DATE

Quine - Mc Cluskey

Quine - McCluskey Minimization Technique

(Tabular Method)

Eg: $Y(A,B,C,D) = \Sigma(0,1,3,7,8,9,11,15)$

	ABCD
0 →	0000
1 →	0001
3 →	0011
7 →	0111
8 →	1000
9 →	1001
11 →	1011
15 →	1111

→ binary equivalent for the given minterms

Step 1:

1st group → minterms with no 1's
2nd group → minterms with 1 1's
3rd group → minterms with 2 1's
4th group → minterms with 3 1's
5th group → minterms with 4 1's

Group	Minterm	Binary representation A B C D	
0	m_0	0 0 0 0	✓
1	m_1	0 0 0 1	✓
	m_8	1 0 0 0	✓
2	m_3	0 0 1 1	✓
	m_9	1 0 0 1	✓

PES

DATE

Group	Minterms	Binary Representation A B C D	
3	m_3	0 0 1 1	✓
	m_9	1 0 0 1	✓
4	m_{15}	1 1 1 1	✓

Step 2

Group	Matched pair	Binary Representation A B C D	
0	$m_0 - m_1$	0 0 0 -	✓
	$m_0 - m_8$	- 0 0 0	✓
1	$m_1 - m_3$	0 0 - 1	✓
	$m_1 - m_9$	- 0 0 1	✓
	$m_8 - m_9$	1 0 0 -	✓
2	$m_3 - m_7$	0 - 1 1	✓
	$m_3 - m_{11}$	- 0 1 1	✓
	$m_9 - m_{11}$	1 0 - 1	✓
3	$m_7 - m_{15}$	- 1 1 1	✓
	$m_{11} - m_{15}$	1 - 1 1	✓

DATE

Step 3

Group	matched Pair	Binary representation A B C D.		
0	$m_0 - m_1$ $m_8 - m_9$	$- 0\ 0 -$	×	$\bar{B}\bar{C}$
	$m_0 - m_8$ $m_1 - m_9$	$- 0\ 0 -$	×	
1	$m_1 - m_3$ $m_9 - m_{11}$	$- 0 - 1$	×	$\bar{B}D$
	$m_1 - m_9$ $m_8 - m_{11}$	$- 0 - 1$	×	
2	$m_3 - m_7$ $m_{11} - m_{15}$	$- - 1\ 1$	×	CD
	$m_3 - m_{11}$ $m_9 - m_{15}$	$- - 1\ 1$	×	

Step 4

again find the matched pair,

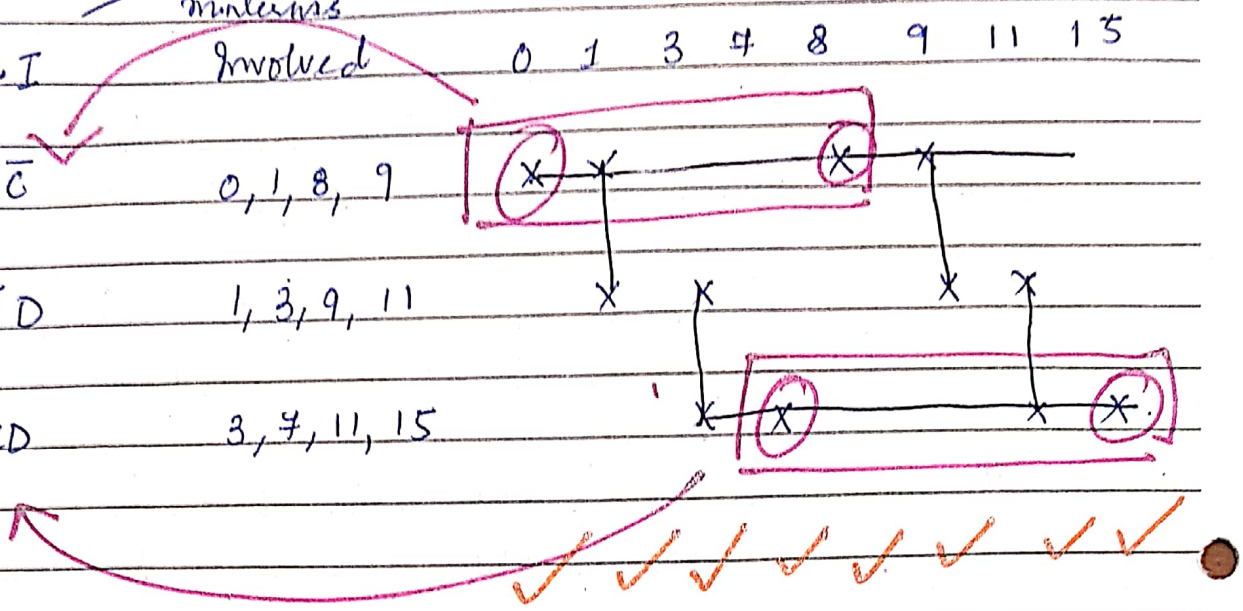
In step 4 we do not have any matched pair

* Also check in step 2 and step 3 if there are any matched pairs unticked to take them as prime implicants.

$\bar{B}\bar{C}$, $\bar{B}D$, CD → Prime Implicants

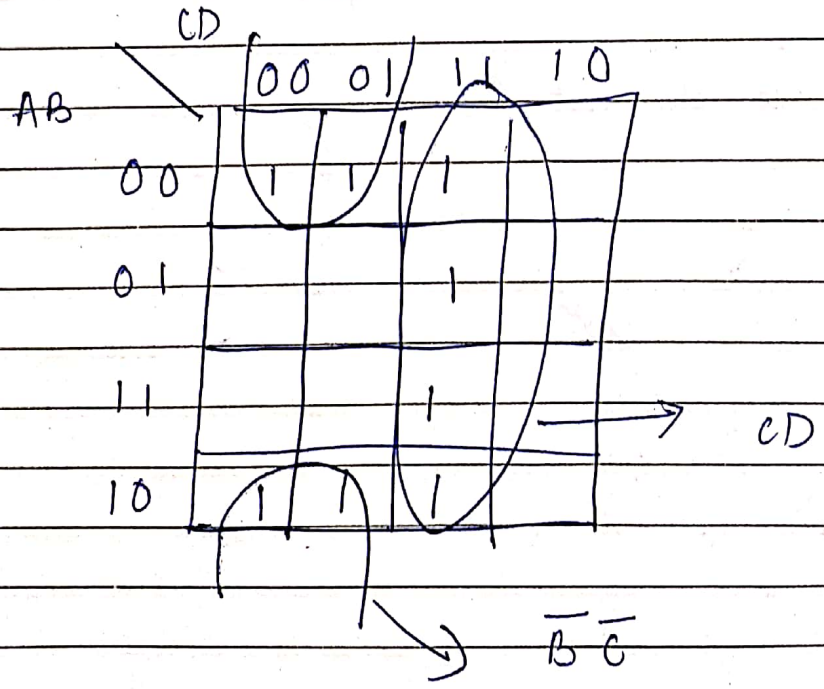
To find out the essential prime implicants

P.I	minterms involved
$\bar{B}\bar{C}$	0, 1, 8, 9
$\bar{B}D$	1, 3, 9, 11
CD	3, 7, 11, 15



$$Y = \bar{B}\bar{C} + CD$$

Proving it with a 4-Variable K-map



$$Y = \bar{B}\bar{C} + CD$$