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Question 1

Correct

Mark 2.00 out of 2.00

Consider the following two tables and four queries in SQL.

Book (isbn, bname), Stock (isbn, copies)

Query 1: SELECT B.isbn, S.copies
 FROM Book B INNER JOIN Stock S
 ON B.isbn = S.isbn;

Query 2: SELECT B.isbn, S.copies
 FROM Book B LEFT OUTER JOIN Stock S
 ON B.isbn = S.isbn;

Query 3: SELECT B.isbn, S.copies
 FROM Book B RIGHT OUTER JOIN Stock S
 ON B.isbn = S.isbn;

Query 4: SELECT B.isbn, S.copies
 FROM Book B FULL OUTER JOIN Stock S
 ON B.isbn = S.isbn;

Which one of the queries above is certain to have an output that is a superset of the outputs of the other three queries?

- ☐ Query2
- ☐ Query1
- ☒ Query4
- ☐ Query3



Question **2**

Correct

Mark 1.00 out of 1.00

Which of the following statement is FALSE?

- ☒ A relation R is in 3NF if every non-prime attribute of R is fully functionally dependent on every key of R
- ☐ Every relation in BCNF is also in 3NF
- ☐ A relation in which every key has only one attribute is in 2NF
- ☐ A prime attribute can not be transitively dependent on a key in a BCNF relation.

Question **3**

Correct

Mark 1.00 out of 1.00

The amount of redundancy in the BCNF decomposition is,

- ☐ Can not be identified
- ☐ Proportional to the size of F+
- ☐ Zero
- ☒ More than or equal to zero but less than 3NF decomposition

Question **4**

Correct

Mark 3.00 out of 3.00

You want to keep the records of grades obtained by the students in all the courses that they have taken. If you are planning to use the following relational schema for this,

R(Roll_number, Course_no, Grade)

Which of the following functional dependencies will be followed by the above relation?

- ☐ There is only trivial functional dependency
- ☐ (Course_no, Grade -> Roll_number)
- ☒ (Roll_number, Course_no -> Grade)
- ☐ (Roll_number, Grade -> Course_no)



Question **5**

Correct

Mark 4.00 out of 4.00

Consider the following table

Mentor

person mentor

A	B
C	D
B	E
E	C
F	B

What will be the output of the following query?

Select distinct T.mentor, F.mentor from mentor T, mentor F where T.person in (Select S.person from mentor S inner join (Select mentor, count(*) as number from mentor group by mentor) as C on S.mentor=C.mentor and C.number >= 2 order by S.person asc) and T.mentor = F.person;

- ☐ C, E
- ☐ F, A
- ☐ B, C
- ☒ B, E
- ☐ A, B

Question **6**

Correct

Mark 1.00 out of 1.00

B+ tree provides an efficient way to keep _____.

- ☒ Non clustering index
- ☐ Actual records in the relation
- ☐ Clustering index
- ☐ Primary index



Question **7**

Correct

Mark 1.00 out of 1.00

Consider the relation schema $R(A, B, C, D, E)$ with functional dependencies $A \rightarrow C$, $B \rightarrow D$, $(A, B) \rightarrow E$

This relation is in,

- ☐ 2 NF
- ☐ BCNF
- ☒ 1 NF
- ☐ 3 NF



Question 8

Correct

Mark 3.00 out of 3.00

Consider the following relational table for maintaining the power capacity of each district,

Electricity

policy district capacity

1	A	40
2	B	15
1	A	30
1	B	25
2	C	2
1	D	13
3	D	25

How many tuples will be returned by the following query?

```
with total(name, capacity) as
  select district, sum(capacity) from Electricity group by district;
```

```
with total_avg(capacity) as
```

```
  select avg(capacity)
```

```
  from total;
```

```
select name
```

```
  from total, total_avg
```

```
  where total.capacity ≥ total_avg.capacity;
```

☐ 1☒ 3☐ 0☐ 4☐ 2

Question 9

Incorrect

Mark 0.00 out of 2.00

Consider the below tables Emp1, Emp2 and Contact.

