DIGITAL SYSTEMS

05/02

TUESDAY

Quine McCluskey Method

$F(A,B,C,D) = \sum m(0,1,2,5,6,7,8,9,10,14)$

Logic : $XY + X\bar{Y} = X(Y+\bar{Y}) = X$.

Minterms

0	0000
1	0001
2	0010
3	0011
4	0100
5	0101
6	0110
7	0111
8	1000
9	1001
10	1010
11	1011
12	1100
13	1101
14	1110
15	1111

Group-0 (zero - '1's)

→ 0000 → m_0

Group-1 (one - '1')

→ 0001 → m_1

0010 → m_2

0100 → m_4

1000 → m_8

Group-2 (two - '1's)

→ 0011 → m_3

0101 → m_5

0110 → m_6

1001 → m_9

1010 → m_{10}

1100 → m_{12}

Group-3 (three - '1's)

→ 0111 → m_7

1011 → m_{11}

1101 → m_{13}

1110 → m_{14}

Group-4 (4 - '1's)

1111 → m_{15}.

Ex.

$$F(A,B,C,D) = \sum m(0,1,2,5,6,7,8,9,10,14)$$

Group (0) → (0) 0000 ✓

Group (1) → (1) 0001 ✓
(2) 0010 ✓
(8) 1000 ✓

Group-(2) → (5) 0101 ✓
(6) 0110 ✓
(9) 1001 ✓
(10) 1010 ✓

Group-(3) → (7) 0111 ✓
(14) 1110 ✓

G(0,1)

✓ (0,1) → 000- ✓
✓ (0,2) → 00-0 ✓
✓ (0,8) → -000 ✓

G(1-2)

★ (1,5) → 0-01
✓ (1,9) → -001
✓ (2,6) → 0-10
✓ (2,10) → -010
✓ (8,9) → 100-
✓ (8,10) → 10-0

G(2-3)

★ (5,7) → 01-1
★ (6,7) → 011-
✓ (6,14) → -110
✓ (10,14) → 1-10

G{0-1 / 1-2}

(0,1,8,9) → -00-
(0,2,8,10) → -0-0
(0,8,2,10) → -0-0
(0,8,1,9) → -00-

G{1-2 / 2-3}

(2,6,10,14) → --10
(2,10,6,14) → --10

PRIME IMPLICATION TABLE

	0	1	2	5	6	7	8	9	10	14
Essential ✓ (0,1,8,9) $\bar{B}\bar{C}$	×	×					×	⊗		
(0,2,8,10) $\bar{B}\bar{D}$	×		×							
✓ (2,6,10,14) $C\bar{D}$			×		×				⊗	
(1,5) $\bar{A}\bar{C}D$		×		×						
★ (5,7) $\bar{A}BD$				×		×				
(6,7) $\bar{A}BC$					×	×				

EPI

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