

Advanced Database Management System Quiz 1

Total points 22/26 ?

Full Marks: 26

Duration: 30 minutes

All fields are mandatory

Please write your Name and Admission Number Correctly

The respondent's email (21mt0214@cse.iitism.ac.in) was recorded on submission of this form.

✓ A primary key if combined with a foreign key creates *

1/1



parent child relationship between tables that connect them



many-to-many relationship between the tables that connect them



network model between the tables connect them



none of the above

Name *

MANISH KUMAR



✗ The employee information in a company is stored in the relation Employee(name, sex, salary, deptName) Consider the following SQL query `Select deptName from Employee where sex='M' group by deptName having avg (salary)>(select avg (salary) from Employee)` It returns the names of the department in which *

0/1

- ☐ the average salary of male employees is more than the average salary in the company.
- ☐ the average salary is more than the average salary in the company
- ☒ the average salary of male employees is more than the average salary of all employees in the department. ✗
- ☐ the average salary of male employees is more than the average salary of all male employee in the company.

Correct answer

- ☒ the average salary of male employees is more than the average salary in the company.

✓ Consider a disk pack with 16 surfaces, 128 track per surface and 256 sectors per track. 512 bytes of data are stored in a bit serial manner in a sector. The capacity of the disk pack and the number of bits required to specify a particular sector in the disk are respectively. *

1/1

- ☒ 256 Mbytes, 19 bits ✓
- ☐ 256 Mbytes, 28 bits
- ☐ 512 Mbytes, 20 bits
- ☐ 64 Gbytes, 28 bits



✓ 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? *

2/2

- ☐ 24
- ☐ 42
- ☐ None of the above
- ☐ 34
- ☒ 43
- ☐ 16
- ☐ 61
- ☐ 44



✓ Let R (a, b, c) and S(d, e, f) be two relations in which d is the foreign key of S that refers to the primary key of R. Consider the following (a) Insert into R (b) Insert into S (c) Delete from R (d) Delete from S Which of the following is true about the referential integrity constraint above? *

1/1

- ☐ Both (a) and (d) can cause its violation
- ☒ Both (b) and (c) can cause its violation
- ☐ None of (a), (b), (c) or (d) cause its violation
- ☐ All of (a), (b), (c) and (d) can cause its violation



 Chose the correct statement(s) *

1/1

- ☐ A clustering index is defined on the fields which are of type key and ordering
- ☐ A clustering index is defined on the fields which are of type non-key and non-ordering
- ☐ A clustering index is defined on the fields which are of type key and non-ordering
- ☒ A clustering index is defined on the fields which are of type non-key and ordering 

 Chose the correct option. *

2/2

The order of a leaf node in B+-tree is the maximum number of (value, data record pointer) pairs it can hold. Given that the block size is 1K bytes, data record pointer is 7 bytes long, the value field is 9 bytes long and a block pointer is 6 bytes long, what is the order of the leaf node?

- ☐ 68
- ☐ 86
- ☐ 46
- ☒ 63 
- ☐ 64
- ☐ None of the above
- ☐ 67
- ☐ 76
- ☐ 36



✓ Let P1 and P2 be two entities in an ER diagram with simple single-valued attributes. R1 and R2 are two relations between P1 and P2, where R1 is one-to-many and R2 is many-to-many. R1 and R2 do not have any attributes of their own. What is the minimum number of tables required to represent this situation in the relational model? *

1/1

- ☐ 4
- ☐ 5
- ☒ 3
- ☐ 2
- ☐ None of the above



✓ Which of the following statements about normal forms is FALSE? *

1/1

- ☐ Lossless, dependency-preserving decomposition into 3NF is always possible.
- ☐ Any relation with two attributes is in BCNF.
- ☐ None of the above
- ☒ Lossless, dependency-preserving decomposition into BCNF is always possible.
- ☐ BCNF is stricter than 3NF.



✓ The relation schema student Performance (name, courseNo, rollNo, grade) Has the following functional dependencies Name, courseNo → grade rollNo, courseNo → grade name → rollNo rollNo → name The highest normal form of this relation scheme is *

- ☐ 4NF
- ☐ 2NF
- ☐ BCNF
- ☒ 3NF



✓ Given the following relational instance. Which of the following functional dependencies are satisfied by the instance? *

X	Y	Z
2	5	3
2	6	4
2	7	4
4	3	3

- ☒ $Y \rightarrow X$
- ☐ $Z \rightarrow Y$
- ☒ $YZ \rightarrow X$
- ☒ $XY \rightarrow Z$
- ☐ $X \rightarrow Z$
- ☐ $XZ \rightarrow Y$
- ☐ None of the above
- ☐ All of the above
- ☒ $Y \rightarrow Z$



- ✓ The following functional dependencies are given: $AB \rightarrow CD$, $AF \rightarrow D$, $DE \rightarrow F$, $2/2$
 $C \rightarrow G$, $F \rightarrow E$, $G \rightarrow A$ Which one of the following options is false? *

$\{CF\}^+ = \{ACDEFG\}$

☐ Option 1

$\{BG\}^+ = \{ABCDG\}$

☐ Option 2

$\{AF\}^+ = \{ACDEFG\}$

☒ Option 3



$\{AB\}^+ = \{ABCDG\}$

☐ Option 4

☐ Other:

.....