Table Emp1

Id	Name	Age
----	------	-----

15	Shreya	24
12	Arun	60
99	Rohit	11

Table Emp2

Id	Name	Age
----	------	-----

15	Shreya	24
25	Hari	40
98	Rohit	20
99	Rohit	11

Table Contact

Id	Phone	Area
----	-------	------

10	2200	02
99	2100	01

If you run the below query, then how many tuples will be there in the final result?

```
SELECT Emp1.id
FROM Emp1
WHERE Emp1.age > ALL (SELECT Emp2.age
                      FROM Emp2
                      WHERE Emp2.name = "Rohit")
```

☐ 2☒ 4☐ 3☐ 1

Question 10

Incorrect

Mark 0.00 out of 2.00

Consider the following relational table,

table1**A B**

a 5

c NULL

b 6

d 4

e 5

What will be the output of the following query,

Select sum(B), avg(B), count(B) from table1;

- ☐ NULL, 5, 5
- ☒ 20, 4, 5
- ☐ 20, 5, 4
- ☐ 20, 5, 5
- ☐ NULL, 4, 5



Question 11

Correct

Mark 2.00 out of 2.00

Consider the following relation

Cinema (theater, address, capacity)

Which of the following options will be needed at the end of the SQL query

SELECT P1. address

FROM Cinema P1

Such that it always finds the addresses of theaters with maximum capacity?

- ☒ a. WHERE P1. *capacity* >= All (select P2.*capacity* from Cinema P2)
- ☐ b. WHERE P1. *capacity* > Any (select max (P2. *capacity*) from Cinema P2)
- ☐ c. WHERE P1. *capacity* > All (select max(P2. *capacity*) form Cinema P2)
- ☐ d. WHERE P1. *capacity* >= Any (select P2. *capacity* from Cinema P2)



Question **12**

Incorrect

Mark 0.00 out of 2.00

Consider the following relational table,

table1

c1	c2	c3
A	3	2
B	NULL	6
C	5	3
D	1	8
E	6	NULL

What will be the output of the following query,

Select c1 from table1 where $c2 + c3 > 5$;

- ☐ C, D, E
- ☒ B, C, D, E
- ☐ A, B, C, D, E
- ☐ C, D
- ☐ B, C, D

✗

Question **13**

Incorrect

Mark 0.00 out of 1.00

A non-clustering index needs to be defined on,

- ☐ Any set of attributes
- ☐ Primary key of relation
- ☐ Set of attributes having Unique key
- ☒ Search key of Sequential file

✗

Question **14**

Correct

Mark 3.00 out of 3.00

Consider the following relation schema for the bus booking,

Traveller(TID, Tname, Age)

Booking(TID, Class, BID)

Table: Traveller

Tid	Tname	Age

0	Sachin	65
1	Rahul	66
2	Sourav	67
3	Anil	69

Table : Booking

Tid	Class	Bid

0	AC	8200
1	AC	8201
2	AC	8201
5	AC	8203
1	SC	8204
3	SC	8202

If we run the following SQL query for the above instance of the tables then, What Tids are returned?

```
SELECT Tid
FROM Booking
WHERE class = 'AC' AND
      EXISTS (SELECT *
              FROM Traveller
              WHERE age > 65 AND
                    Traveller.Tid = Booking.Tid)
```

☐ 2, 5☒ 1, 2☐ 1, 3☐ 1, 0☐ 1, 5

Question 15

Correct

Mark 1.00 out of 1.00

Consider an ER model, in which there are two entity A and B . A and B are related with the relationship R . Suppose A and B participate totally in R and the cardinality of A is greater than the cardinality of B . If R is a many-to-one relationship from A to B then which one of the following is true about R ?

