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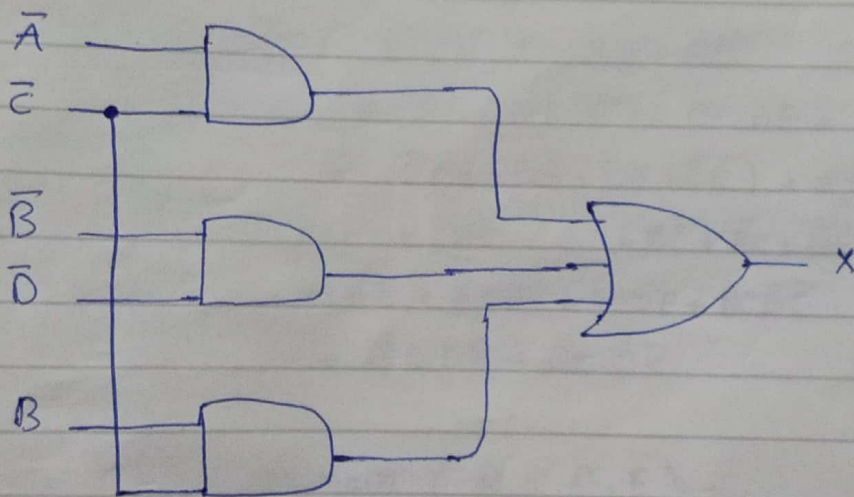
①

$$\overline{(C+D)(\bar{B}+C)} + \overline{(B+D)(A+B+C)} = X$$

$$X = \overline{(C+D)(\bar{B}+C)} + \overline{(B+D)} + \overline{(A+B+C)}$$

$$= (\bar{C}\bar{D}) + (B\bar{C}) + (\bar{B}\bar{D}) + (\bar{A}\bar{B}\bar{C})$$

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



②

a- $ACD + AC + CD = AC + CD$

b- $BC + B\bar{C}DE + DE = BC + DE$

c- $B + BCD + CE + C\bar{D}E = CE + B$

(3)

a- domain (A, C, D)

$$\begin{aligned}SSOP &= AC + CD \\&= AC(D + \bar{D}) + CD(A + \bar{A}) \\&= ACD + AC\bar{D} + ACD + \bar{A}CD \\&= ACD + AC\bar{D} + \bar{A}CD\end{aligned}$$

b- domain (B, C, D, E)

$$\begin{aligned}SSOP &= BC + B\bar{C}DE + DE \\&= BC(D + \bar{D})(E + \bar{E}) + B\bar{C}DE + DE(B + \bar{B})(C + \bar{C}) \\&= BC(DE + D\bar{E} + \bar{D}E + \bar{D}\bar{E}) + B\bar{C}DE \\&\quad + DE(BC + B\bar{C} + \bar{B}C + \bar{B}\bar{C}) \\&= BCDE + BC\bar{D}\bar{E} + BC\bar{D}E + BC\bar{D}\bar{E} + B\bar{C}DE \\&\quad + \bar{B}CDE + \bar{B}\bar{C}DE\end{aligned}$$

c- domain (B, C, D, E)

$$\begin{aligned}SSOP &= B + BCD + CE + C\bar{D}E \\&= B(C + \bar{C})(D + \bar{D})(E + \bar{E}) + BCD(E + \bar{E}) + CE(B + \bar{B})(D + \bar{D}) \\&\quad + C\bar{D}E(B + \bar{B}) \\&= BCDE + BC\bar{D}\bar{E} + BC\bar{D}E + BC\bar{D}\bar{E} + B\bar{C}DE + B\bar{C}\bar{D}\bar{E} + B\bar{C}\bar{D}E \\&\quad + \bar{B}C\bar{D}\bar{E} + \bar{B}C\bar{D}E + \bar{B}CDE\end{aligned}$$

