

# DE Assignment

20DCS103

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Que: 1 Use Quine - McCluskey (Tabulation) minimization technique to solve below example.  
 $F(A, B, C, D) = \sum m(0, 1, 3, 7, 8, 9, 11, 15)$

→ Step: 1 :-

Group	Minterms	Binary Rep.			
		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
3	$M_7$	0	1	1	1
	$M_{11}$	1	0	1	1
4	$M_{15}$	1	1	1	1

→ Step: 2 :-

Group	Matched pairs	Binary Rep			
		A	B	C	D
0	$M_0, M_1$	0	0	0	-
	$M_0, M_8$	-	0	0	0

1	$M_1, M_3$ $M_1, M_9$ $M_8, M_9$	0 0 - 1 - 0 0 1 1 0 0 -
2	$M_3, M_7$ $M_3, M_{11}$ $M_9, M_{11}$	0 - 1 1 - 0 1 1 1 0 - 1
3	$M_7, M_{15}$ $M_{11}, M_{15}$	- 1 0 1 1 - 1 1

→ Step : 4 :-

Group	Matched pairs	Binary form A B C D
0	0, 1, 8, 9 0, 8, 1, 9	- 0 0 - ( $\bar{B}\bar{C}$ ) - 0 0 - ( $\bar{B}\bar{C}$ )
1	1, 3, 9, 11 1, 9, 3, 11	- 0 - 1 ( $\bar{B}D$ ) - 0 - 1 ( $\bar{B}D$ )
2	3, 7, 11, 15 3, 11, 7, 15	- 0 - 1 1 ( $C\bar{D}$ ) - 0 - 1 1 ( $C\bar{D}$ )



	0	1	3	7	8	9	11	15
$(0, 1, 8, 9) \bar{B} \bar{C}$	(X)	X			(X)	X		
$(1, 3, 9, 11) \bar{B} D$		X	X			X	X	
$(3, 7, 11, 15) CD$			X	(X)			X	

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

Que: 2 Solve question: 1 using K-map.

$$F(A, B, C, D) = \sum m(0, 1, 3, 7, 8, 9, 11, 15)$$

	CD			
AB	00	01	11	10
00	1	1	1	
01			1	
11			1	
10	1	1	1	

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

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

Que: 3 Use Quine - McCluskey (Tabulation) minimization technique to solve below example.

$$F(A, B, C, D) = \sum m(0, 1, 2, 4, 5, 9, 15) + d(6, 13)$$

→ Step : 1 :-

0 → 0 0 0 0

1 → 0 0 0 1

2 → 0 0 1 0

4 → 0 1 0 0

5 → 0 1 0 1

6 → 0 1 1 0

9 → 1 0 0 1

13 → 1 1 0 1

15 → 1 1 1 1

→ Step : 2 :-

Group	Minterms	Binary Rep.
0	$M_0$	0 0 0 0
1	$M_1$	0 0 0 1
	$M_2$	0 0 1 0
	$M_4$	0 1 0 0
2	$M_5$	0 1 0 1
	$M_6$	0 1 1 0
	$M_9$	1 0 0 1
3	$M_{13}$	1 1 0 1
4	$M_{15}$	1 1 1 1



→ Step : 3 :-

Group	Matched pair	Binary Rep.
0	$M_0, M_1$	0 0 0 -
	$M_0, M_2$	0 0 - 0
	$M_0, M_4$	0 - 0 0
1	$M_1, M_5$	0 - 0 1
	$M_1, M_9$	- 0 0 1
	$M_2, M_6$	0 - 0 1 0
	$M_4, M_5$	0 1 0 -
	$M_4, M_6$	0 1 - 0
2	$M_5, M_{13}$	- 1 0 1
	$M_9, M_{13}$	1 - 0 1
3	$M_{13}, M_{15}$	1 1 - 1

→ Step : 4 :-

Group	Matched pair	Binary Rep.
0	0, 2, 4, 6	0 - - 0 (A $\bar{D}$ )
	0, 1, 4, 5	0 - 0 - (A $\bar{C}$ )
	0, 4, 2, 6	0 - - 0 (A $\bar{D}$ )
	0, 4, 1, 5	0 - 0 - (A $\bar{C}$ )
1	1, 5, 9, 13	- - 0 1 (C $\bar{D}$ )
	1, 9, 5, 13	- - 0 1 (C $\bar{D}$ )

→ Step : 5 :-

	0	1	2	4	5	9	15
(0, 2, 4, 6) $\bar{A}\bar{D}$	X		(X)	X			
(0, 1, 4, 5) $\bar{A}\bar{C}$	X	X		X	X		
(0, 5, 9, 13) $\bar{C}D$		X			X	(X)	
(13, 15) $ABD$							(X)

$$F = \bar{D}\bar{A} + \bar{C}D + ABD$$

Que: 4 Solve question 3 using K-map.

AB \ CD	00	01	11	10
00	1	1		1
01	1	1		X
11		X	1	
10		1		

$$F = \bar{C}D + \bar{A}\bar{D} + ABD$$

Que : 5 Use Quine - McCluskey (Tabulation) minimization technique to solve below example.

$$F(A, B, C, D) = \sum m(0, 5, 8, 9, 10, 11, 14, 15)$$

→ Step : 1 :-



0  $\rightarrow$  000010  $\rightarrow$  10105  $\rightarrow$  010111  $\rightarrow$  10118  $\rightarrow$  100014  $\rightarrow$  11109  $\rightarrow$  100115  $\rightarrow$  1111 $\rightarrow$  Step : 2 :-

Group	Minterms	Binary Rep.
0	$M_0$	0000
1	$M_8$	1000
2	$M_5$	0101
	$M_9$	1001
	$M_{10}$	1010
3	$M_{11}$	1011
	$M_{14}$	1110
4	$M_{15}$	1111

 $\rightarrow$  Step : 3 :-

Group	Matched pair.	Binary Rep.
0	$M_0, M_8$	- 000

1.	$M_8, M_9$ $M_6, M_{10}$	1 0 0 - 1 0 - 0
2	$M_9, M_{11}$ $M_{10}, M_{11}$ $M_{10}, M_{14}$	1 0 - 1 1 0 1 - 1 - 1 0
3.	$M_{11}, M_{15}$ $M_{14}, M_{15}$	1 - 1 1 1 1 1 -

→ Step : 4 :-

Group	Matched pair	Binary Rep.
0	-	-
1	8, 9, 10, 11 8, 10, 9, 11	1 0 - - ( $A\bar{B}$ ) 1 0 - - ( $A\bar{B}$ )
2.	10, 11, 14, 15. 10, 14, 11, 15.	1 - 1 - ( $AC$ ) 1 - 1 - ( $AC$ )

→ Step : 5 :-

	0	5	8	9	10	11	14	15
(8, 9, 10, 11) $A\bar{B}$			X	(X)	X	X		
(10, 11, 14, 15) $AC$					X	X	(X)	(X)
(0, 8) $\bar{B}\bar{C}\bar{D}$	(X)		X					
(5) $AB\bar{C}D$		(X)						



$$F = A\bar{B} + AC + \bar{B}\bar{C}\bar{D} + A\bar{B}\bar{C}D$$

Que: 6 :  $F(A, B, C, D)$  Solve using K-map.

AB \ CD	00	01	11	10
00	1	1		
01		1		
11			1	1
10	1	1	1	1

$$F = A\bar{B} + AC + \bar{B}\bar{C}\bar{D} + A\bar{B}\bar{C}D$$

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