- ☐ Every entity in B is associated with exactly one entity in A
- ☐ Some entity in A is associated with more than one entity in B
- ☐ Every entity in B is associated with at most one entity in A
- ☒ Every entity in A is associated with exactly one entity in B



Question 16

Correct

Mark 2.00 out of 2.00

Consider the following table,

Table1**col1 col2**

A	8
B	2
C	8
D	1

Consider the following query,

Select col2 from (select col2 from table1 as S where S.col2=(select max(col2) from table1)) as R limit 1;

The output of the above query is

Question **17**

Correct

Mark 3.00 out of 3.00

Consider the following table

T1**C1 C2 City**

A 3 City1
B 3 City2
C 5 City1
D 6 City3
E 3 City5
F 7 City4
G 5 City6
H 3 City4

What will be the output of the following SQL query?

```
SELECT C1 FROM T1 as R Where (Select count(*) from T1 as S Where S.C2 > R.C2) < 3;
```

- ☐ C, G
- ☐ A, B, E, H, C, G
- ☐ A, B, E, H
- ☒ C, D, F, G
- ☐ D, F



Question **18**

Correct

Mark 3.00 out of 3.00

Consider the following table

Mentor

person mentor

A	B
C	D
B	E
E	C
F	B

What will be the output of the following query?

Select S.person from mentor S inner join (Select mentor, count(*) as number from mentor group by mentor) as T on S.mentor=T.mentor and T.number >= 2;

- ☐ A, B
- ☐ E, B
- ☐ A
- ☒ F, A
- ☐ C, E

Question **19**

Incorrect

Mark 0.00 out of 1.00

In the index allocation scheme of blocks to a file, the maximum possible size of the file depends on :

- ☐ None of these
- ☒ The size of the blocks, the number of blocks used for the index, and the size of the address of the blocks.
- ☐ The size of the blocks, and the size of the address of the blocks
- ☐ The number of blocks used for the index, and the size of the blocks



Question **20**

Correct

Mark 2.00 out of 2.00

Which of the following statements are **TRUE** about an SQL query?

P : An SQL query can contain a HAVING clause even if it does not have a GROUP BY clause

Q : An SQL query can contain a HAVING clause only if it has a GROUP BY clause

R : All attributes used in the GROUP BY clause must appear in the SELECT clause

S : Not all attributes used in the GROUP BY clause need to appear in the SELECT clause

☐ P and R

☐ P and S

☒ Q and R

☐ Q and S

Question **21**

Correct

Mark 1.00 out of 1.00

Which of the following statement is correct?

S1.) Magnetic disc allows Direct Access whereas Tap Storage allow sequential access

S2.) Magnetic disc allows Sequential Access whereas Tap Storage allow Direct access

S3.) Magnetic disc is faster than Tape storage

S4.) Tape Storage is faster than Magnetic Discs

☐ S2 only

☐ S2 and S4 only

☐ S1 only

☒ S1 and S3 only



Question **22**

Incorrect

Mark 0.00 out of 1.00

If the order of the B+ tree is 4, then how many maximum records in the relation can be pointed by the one leaf node?

- ☐ 4
- ☐ 2
- ☒ 5
- ☐ 3

✗

Question **23**

Incorrect

Mark 0.00 out of 2.00

A book store maintains the information related with customer and available books in the relation customer(cust_id, name, zip) and books(book_id, title, price, quantity) respectively. A customer may buy multiple books in a single transaction (represented by trans_id). If we want to record the details of transactions, then the functional dependency, which should be maintained in a transaction, are

- ☐ (trans_id -> cust_id), (trans_id, book_id -> cust_id)
- ☐ (cust_id -> book_id), (book_id, trans_id -> cust_id)
- ☐ (book_id -> cust_id), (trans_id, cust_id -> book_id)
- ☒ (trans_id -> book_id), (trans_id, cust_id -> book_id)

