

Digital Electronics - Assignment - 1

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1.) Q-M method (tabulation) \rightarrow SOP form

$\Rightarrow f(A, B, C, D) = \sum m(2, 3, 6, 7, 10, 11, 12, 13, 14, 15)$

Groups	Minterms	1 st level of grouping	2 nd level
G-1	2 - 0010	(2,3) (1) (2,6) (4) (2,10) (8)	(2,3,6,7) :: (1,4) (2,3,10,11) :: (1,8) (2,6,10,14) :: (4,8)
G-2	3 - 0011 6 - 0110 10 - 1010 12 - 1100	(3,7) (4) (3,11) (8) (6,7) (1) (6,14) (8) (10,14) (4)	(1,2,3,4,15) :: (1,2) (3,7,11,15) :: (4,8)
G-3	7 - 0111 11 - 1011 13 - 1101 14 - 1110	(12,13) (1) (12,14) (8) (10,11) (4) (7,15) (8) (11,15) (4)	(2,3,6,7,10,11,14,15) :: (1,4,8)
G-4	15 - 1111	(13,15) (2) (14,15) (4)	

1.) $P = \bar{A}C$ $Q = \bar{B}C$ $R = AB$ $S = C$.

	2	3	6	7	10	11	12	13	14	15
P	x	x	x	x						
Q	x	x			x	x				
R							⊗	⊗	x	x
S	x	x	x	x	x	x			x	x

R is essential prime implicant

2, 3, 6, 7, 10, 11 are not represented by R.

$\therefore S$ is taken $\Rightarrow f = R + S$
 $f = AB + C$ $= C + AB$

2.) K-Map method \rightarrow sop

$f(A, B, C, D) = \sum m(0, 1, 4, 5, 8, 9, 10, 11, 12)$
 std sop

$f = m_0 + m_1 + m_4 + m_5 + m_8 + m_9 + m_{10} + m_{11} + m_{12}$

K-Map

AB \ CD	00	01	11	10
00	1	1	0	0
01	1	1	0	0
11	1	0	0	0
10	1	1	1	1

2.) $P = \bar{A}\bar{C}$ $q = \bar{C}\bar{D}$ $R = \bar{A}\bar{B}$

$$f = P + q + R.$$

$$f = \bar{A}\bar{C} + \bar{A}\bar{B} + \bar{C}\bar{D}$$

Simplified sop.

3.)

D_0, D_1, D_2, D_3 , A is M.E.V

$$\Rightarrow f(A, B, C) = \sum m(0, 3, 7)$$

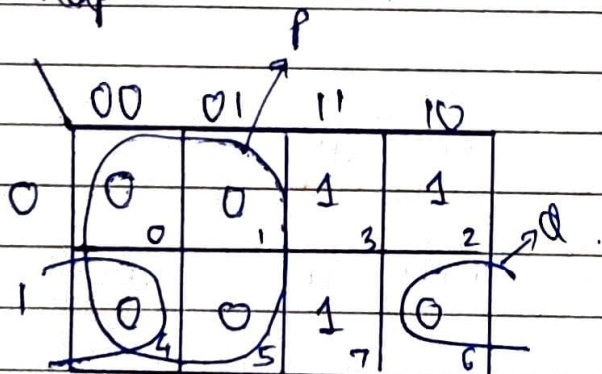
Table / map :

	D_0	D_1	D_2	D_3
\bar{A}	0	1	2	3
A	4	5	6	7
\bar{A}	0	0	0	1

$$D_0, D_1, D_2, D_3 = \boxed{\bar{A}001}$$

4.) POS form: $f(A, B, C) = \prod M(0, 1, 4, 5, 6)$
 $f = M_0 \cdot M_1 \cdot M_4 \cdot M_5 \cdot M_6$

K-Map-



$$P = B \quad q = \bar{A} + C$$

$$f = P \cdot q$$

$$f = \boxed{B \cdot (\bar{A} + C)}$$