④

$$a - \overset{m_7}{111} + \overset{m_6}{110} + \overset{m_3}{011}$$

$$b - \overset{m_{15}}{1111} + \overset{m_{14}}{1110} + \overset{m_{13}}{1101} + \overset{m_{12}}{1100} + \overset{m_{11}}{1011} + \overset{m_7}{0111} + \overset{m_3}{0011}$$

$$c - \overset{m_{15}}{1111} + \overset{m_{14}}{1110} + \overset{m_{13}}{1101} + \overset{m_{12}}{1100} + \overset{m_{11}}{1011} + \overset{m_{10}}{1010} + \overset{m_9}{1001} + \overset{m_8}{1000} \\ + \overset{m_5}{0101} + \overset{m_7}{0111}$$

⑤

$$a - 0 + 1 + 2 + 4 + 5$$

$$000 * 001 * 010 * 100 * 101$$

$$M_0 \quad M_1 \quad M_2 \quad M_4 \quad M_5$$

$$= (A+C+D)(A+C+D')(A+C'+D)(A'+C+D)(A'+C+D')$$

$$b - M_0 \quad M_1 \quad M_2 \quad M_4 \quad \overset{M_6}{M_5} \quad M_8 \quad M_9 \quad M_{10}$$

$$= (B+C+D+E)(B+C+D+\bar{E})(B+C+\bar{D}+E)(B+\bar{C}+D+E)$$

$$(B+\bar{C}+D+\bar{E})(B+\bar{C}+\bar{D}+E)(\bar{B}+C+D+E)$$

$$(\bar{B}+C+D+\bar{E})(\bar{B}+C+\bar{D}+E)$$

$$c - M_0 \quad M_1 \quad M_2 \quad M_3 \quad M_4 \quad M_6$$

$$= (B+C+D+E) + (B+C+D+\bar{E})(B+C+\bar{D}+E)(B+\bar{C}+D+E) \\ (B+\bar{C}+D+\bar{E})(B+\bar{C}+\bar{D}+E)$$

⑥

a- $ABC + \bar{A}\bar{B}C + A\bar{B}\bar{C}$

$111 + 001 + 110$

A B C X

$000 = 0$

$001 = 1$

$010 = 0$

$011 = 0$

$(0+1+A)(0+1+B)(0+1+C) = 0$

$100 = 0$

$101 = 1$

$110 = 1$

$111 = 1$

⑦

a- $(A+\bar{B}+C+\bar{D})(\bar{A}+B+\bar{C}+D)(A+B+\bar{C}+\bar{D})(\bar{A}+\bar{B}+C+D)$

$0101 \quad 0100 \quad 0011 \quad 1100$

A B C D X

$0000 = 1$

$0001 = 1$

$0010 = 1$

$0011 = 0$

$0100 = 0$

$0101 = 0$

$0110 = 0$

$0111 = 1$

$1000 = 1$

$1001 = 1$

$1010 = 1$

$1011 = 0$

$1100 = 0$

10

a-

$$SSOP = m_5 + m_6 + m_7 + 100 + 111$$

X C B A

$$= A\bar{B}C + AB\bar{C} + ABC$$

1 1 0 0

$$SPOS = M_0 M_1 M_2 M_3 M_4$$

0 1 1 0

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

$$(A+\bar{B}+C)$$

1 0 1 1

1 1 1 1

$$(A+C+\bar{B}+\bar{A})(\bar{A}+\bar{B}+B+A)(A+\bar{B}+B+\bar{A})(\bar{A}+C+\bar{B}+A)$$