✗

Question **24**

Incorrect

Mark 0.00 out of 2.00

You want to keep the rating information provided by the users for different products, that they have used, in the following relation

$R(\text{User_id}, \text{User_name}, \text{Product_id}, \text{Rating})$

If the above relation has following functional dependencies,

$\text{User_id} \rightarrow \text{User_name}$

$\text{User_name} \rightarrow \text{User_id}$

$\text{User_id}, \text{Product_id} \rightarrow \text{Rating}$

$\text{User_name}, \text{Product_id} \rightarrow \text{Rating}$

Which of the highest normal form the above schema satisfies,

- ☐ 4 NF
- ☐ 3 NF
- ☒ BCNF
- ☐ 2 NF

✗

Question **25**

Incorrect

Mark 0.00 out of 1.00

Which one of the following queries always gives the same answer as the nested query shown below:

$\text{select } * \text{ from } R \text{ where } a \text{ in } (\text{select } S.a \text{ from } S);$

- ☒ $\text{select } R.* \text{ from } R, S \text{ where } R.a=S.a$
- ☐ $\text{select } R.* \text{ from } R, (\text{select distinct } a \text{ from } S) \text{ as } S1 \text{ where } R.a=S1.a$
- ☐ $\text{select distinct } R.* \text{ from } R, S \text{ where } R.a=S.a$
- ☐ $\text{select } R.* \text{ from } R, S \text{ where } R.a=S.a \text{ and is unique } R$

✗

Question **26**

Incorrect

Mark 0.00 out of 3.00

Consider the relation schema $R(S, T, U, V, W, X, Y, Z)$ in which each attribute only contains atomic values. The set of functional dependencies are given as $F = \{UZ \rightarrow Y, S \rightarrow TU, T \rightarrow UXZ, W \rightarrow S, X \rightarrow WY\}$. The maximum possible candidate keys, R may have, is:

☐ 4☐ 3☐ 6☒ 5

Question **27**

Correct

Mark 4.00 out of 4.00

Consider the following relations,

manage

name manage

'A'	'E'
'B'	'C'
'C'	'G'
'D'	'E'
'F'	'E'
'E'	'G'

Emp

name street city

'A'	'x'	1
'B'	'y'	2
'C'	'z'	3
'D'	'x'	1
'E'	'x'	4
'F'	'y'	2
'G'	'z'	3

$\pi_{\text{manage.manage}} (\sigma_{\text{manage.manage}=\text{emp2.name}} ((\sigma_{\text{emp1.name} \neq \text{emp2.name} \wedge \text{emp1.street} = \text{emp2.street} \wedge \text{emp1.city}=\text{emp2.city}} (\rho_{\text{emp1}} (\text{emp}) \times \rho_{\text{emp2}} (\text{emp}))) \times \text{manage}))$

How many tuples will be there in the output of the above query?

- ☐ None of the mentioned
- ☒ 2
- ☐ 4
- ☐ 1
- ☐ 3



Question **28**

Correct

Mark 4.00 out of 4.00

Consider the following relational table for maintaining the power capacity of each district,

Electricity

policy district capacity

1	A	40
2	B	15
1	A	30
1	B	25
2	C	2
1	D	13
3	D	25

What will be the output of the following query,

```
SELECT t1.t_capacity FROM (select policy, district, sum(capacity) as t_capacity from Electricity group by policy, district) t1 INNER JOIN (
SELECT policy, MAX(t_capacity) AS max_capacity FROM (select policy ,district ,sum(capacity) as t_capacity from Electricity group by policy,
disctrict) as t3 GROUP BY policy ) t2 ON t1.policy = t2.policy AND t1.capacity = t2.max_capacity;
```

- ☐ 70, 25
- ☒ 70, 15, 25
- ☐ 35, 25, 15
- ☐ 25, 15
- ☐ 80, 35, 15



Question **29**

Incorrect

Mark 0.00 out of 1.00

Consider the following relational table,

table1

	name	sal	bon
a		30	10
b		5	NULL
c		NULL	10
d		20	NULL
e		3	8

What will be the output of the following query,

select name from emp where sal + bon >=15 or bon >=10;

- ☐ a, c, d, e
- ☐ a, b, c, d
- ☒ a, c, d
- ☐ a, c



Question **30**

Incorrect

Mark 0.00 out of 2.00

The following table has two attributes A and C where A is the primary key and C is the foreign key referencing A with on-delete cascade.

