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Question 1 [5 Marks]

A weak entity set in an E-R diagram is an entity set that:

A. must not participate as an owner in an identifying relationship with another entity set

✓ must be a part of a one to many relationship sets

C. has a primary key

✗ is not existence dependent on a dominant entity.

Explanation
Self-explanatory

Your submitted response was incorrect.

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Question 2 [5 Marks]

In an Entity-Relationship (ER) model, suppose R is a many-to-one relationship from entity set E1 to the entity set E2. Assume that E1 and E2 participate totally in R and that the cardinality of E1 is greater than the cardinality of E2. Which one of the following is true about R?

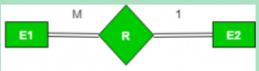
✓ Every entity in E1 is associated with exactly one entity in E2.

B. Some entity in E1 is associated with more than one entity in E2.

C. Every entity in E2 is associated with exactly one entity in E1.

D. Every entity in E2 is associated with at most one entity in E1.

Explanation
Since given relation is many to one :



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Question 3 [5 Marks]

Match the following with respect to RDBMS :

(a)	Entity integrity	(i)	enforces some specific business rule that do not fall into entity or domain
(b)	Domain integrity	(ii)	Rows can't be deleted which are used by other records
(c)	Referential integrity	(iii)	enforces valid entries for a column
(d)	Userdefined integrity	(iv)	No duplicate rows in a table

Code :

	(a)	(b)	(c)	(d)
(1)	(iii)	(iv)	(i)	(ii)
(2)	(iv)	(iii)	(ii)	(i)
(3)	(iv)	(ii)	(iii)	(i)
(4)	(ii)	(iii)	(iv)	(i)

A (1)

✓ (2)

C (3)

D (4)

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Question 4 [5 Marks]

Which symbol denote derived attributes in ER Model?

A Double ellipse

✓ Dashed ellipse

C Squared ellipse

D Ellipse with attribute name underlined

Your submitted response was correct.

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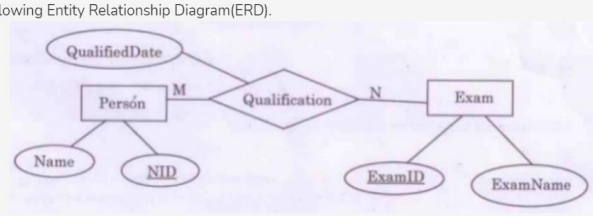
Question 5 [5 Marks]

Consider the following Entity Relationship Diagram(ERD).



Which of the following possible relations will not hold if the above ERD is mapped into a relation model?

A. Person (NID, Name)

B. Qualification (NID, ExamID, QualifiedDate)

✓ Exam (ExamID, NID, ExamName)

D. Exam (ExamID, ExamName)

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Question 6 [5 Marks]

Which of the following statements is FALSE about weak entity set?

A. Weak entities can be deleted automatically when their strong entity is deleted.

B. The weak entity set avoids the data duplication and consequent possible inconsistencies caused by duplicating the key of the strong entity.

C. A weak entity set has no primary keys unless attributes of the strong entity set on which it depends are included

✓ Tuples in a weak entity set are not partitioned according to their relationship with tuples in a strong entity set.

Explanation

- Weak entities can be deleted automatically when their strong entity is deleted. Correct
- The weak entity set avoids the data duplication and consequent possible inconsistencies caused by duplicating the key of the strong entity. Correct
- A weak entity set has no primary keys unless attributes of the strong entity set on which it depends are included. Correct
- Tuples in a weak entity set are not partitioned according to their relationship with tuples in a

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Question 7 [5 Marks]

Immunity of the external schemas (or application programs) to changes in the conceptual schema is referred to as:

A. Physical Data Independence

✓ Logical Data Independence

C. Both (a) and (b)

D. None of the above

Explanation

Immunity is when data at one layer is changed, it does not affect the data at another level. Physical data independence:- if changes are made in the physical storage of schema then it will not affect the logical schema of the database. Logical data independence:- if any changes are made in the conceptual schema then it will not affect external schema or the view level of the database. So, option (B) is correct.

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Question 8 [5 Marks]

Given the following relation instance.
x y z
1 4 2
1 5 3
1 6 3
3 2 2
Which of the following functional dependencies are satisfied by the instance?