0 0 1 1 1 1 0 0 0 0 1 0 1 0 1 0

X A C B A

1 0 0 0 0

1 1 0 0 0

1 0 1 0 0

0 1 1 0 0

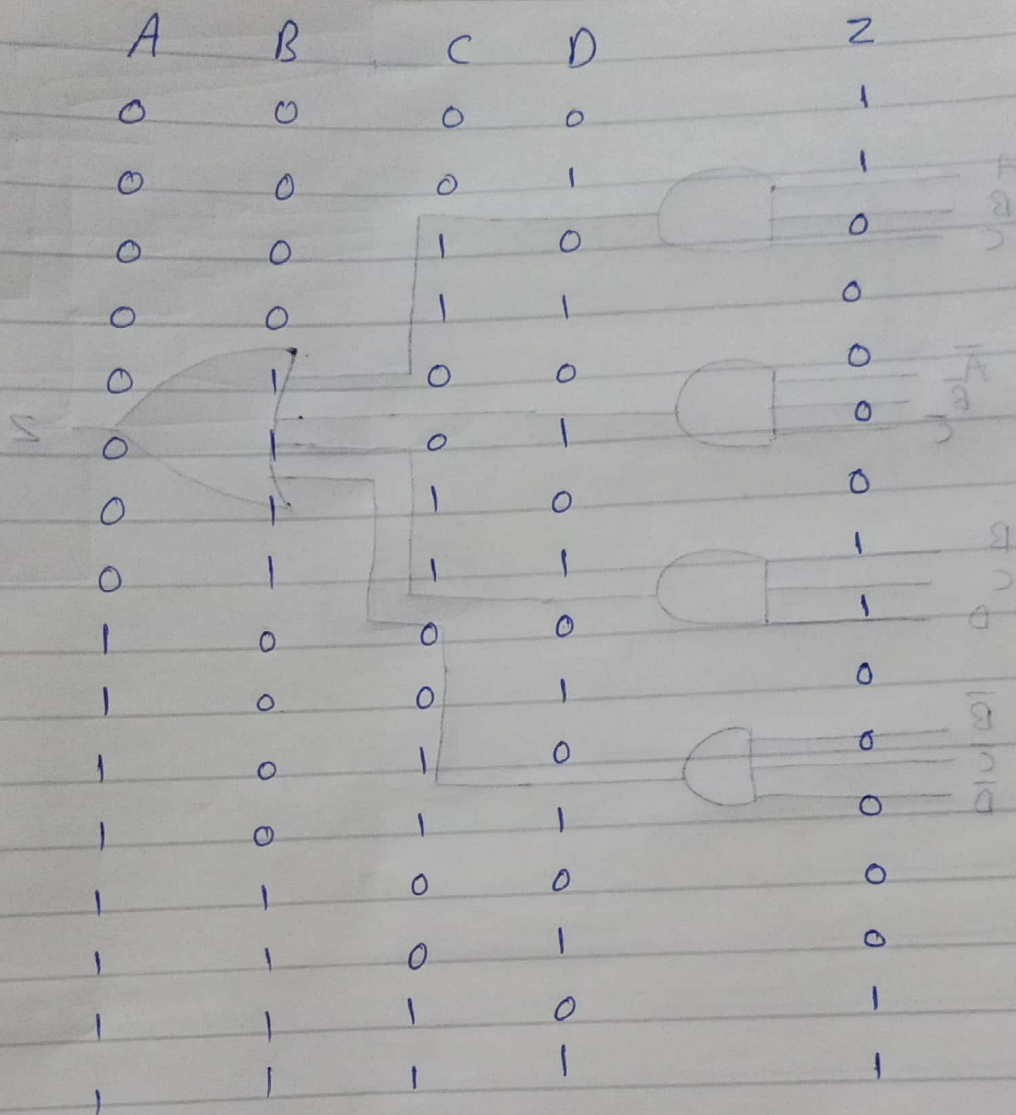