A	C
2	4
3	4
4	3
5	2
7	2
9	5
6	4

The set of all tuples that must be additionally deleted to preserve referential integrity when the tuple (2,4) is deleted is:

- ☐ (5,2) and (7,2)
- ☐ (5,2), (7,2) and (9,5)
- ☒ (3,4) and (6,4)
- ☐ (3,4), (4,3) and (6,4)

✗

Question **31**

Incorrect

Mark 0.00 out of 2.00

Consider the following relational table,

Account

amount flag

400	f
500	s
600	f
300	s
500	f

What will be the output of the following query,

`select (select sum(amount) from Account group by flag having flag = 'f') - (select sum(amount) from Account group by flag having flag = 's');`

- ☐ 200
- ☐ 700
- ☐ Error in the outer select clause
- ☒ Error in the Group by clause

Question **32**

Correct

Mark 1.00 out of 1.00

_____ is the time from when a read or write request is issued to when data transfer begins.

- ☐ Seek time
- ☐ Average seek time
- ☐ Rotational latency time
- ☒ Access time



Question **33**

Incorrect

Mark 0.00 out of 1.00

Which of the following is correct?

- ☒ B-trees are for primary indexes and B+ trees are for secondary indexes. ✖
- ☐ B-trees are for storing data on disk and B+ trees are for main memory.
- ☐ Queries generated for the range of values runs faster on B+ trees.
- ☐ The height of a B+ tree is independent of the number of records where for B tree height is dependent on number of records.

Question **34**

Incorrect

Mark 0.00 out of 2.00

If we have the relation schema R(Roll_n, Name, DoB, Age) with the following functional dependencies,

Name → Roll_n,

DoB → Age,

Roll_n → Name

This relation is in,

- ☐ Third normal form but not in BCNF
- ☐ None of the mentioned
- ☒ BCNF ✖
- ☐ Second normal form but not in third normal form

Question **35**

Incorrect

Mark 0.00 out of 2.00

A B⁺ - tree index is to be built on the Name attribute of the relation STUDENT. Assume that all student names are of length 8 bytes, disk blocks are of size 512 bytes, and index pointers are of size 4 bytes. Given this scenario, what would be the best choice of the degree (i.e. the number of pointers per node) of the B⁺ - tree?

- ☐ 16
- ☐ 44
- ☒ 42 ✖
- ☐ 43

Question **36**

Incorrect

Mark 0.00 out of 1.00

If we have a schema R (A, B, C, D) with functional dependencies $A \rightarrow B$ and $C \rightarrow D$. Then the decomposition of R into R1 (A, B) and R2(C, D) is

- ☐ Dependency preserving but not lossless join
- ☐ Dependency preserving and lossless join
- ☐ Lossless join but not dependency preserving
- ☒ Not dependency preserving and not lossless join

Question **37**

Correct

Mark 2.00 out of 2.00

Consider the following relational table,

empd

empid empn deptn

1	a	abc
2	b	abc
3	c	bcd
4	d	cde
5	e	abc

What will be the output of the following query?