A. XY -> Z and Z -> Y

✓ YZ -> X and Y -> Z

C. YZ -> X and X -> Z

D. XZ -> Y and Y -> X

Explanation

A functional dependency (FD) is a constraint between two sets of attributes in a relation from a

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Question 9 [5 Marks]

A table has fields Fl, F2, F3, F4, F5 with the following functional dependencies.

```
F1 → F3

F2→ F4

(F1 . F2) → F5
```

In terms of Normalization, this table is in -

- ✓ 1NF
- B 2NF
- C 3NF
- D None

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Question 10 [5 Marks]

Let R (A, B, C, D, E, P, G) be a relational schema in which the following functional dependencies are known to hold:

```
AB → CD

DE → P

C → E

P → C

B → G
```

- A BCNF
- B 3NF, but not in BCNF
- C 2NF, but not in 3NF
- ✓ Not 2NF

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Question 11 [5 Marks]

Let R = (A, B, C, D, E, F) be a relation scheme with the following dependencies:

```
C → F

E → A

EC → D

A → B.
```

Which of the following is a key of R?

A CD

✓ EC

C AE

✗ AC

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Question 12 [5 Marks]

If every non-key attribute is functionally dependent on the primary key, then the relation is in _____ .

A 1NF

✓ 2NF

C 3NF

D BCNF

Explanation

Conditions for various normal forms:

- 1 NF - A relation R is in first normal form (1NF) if and only if all underlying domains contain atomic values only.
- 2 NF - A relation R is in second normal form (2NF) if and only if it is in 1NF and every non-key attribute is fully dependent on the primary key.
- 3 NF - A relation R is in third normal form (3NF) if and only if it is in 2NF and every non-key attribute is non-transitively dependent on the primary key.
- BCNF - A relation R is in Boyce-Codd normal form (BCNF) if and only if every determinant is a

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Question 13 [5 Marks]

Let x, y, z, a, b, c be the attributes of an entity set E.
If {x}, {x,y}, {a,b}, {a,b,c}, {x,y,z} are superkeys.
Then which of the following are the candidate keys?

A. {x,y} and {a,b}
✓ {x} and {a,b}
C. {x,y,z} and {a,b,c}
D. {z} and {c}

Explanation
A Candidate key is the minimal Superkey i.e. it is a minimal set of attributes required to identify a tuple. {x} ; {a,b} are the candidate keys for the above schema as they do not contain any extraneous attribute. So, option (B) is correct.

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Question 14 [5 Marks]

In RDBMS, the constraint that no key attribute (column) may be NULL is referred to as:

A. Referential integrity
B. Multi-valued dependency
✓ Entity Integrity
D. Functional dependency

Explanation
- In RDBMS, the constraint that no key attribute (column) may be NULL is referred to as Entity Integrity.
- Referential integrity states that table relationships must always be consistent.
- Multi-valued dependency is a full constraint between two sets of attributes in a relation.
- A functional dependency is a relationship that exists when one attribute uniquely determines another attribute.

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Question 15 [5 Marks]

Which of the following scenarios may lead to an irrecoverable error in a database system ?

A. A transaction writes a data item after it is read by an uncommitted transaction.

B. A transaction reads a data item after it is read by an uncommitted transaction.

C. A transaction reads a data item after it is written by a committed transaction.

✓ A transaction reads a data item after it is written by an uncommitted transaction.

Explanation
Option C is a normal operation. Option B is also fine as no write operation is involved. Option A can be recovered, but option D can't be.

Your submitted response was correct.

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Question 16 [5 Marks]

Consider the following transaction involving two bank accounts x and y.

