

C++

Nucleus



CODING
BLOCKS

Karnaugh-Map

- K-Map for S.O.P/P.O.S
- Expressions using K-Map

Kartik Mathur

Karnaugh map (3 - marks)

- K-Map is a rectangular shape map with it's help we can reduce a Boolean expression.
- It follows the concept of Grey-Code, i.e. while going from one state to another state we can only change one single bit.

Karnaugh map-For Canonical S.O.P

The most commonly used K-Map's are :

2-Variable K-Map?

3-Variable K-Map?

4-Variable K-Map?

Karnaugh map-For Canonical P.O.S

The most commonly used K-Map's are :

2-Variable K-Map?

3-Variable K-Map?

4-Variable K-Map?

Steps for Reducing Expression using K-Map?

1. Design/ Create the required K- map.
2. Now place 1's and 0's in the map according to the given expression.
 1. Place 0 for the given terms in Canonical P.O.S.
 2. Place 1 for the given terms in Canonical S.O.P.
3. Solve the map according to following priority order.
Oct – Quad – Pair – Singleton
-----> Decreasing order of priority.
4. To make these above cases we use overlapping or folding within the map.

Note :

Folding : This means meeting the top most edges with bottom edge and then left edge with the right edge it is called as folding once.

WE CAN DO FOLDING ONLY ONCE IN A MAP.



Reduce following Expression using K-Map?

1. $F(X,Y,W,Z) = S(4, 5, 6, 12, 13, 14)$
2. $F(X,Y,W,Z) = S(0, 1, 3, 4, 5, 8, 9, 12, 13)$

<div> <div> WZ </div> <div> $\bar{W}\bar{Z}$ </div> <div> $\bar{W}Z$ </div> <div> WZ </div> <div> $W\bar{Z}$ </div> </div> <div> XY </div>	00	01	11	10
$\bar{X}\bar{Y}00$	$\sqrt{0}$	$\sqrt{1}$	$\sqrt{3}$	$\sqrt{2}$
$\bar{X}Y01$	$\sqrt{4}$	$\sqrt{5}$	$\sqrt{7}$	$\sqrt{6}$
$XY11$	$\sqrt{12}$	$\sqrt{13}$	$\sqrt{15}$	$\sqrt{14}$
$X\bar{Y}10$	$\sqrt{8}$	$\sqrt{9}$	$\sqrt{11}$	$\sqrt{10}$

Reduce following Expression using K-Map?

1. $F(X,Y,W,Z) = \sum(0,2,8,10,13,15)$
2. $F(X,Y,W,Z) = \sum(0,1,2,3,5,7,8,9,10,11,13,15)$

$xy \backslash wz$		$w+z$	$w+\bar{z}$	$\bar{w}+\bar{z}$	$\bar{w}+z$
		00	01	11	10
$x+y$	00	$\sqrt{0}$	$\sqrt{1}$	$\sqrt{3}$	$\sqrt{2}$
$x+\bar{y}$	01	$\sqrt{4}$	$\sqrt{5}$	$\sqrt{7}$	$\sqrt{6}$
$\bar{x}+\bar{y}$	11	$\sqrt{12}$	$\sqrt{13}$	$\sqrt{15}$	$\sqrt{14}$
$\bar{x}+y$	10	$\sqrt{8}$	$\sqrt{9}$	$\sqrt{11}$	$\sqrt{10}$

NAND TO NAND LOGIC?

To convert into NAND TO NAND LOGIC we need to have S.O.P expression.

1) $x.y + w.z$

NOR TO NOR LOGIC?

To convert into NOR to NOR LOGIC we need to have P.O.S expression.

1) $(X+Y).(W+Z)$

Algebraic Proof of Demorgan's Law?

Prove the following :

Statement 1 :

$$(X+Y)' = X'.Y'$$

Statement 2 :

$$(X.Y)' = X'+Y'$$

These two statements are dual of each other.

P.O.S

Write the canonical P.O.S/Max term for the Boolean function F whose truth table is as follows :

X	Y	F
0	0	0
0	1	0
1	0	1
1	1	1

CANONICAL POS TO SOP?

Convert the following canonical POS to SOP.

$$F(X,Y) = (X+Y).(X)$$

POINTERS ?

OUTPUT QUESTION!

```
void main(){
    int a[]={10,15,20,25,30};
    int *p =a;

    while(*p<30){
        if(*p%3!=0){
            *p=*p+2;
        }
        else{
            *p=*p+1;
        }
        p++;
    }

    for(int j=0;j<4;j++){
        cout<<a[j]<<"*";
        if(j%3==0){ cout<<endl;}
    }
    cout<<a[4]*3<<endl;
}
```


C++

Nucleus



CODING
BLOCKS

Thankyou

Kartik Mathur