`SELECT AVG(EC.Num) FROM (SELECT deptn, COUNT(empid) as NUM FROM empd GROUP BY deptn) as EC;`

- ☐ 0.667
- ☒ 1.667
- ☐ 2.667
- ☐ 3.667



Question **38**

Incorrect

Mark 0.00 out of 4.00

Consider the following relations,

manage

name manage

'A'	'E'
'B'	'C'
'C'	'G'
'D'	'E'
'F'	'E'
'E'	'G'

Emp

name street city

'A'	'x'	1
'B'	'y'	2
'C'	'z'	3
'D'	'x'	1
'E'	'x'	1
'F'	'y'	2
'G'	'z'	4

$\pi_{\text{manage.name}} (\sigma_{\text{emp1.city} = \text{emp2.city} \wedge \text{manage.manage} = \text{emp2.name}} ((\sigma_{\text{emp1.name} = \text{manage.name}} (\rho_{\text{emp1}}(\text{emp}) \times \text{manage})) \times \rho_{\text{emp2}}(\text{emp})))$

Output of the above query will include the following names,

- ☐ A only
- ☐ A, C, D only
- ☐ A, C only
- ☐ A, D only
- ☒ C only



Question **39**

Correct

Mark 4.00 out of 4.00

Consider the following relations,

manage

name manage

'A'	'E'
'B'	'C'
'C'	'G'
'D'	'E'
'F'	'E'
'E'	'G'

Emp

name street city

'A'	'x'	1
'B'	'y'	2
'C'	'z'	3
'D'	'x'	1
'E'	'x'	4
'F'	'y'	2
'G'	'z'	3

$\pi_{\text{manage.name}} (\sigma_{\text{emp1.street} = \text{emp2.street} \wedge \text{manage.manage} = \text{emp2.name}} ((\sigma_{\text{emp1.name} = \text{manage.name}} (\rho_{\text{emp1}}(\text{emp}) \times \text{manage})) \times \rho_{\text{emp2}}(\text{emp})))$

Output of the above query will include the following names,

- ☐ C only
- ☒ A, C, D only
- ☐ A, D only
- ☐ C, D only
- ☐ A only



Question **40**

Incorrect

Mark 0.00 out of 3.00

Consider the following relation,

R**Name Number**

Amit 2

Akash 4

Arif 3

Akhil 5

 $\pi_{r1.Number, r2.Name} (\sigma_{r1.Number > r2.Number} ((p_{r1}(R)) \times (p_{r2}(R))))$

The output of the above query will include the following names,

- ☐ Only Akhil
- ☐ Only Amit
- ☐ Amit, Akash, Arif
- ☒ Akash, Arif, Akhil
- ☐ Akash and Arif

✗

Question **41**

Correct

Mark 1.00 out of 1.00

Index files are usually stored in _____ organization.

- ☐ Multitable Clustering File
- ☒ Sequential File
- ☐ Heap File
- ☐ Hash File

✓

Question **42**

Correct

Mark 1.00 out of 1.00

Primary index should be defined as _____ whereas Secondary index should always be defined as _____.

- ☐ None of these
- ☒ Dense as well as Sparse, Dense
- ☐ Dense, Sparse
- ☐ Sparse, Sparse

Question **43**

Correct

Mark 3.00 out of 3.00

Consider the following table

T1

C1 C2 City

A 3 City1
B 3 City2
C 5 City1
D 6 City3
E 3 City5
F 7 City4
G 5 City6
H 3 City4

What will be the output of the following SQL query?

```
SELECT C1 FROM T1 y WHERE 2=(SELECT COUNT(DISTINCT C2) FROM T1 p  
WHERE y.C2<=p.C2);
```

- ☐ C, G
- ☒ D
- ☐ A, B, E, H
- ☐ F
- ☐ A, B, C, G



Question **44**

Incorrect

Mark 0.00 out of 1.00

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

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

Question **45**

Correct

Mark 1.00 out of 1.00

Consider a B+-tree in which the maximum number of keys in a node is 6. What is the minimum number of keys in any non-root/non-leaf node?

- ☐ 1
- ☒ 2
- ☐ 3
- ☐ 4

[◀ Quiz5_Section2 \(6th May 2022\)](#)[Quiz 1 ▶](#)