**Branch : CSE & IT** **Batch : Hinglish**

# DBMS

## FD's & Normalization

**DPP 02**

**[MSQ]**

**1.** Choose the correct statement from the following:
(a) There can be many primary keys for a relation.
(b) There can be many alternate keys for a relation.
(c) All the candidate keys are also super keys.
(d) 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.
(a) {D} is the superkey for the relation.
(b) {DN} is the candidate key for the relation.
(c) {DC} is the candidate key for the relation.
(d) {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
(a) All super keys cannot be primary key.
(b) We choose the minimal candidate key to be a primary key.
(c) The number of super keys are equal to the number of primary keys for a relation.
(d) 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)
$\{A \rightarrow D, C \rightarrow BDE, B \rightarrow F, B \rightarrow C\}$
(a) AC could be the primary key.
(b) There are two candidate keys AC and AB.
(c) BC is the primary key.
(d) 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)**

$\{D \to N, D \to C, D \to S, C \to S\}$

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 ${}^{n}C_{\left\lfloor \frac{n}{2} \right\rfloor}$

n = 9, therefore ${}^{9}C_{\left\lfloor \frac{9}{2} \right\rfloor} \Rightarrow {}^{9}C_{4}$

$$\Rightarrow \frac{9\times8\times7\times6\times5!}{4!\times5!} \Rightarrow \frac{9\times3\times7\times6}{4\times3\times2} = 42 \times 3 = 126$$

**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

$\therefore$ Maximum candidate keys = ${}^{n}C_{\left\lfloor \frac{n}{2} \right\rfloor}$

$${}^{6}C_{\left\lfloor \frac{6}{2} \right\rfloor} \Rightarrow {}^{6}C_{3} \Rightarrow \frac{6\times5\times4\times3!}{3!\times3\times2\times1} = 20$$

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