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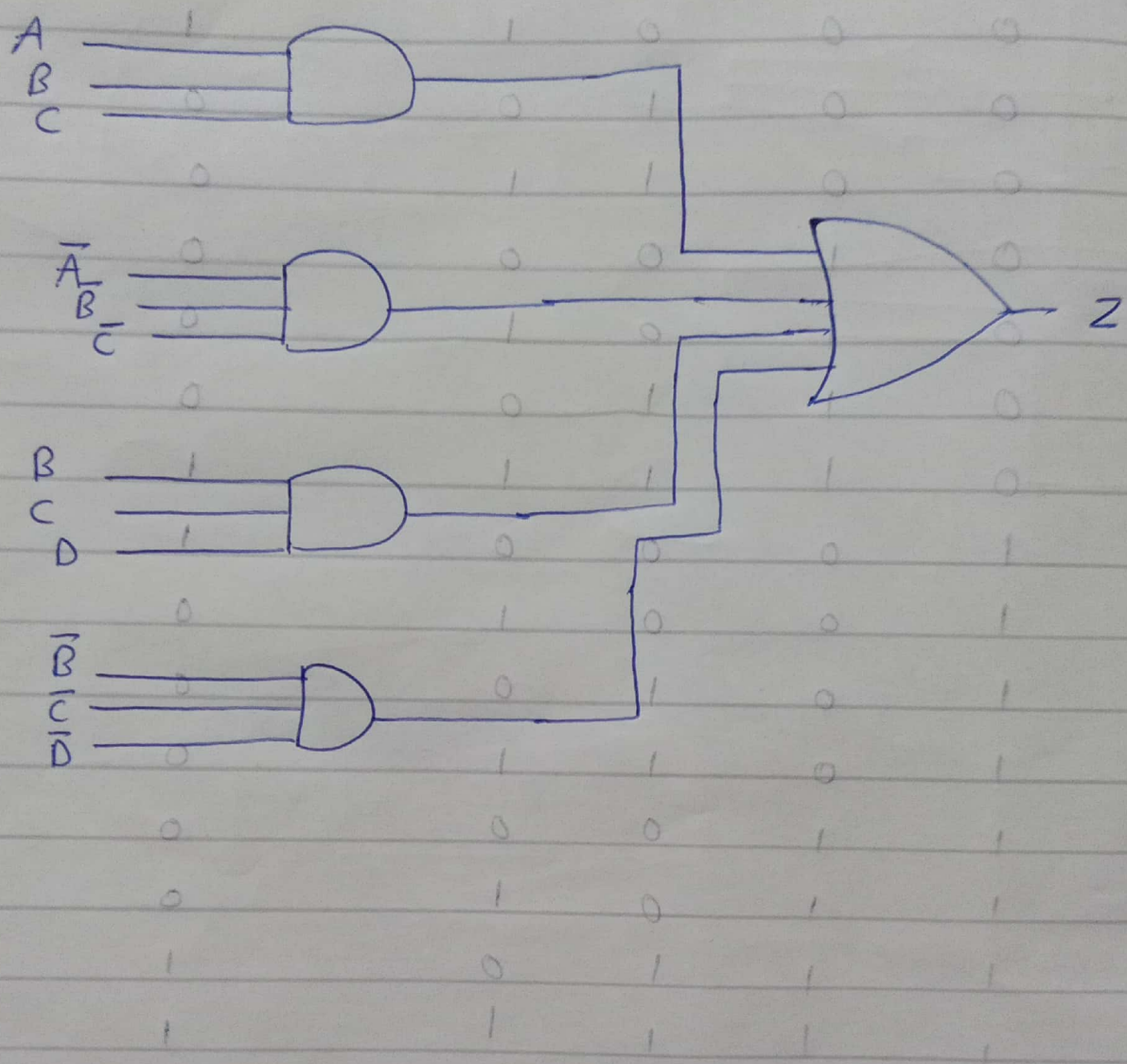
0 1 0 1 0