✓ Which of the following is the key factor for preferring B+ trees to binary search tree for indexing database relations? * 1/1

- ☒ Data transfer from disks is in blocks. ✓
- ☐ Database relations have a large number of records.
- ☐ B+-tree requires less memory than binary search trees
- ☐ None of these
- ☐ Database relations are sorted on the primary key.

✓ The following key values are inserted into a B+ tree in which order of the internal nodes is 3 and that of leaf nodes is 2, in the sequence given below. The order of internal nodes is the maximum number of tree pointers in each node and the order of leaf nodes is the maximum number of data items that can be stored in it. The B+ tree is initially empty. 10, 3, 6, 8, 4, 2, 1 The maximum number of times leaf nodes would get split up as a result of these insertions is * 2/2

- ☒ 3 ✓
- ☐ 5
- ☐ 4
- ☐ 2
- ☐ 6
- ☐ None of the above



✓ Chose the correct option *

1/1

Consider the table employee (empId, name, department, salary) and the two queries Q1, Q2 below. Assuming that department 5 has more than one employee and we want to find the employees who get higher salary than anyone in the department 5, which one of the statements is TRUE for any arbitrary employee table?

Q1: Select e.empId From Employee e where not exists (Select * From employee s Where s.department ="5" and s.slary>=e.salary)

Q2: Select e.empId From employee e where e.salary> Any(Select distinct salary From employee s Where s.department="5")

- ☒ Q1 is the correct query
- ☐ Q2 is the correct query
- ☐ Neither Q1 nor Q2 is the correct query.
- ☐ All of the above



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✓ Relation R is decomposed using a set of functional dependencies, F, and relation S is decomposed using another set of functional dependencies G. One decomposition is definitely BCNF, the other is definitely 3NF, but it is not known which is which. To make a guaranteed identification, which one of the following tests should be used on the decompositions? (Assume that the closures of F and G are available). *

- ☐ Lossless-join
- ☐ All of the above
- ☐ Dependency-preservation
- ☐ None of the above
- ☐ 3NF Definition
- ☒ BCNF definition



✗ Consider the following implications relating to functional and multivalued dependencies given below, which may or may not be correct. Exactly how many of the above implications are valid? (i) If $P \twoheadrightarrow Q$ and $P \twoheadrightarrow R$ then $P \twoheadrightarrow QR$ (ii) If $P \rightarrow Q$ and $P \rightarrow R$ then $P \twoheadrightarrow QR$ (iii) If $P \twoheadrightarrow QR$ then $P \rightarrow Q$ then $P \twoheadrightarrow R$ (iv) If $P \rightarrow QR$ then $P \twoheadrightarrow Q$ and $P \twoheadrightarrow C$ *

- ☐ 2
- ☐ 1
- ☒ 0
- ☐ 3



Correct answer

- ☒ 1



✓ In SQL, relations contain null values, and comparisons with null values are 1/1 treated as unknown. Suppose all comparisons with a null values are treated as false. Which of the following pairs is not equivalent? *

- ☐ $p=5$ and $\text{not}(\text{not}(p=5))$
- ☐ all of the above
- ☐ $p=5$ and $p>4$ and $p<6$, where p is an integer
- ☐ None of the above
- ☒ $p \neq 5$ and $\text{not}(p=5)$



✗ Consider the schema $R=(P \ Q \ R \ S)$ and the dependencies $P \rightarrow Q$, $Q \rightarrow R$, $R \rightarrow S$ and $S \rightarrow P$. Let $R=(R1 \text{ and } R2)$ be a decomposition such that $R1 \cap R2 = \emptyset$. The decomposition is *

0/2

- ☐ not in 2NF
- ☐ None of the above
- ☒ in 3NF
- ☐ All of the above
- ☐ not in 3NF
- ☒ in 2NF



Correct answer

- ☒ not in 2NF
- ☒ not in 3NF



✓ Which one of the following statement is FALSE? *

1/1

- ☐ A prime attribute can be transitively dependent on a key in a 3NF relation.
- ☐ Any relation with two attributes is in BCNF.
- ☒ A prime attribute can be transitively dependent on a key in a BCNF relation. ✓
- ☐ A relation in which every key has only one attribute is in 2NF.

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