28) Qm-M method

$$F(A, B, C, D) = \Sigma m(0, 2, 3, 4, 5, 6, 7, 8, 10, 12, 13)$$

Step 1

Minterms	Binary equivalents				Number of 1's
	A	B	C	D	
0	0	0	0	0	0
2	0	0	1	0	1
3	0	0	1	1	2
4	0	1	0	0	1
5	0	1	0	1	2
6	0	1	1	0	2
7	0	1	1	1	3
8	1	0	0	0	1
10	1	0	1	0	2
12	1	1	0	0	2
13	1	1	0	1	3

→ Adjacent or valid pair
only 1 variable change.

Step 2:

Minterms	Binary equ				No of 1's
	A	B	C	D	
0	0	0	0	0	0
2	0	0	1	0	1
4	0	1	0	0	1
8	1	0	0	0	1
3	0	0	1	1	2
6	0	1	1	0	2
10	1	0	1	0	2
12	1	1	0	0	2

2,13)

mber of 1's is

0

1

2

1

2

2

d pair
only 1
ariable
change.

Step 3:

Min	A	B	C	D
0, 2	0	0	—	0
0, 4	0	—	0	0
0, 8	—	0	0	0
2, 3	0	0	1	—
2, 6	0	—	1	0
2, 10	—	0	1	0
4, 6	0	1	—	0
4, 12	—	1	0	0
8, 10	1	0	—	0
8, 12	1	—	0	0
3, 7	0	—	1	1
6, 7	0	1	1	—
12, 13	1	1	0	—

Step 4 :- [Identification prime & essential]

Minterms	A	B	C	D
0, 2, 4, 6	0	—	—	0
0, 2, 8, 10	—	0	—	0
0, 4, 2, 6	0	—	—	0
0, 4, 8, 12	—	—	0	0
0, 8, 2, 10	—	0	—	0
0, 8, 4, 12	—	—	0	0
2, 3, 6, 7	0	—	1	—
2, 6, 3, 7	0	—	1	—
12, 13	1	1	0	—

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step5:- [Remove reductant ones]

0,2,4,6	A	B	C	D
0,2,4,6	0	—	—	0
0,2,8,10	—	0	—	0
0,4,8,12	—	—	0	0
2,3,6,7	0	—	1	0
12,13 *	1	1	0	—

step6:-

Minterms	m_0	m_2	m_3	m_4	m_6 m_7	m_8	m_{10}	m_{12}
→ 0,2,4,6	·	·		·	·			
0,2,8,10	·	·				·	·	
→ 0,4,8,12	·			·		·		·
2,3,6,7		·	⊙		· ⊙			
12,13 *								·

Final result