1 0 1 1 0

1 1 1 1 0

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①

a-

$AB \backslash C$	\bar{C}	C
$\bar{A}\bar{B}$	1	1
$\bar{A}B$	1	1
AB	1	
$A\bar{B}$		

$$X = \bar{A} + B\bar{C}$$

b-

$AB \backslash C$	\bar{C}	C
$\bar{A}\bar{B}$		1
$\bar{A}B$	1	1
AB	1	1
$A\bar{B}$		

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

c-

$AB \backslash CD$	$\bar{C}\bar{D}$	$\bar{C}D$	CD	$C\bar{D}$
$\bar{A}\bar{B}$	1	1	1	1
$\bar{A}B$				
AB				
$A\bar{B}$	1	1	1	1

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

$$W = A\bar{B} + \bar{B}\bar{D}$$

②

a-

	\bar{c}	c
$\bar{A}\bar{B}$	1	1
$\bar{A}B$		
AB		
$A\bar{B}$		1

$$\bar{A}\bar{B} + \bar{B}c$$

d-

	\bar{c}	c
$\bar{A}\bar{B}$	1	
$\bar{A}B$		1
AB	1	
$A\bar{B}$		1

$$\bar{A}\bar{B}\bar{c} + \bar{A}Bc + AB\bar{c} + A\bar{B}c$$

③

$$\begin{aligned} a- & A(B+\bar{B})(c+\bar{c}) + BC(A+\bar{A}) \\ & = ABC + AB\bar{c} + A\bar{B}c + A\bar{B}\bar{c} + \bar{A}BC \end{aligned}$$

	\bar{c}	c
$\bar{A}\bar{B}$		
$\bar{A}B$		1
AB	1	1
$A\bar{B}$	1	1

$$A + BC$$

4

a -

	\bar{z}	z
$\bar{x} + \bar{y}$	0	0
$\bar{x} + y$		0
$x + y$		
$x + \bar{y}$	0	

$$(\bar{x} + z)(\bar{y} + \bar{z})$$

c -

	$\bar{z} + \bar{w}$	$\bar{z} + w$	$z + w$	$z + \bar{w}$
$\bar{x} + \bar{y}$	0	0		
$\bar{x} + y$		0		
$x + y$		0	0	
$x + \bar{y}$	0	0	0	0

$$(x + w)(x + \bar{y})(\bar{z} + w)(\bar{y} + \bar{z})$$

5

a- $F_1 =$

$I = X$

	01	11	00	10
00	1	X	0	0
01	1	1	0	1
11	1	1	1	1
10			0	1

$F_1 = \bar{A}\bar{B} + AC$

The Value for $X = 1$

b- $F_2 =$

$F_2 = \bar{C}$

	01	11	00	10
00	1	1	1	0
01	1	1	1	0
11	X	1	1	0
10	1	1	1	0

c- $F_3 =$

$X_1 = 0, X_2 = 1$

$F_3 = A + BC$

	01	11	00	10
00	0	0	0	0
01	X ₁	1	1	1
11	X ₂	1	1	1
10	1	1	1	1

d- $F_4 =$

$F_4 = BC + \bar{B}\bar{C}$

	01	11	00	10
00	1	0	0	0
01	0	1	0	0
11	X ₁	X ₂	1	1
10	1	0	0	0

$X_1 = 0$

$X_2 = 1$

⑦

	00	01	11	10
00	1	1	X	1
01	0	X	1	1
11	X	1	1	1
10	1	0	0	0

$$X=1$$

$$AB + \bar{A}D + \bar{A}C + A\bar{C}\bar{D}$$

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

⑧

	00	01	11	10
00	0	0	X	1
01	0	X	1	1
11	X	1	1	1
10	1	0	0	0

$$(\bar{A} + \bar{B} + D)(\bar{A} + B + \bar{D})(\bar{A} + B + C)$$

	00	01	11	10
00	1	X	1	1
01	1	1	1	1
11	1	1	1	1
10	1	1	1	1

①

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

$$0 = X$$

$$1 = X$$

①

	00	01	11	10
00	0	1	0	0
01	1	0	1	1
11	X	X	1	1
10	0	1	0	1

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