cannot occur in a scheme using 2PL protocol.
- ☐ d. This schedule is serialisable and can occur in a scheme using 2PL protocol.

C (<https://www.geeksforgeeks.org/gate-gate-cs-1999-question-31/> )