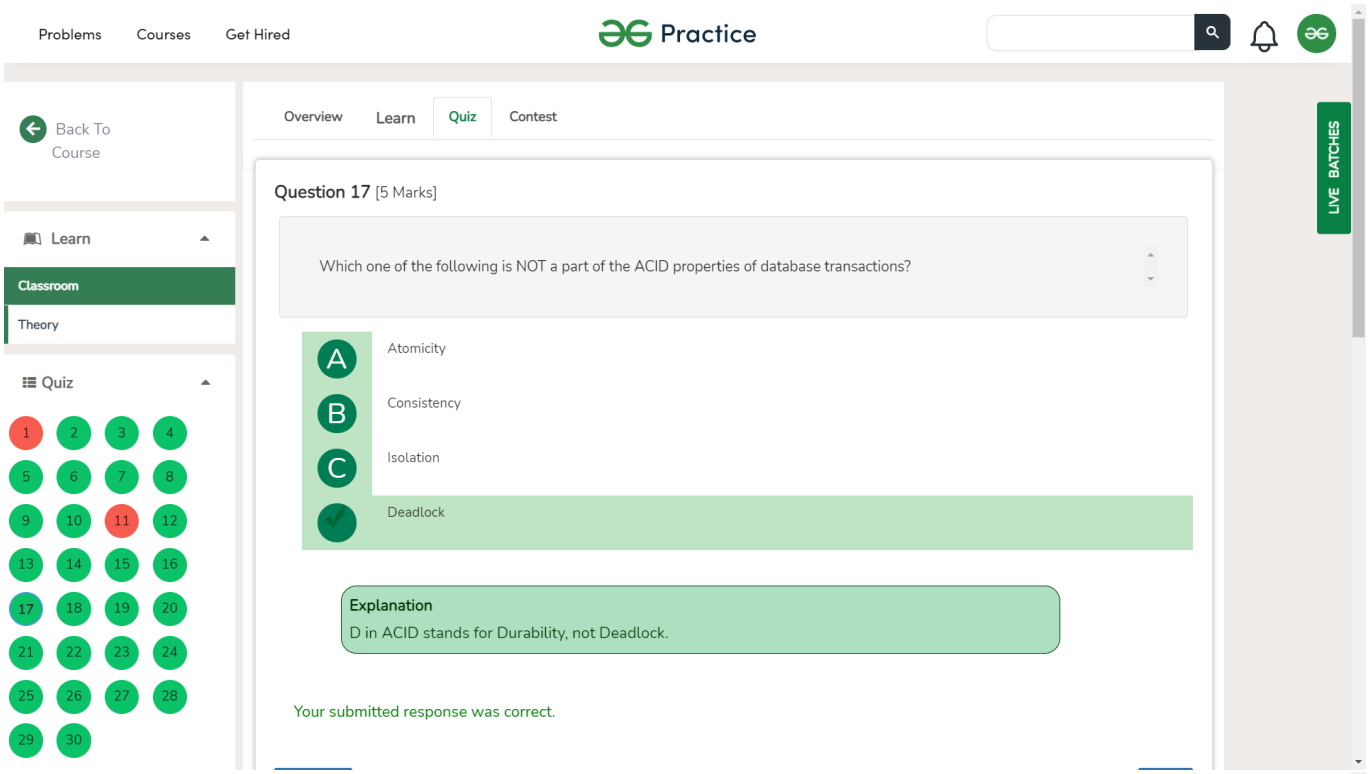
```
read(x);

x := x - 50;

write(x);

read(y);

y := y + 50;

write(y)
```

