

## DBMS

## FD's &amp; Normalization

## Key Concepts &amp; Finding Number of Candidate keys(Part-1)

DPP 02

## [MSQ]

1. Choose the correct statement from the following:
- There can be many primary keys for a relation.
  - There can be many alternate keys for a relation.
  - All the candidate keys are also super keys.
  - All the super keys are also the candidate keys.

## [NAT]

2. Consider the below instance of relation:

Employee:

Emp_rating	Emp_name	Emp_mail	Emp_sal
1	Rohit	p@pw	40000
2	Kanika	c@pw	60000
1	Rohit	Null	50000
3	Pankaj	g@pw	60000

The maximum possible number of alternate keys for the above relational instance is/are \_\_\_\_.

## [MCQ]

3. Consider the set of functional dependencies for a relation R(D, N, C, S)
- $$\{D \rightarrow N, D \rightarrow C, D \rightarrow S, C \rightarrow S\}$$

Then choose the correct statement regarding the above set.

- {D} is the superkey for the relation.
- {DN} is the candidate key for the relation.
- {DC} is the candidate key for the relation.
- {CN} is the superkey for the relation.

## [NAT]

4. Consider the given FD set for relation

R (X, Y, Z, W, U, V)

 $\{X \rightarrow Y, YZ \rightarrow W, U \rightarrow Z, W \rightarrow X\}$ 

Then the number of prime attributes for the relation are?

## [MCQ]

5. Choose the incorrect statement from the following
- All super keys cannot be primary key.
  - We choose the minimal candidate key to be a primary key.
  - The number of super keys are equal to the number of primary keys for a relation.
  - None of the above.

## [NAT]

6. Suppose a relation R has 9 attributes, then the maximum possible number of candidate keys are?

## [MSQ]

7. For all given set of FD's find the primary key from the options below, for relation R (A, B, C, D, E, F)
- $$\{A \rightarrow D, C \rightarrow BDE, B \rightarrow F, B \rightarrow C\}$$
- AC could be the primary key.
  - There are two candidate keys AC and AB.
  - BC is the primary key.
  - No primary key exists for the relation.

## [MCQ]

8. Consider a relation R (A B C D E F), on this relation how many maximum number of candidate keys are possible?

- |        |        |
|--------|--------|
| (a) 8  | (b) 12 |
| (c) 16 | (d) 20 |

## Answer Key

1. (b, c)
2. (3)
3. (a)
4. (5)

5. (c)
6. (126)
7. (a, b)
8. (d)



## Hints & Solutions

1. (b, c)

I. There exists exactly at most one primary key for any relational table while there can be multiple alternate keys for a relation.

II. All the candidate keys are super keys, but it is not compulsory that all super key are candidate keys.

**NOTE:** A candidate key is minimal set of attributes that determine relational table uniquely. Also, every candidate key is a Super key but every Super key need not be Candidate.

2. (3)

An alternate key is one that is not the primary key. It allows null values. So, the alternate/candidate key for given relation is/are: {Emp\_mail} {Emp\_rating, Emp\_sal}, and {Emp\_name, Emp\_sal}

3. (a)

{D → N, D → C, D → S, C → S}

the candidate keys of the relation are:

D+ = {D, N, C, S} ✓

C+ = {C, S} ✗

S+ = {S} ✗

N+ = {N} ✗.

{D} is the candidate key as well as the super key.

{DN} and {DC} are the super keys not the candidate key.

{CN} is not any key.

4. (5)

In order to find the prime attributes, we first find the candidate keys for the relation as prime attributes are part of Candidate Key.

The candidate keys are: XUV, YUV, WUV

So the prime attributes are {X, Y, W, U, V}

Non-prime attribute is {z}.

5. (c)

All super keys cannot be primary key. For a relation the number of super keys are more than number of primary keys.

6. (126)

For a relation with n attributes, the maximum number of candidate keys will be  ${}^nC_{\left[\frac{n}{2}\right]}$

n = 9, therefore  ${}^9C_{\left[\frac{9}{2}\right]} \Rightarrow {}^9C_4$

$$\Rightarrow \frac{9 \times 8 \times 7 \times 6 \times 5!}{4! \times 5!} \Rightarrow \frac{9 \times 3 \times 7 \times 6}{4 \times 3 \times 2} = 42 \times 3 = 126$$

7. (a, b)

There can be at most one primary key for a relation. There exists two candidate keys i.e. AC and AB out of these two only one is selected to be the primary key. So, option (a) and (b) is correct choice.

8. (d)

n = 6

∴ Maximum candidate keys =  ${}^nC_{\left[\frac{n}{2}\right]}$

$${}^6C_{\left[\frac{6}{2}\right]} \Rightarrow {}^6C_3 \Rightarrow \frac{6 \times 5 \times 4 \times 3!}{3! \times 3 \times 2 \times 1} = 20$$



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