A. Atomicity

✓ Consistency

C. Isolation

D. Durability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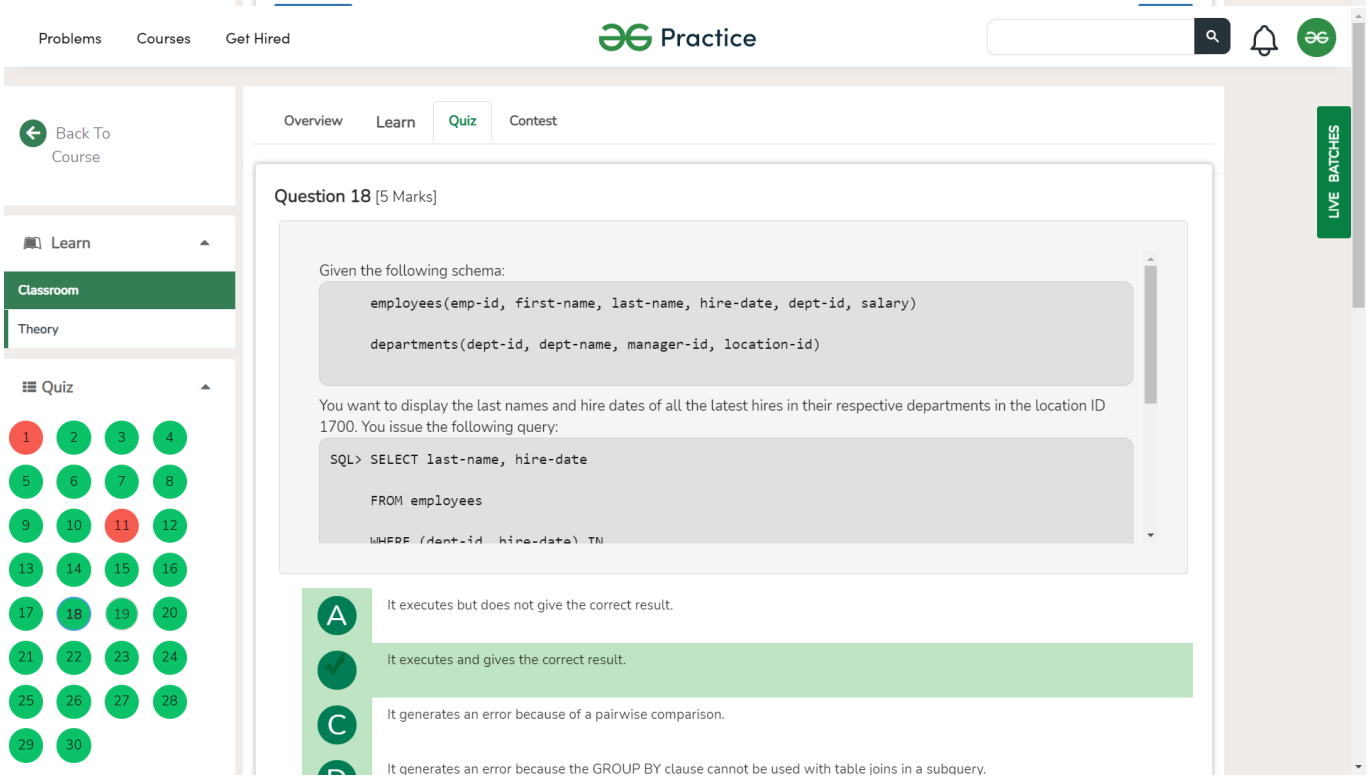
Question 17 [5 Marks]
Which one of the following is NOT a part of the ACID properties of database transactions?
A Atomicity
B Consistency
C Isolation
Deadlock
Explanation
D in ACID stands for Durability, not Deadlock.
Your submitted response was correct.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Question 18 [5 Marks]
Given the following schema:
employees(emp-id, first-name, last-name, hire-date, dept-id, salary)
departments(dept-id, dept-name, manager-id, location-id)
You want to display the last names and hire dates of all the latest hires in their respective departments in the location ID 1700. You issue the following query:
SQL> SELECT last-name, hire-date
FROM employees
A It executes but does not give the correct result.
It executes and gives the correct result.
C It generates an error because of a pairwise comparison.
It generates an error because the GROUP BY clause cannot be used with table joins in a subquery.

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Question 19 [5 Marks]

Consider the join of a relation R with a relation S. If K has m tuples and S has n tuples, then the maximum and minimum sizes of the join respectively are:

A. m+n and 0
✓ mn and 0
C. m+n and m-n
D. mn and m+n

Explanation
When there is no foreign key constraint between two tables then the max and min number of tuples in their join is mn and 0 respectively.

Your submitted response was correct.

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Question 20 [5 Marks]

Consider the following relational schema:

```
employee(empId, empName, empDept)

customer(custId, custName, salesRepId, rating)
```

salesRepId is a foreign key referring to the empId of the employee relation. Assume that each employee makes a sale to at least one customer. What does the following query return?

```
SELECT empName

      FROM employee E

      WHERE NOT EXISTS (SELECT custId
```

A. Names of all the employees with at least one of their customers having a 'GOOD' rating.
B. Names of all the employees with at most one of their customers having a 'GOOD' rating.
C. Names of all the employees with none of their customers having a 'GOOD' rating.
✓ Names of all the employees with all their customers having a 'GOOD' rating.

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Question 21 [5 Marks]

Consider the following relation schema pertaining to a students database:

```
Student (rollno, name, address)

Enroll (rollno, courseno, coursename)
```

where the primary keys are shown underlined. The number of tuples in the Student and Enroll tables are 120 and 8 respectively. What are the maximum and the minimum number of tuples that can be present in (Student * Enroll), where '*' denotes natural join?

- ✓ 8, 8
- B 120, 8
- C 960, 8
- D 960, 120

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Question 22 [5 Marks]

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?

- ✓ WHERE P1. Capacity> = All (select P2. Capacity from Cinema P2)
- B WHERE P1. Capacity> = Any (select P2. Capacity from Cinema P2)
- C WHERE P1. Capacity > All (select max(P2. Capacity) from Cinema P2)
- D WHERE P1. Capacity > Any (select max (P2. Capacity) from Cinema P2)

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Question 23 [5 Marks]

Suppose a database schedule S involves transactions T1, ...Tn. Construct the precedence graph of S with vertices representing the transactions and edges representing the conflicts. If S is serializable, which one of the following orderings of the vertices of the precedence graph is guaranteed to yield a serial schedule?

- ✓ Topological Order
- B Depth First Order
- C Breadth First Order
- D Ascending order of transaction indices

Explanation

Cycle in the precedence graph tells that the schedule does not conflict serializable. DFS and BFS traversal of the graph are possible even if the graph contains a cycle. And hence DFS and BFS are also possible for non-serializable graphs. But Topological sort of any cyclic graph is not possible. Thus topological sort guarantees graph to be serializable. Option D is not valid because in a

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Question 24 [5 Marks]

Which of the following is the highest isolation level in transaction management?

- ✓ Serializable
- B Repeated Read
- C Committed Read
- D Uncommitted Read

Explanation

Serializable is the highest isolation level which guarantees the transaction to be serializable. Serializable execution is defined to be an execution of operations in which concurrently executing transactions appears to be serially executing. Refer: Transaction Isolation Levels in DBMS Option (A) is the correct answer.

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Question 25 [5 Marks]

An index is clustered, if

A. it is on a set of fields that form a candidate key.

B. it is on a set of fields that include the primary key.

✓ the data records of the file are organized in the same order as the data entries of the index.

D. the data records of the file are organized not in the same order as the data entries of the index.

Explanation
A database index is clustered if physical records on disk follow the index order.

Your submitted response was correct.

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Question 26 [5 Marks]

Which of the following is a dense index?

A. Primary Index

✓ Secondary Index

C. Clustered Index

D. None of the Above

Explanation
Dense index: In a dense index, an index entry appears for every search-key value in the file. In a dense clustering index, the index record contains the search-key value and a pointer to the first data record with that search-key value. It is also a secondary index. Option (B) is correct.

Your submitted response was correct.

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Question 27 [5 Marks]

```
Table A

Id   Name    Age

---------------

12   Arun    60

15   Shreya  24

99   Rohit   11
```

A. 4

✓ 3

C. 0

D. 1

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Question 28 [5 Marks]

In SQL, relations can contain null values, and comparisons with null values are treated as unknown. Suppose all comparisons with a null value are treated as false. Which of the following pairs is not equivalent?

A. x = 5 AND not(not(x = 5))

B. x = 5 AND x> 4 and x < 6, where x is an integer

✓ x < 5 AND not (x = 5)

D. None of the above

Explanation
For all values smaller than 5, x < 5 will always be true but x = 5 will be false.

Your submitted response was correct.

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Question 29 [5 Marks]

Which of the following is correct?

A. An SQL query automatically eliminates the duplicates

B. An SQL query will not work if there are no indexes on the relations

C. SQL permits attribute names to be repeated in the same relation

✓ None of the above

Explanation
An SQL does not remove duplicates like relational algebra projection, we have to remove it using distinct. An SQL will work slowly but surely if there are no indexes. An SQL does not permit 2 attributes of same name in a relation. So, none of the options (a), (b) and (c) are correct. Hence, option (d) is Answer.

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Question 30 [5 Marks]

The relation book (title, price) contains the titles and prices of different books. Assuming that no two books have the same price, what does the following SQL query list?

```
select title

from book as B

where (select count(*)

   from book as T

   where T.price > B.price) < 5;
```

A. Titles of the four most expensive books

B. Title of the fifth most inexpensive book

C. Title of the fifth most expensive book of the five most expensive books

✓ Titles of the five most expensive books