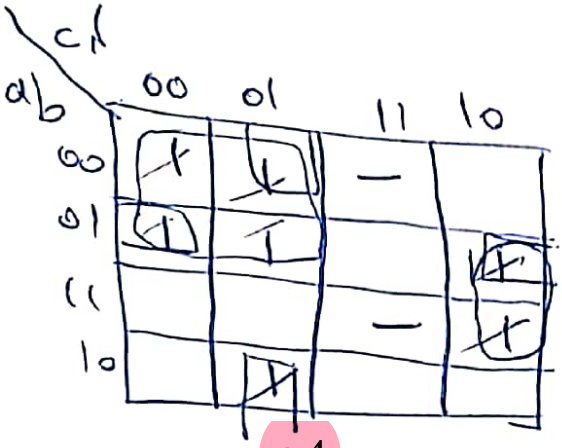
99463137

$F(a,b,c,d) = \Pi M(2,7,8,10,11,12,13) \cdot D(3,15)$

$= \Sigma m(0,1,4,5,6,9,14) + d(3,15)$



+4

PI

$\bar{a}\bar{c}$

$b\bar{c}d$

$\bar{a}b\bar{d}$

$bc\bar{d}$

+4

EPI

$\bar{a}\bar{c}$

$b\bar{c}d$

$bc\bar{d}$

+1.5

-0.5 for surplus EPI

-1 for missed PI

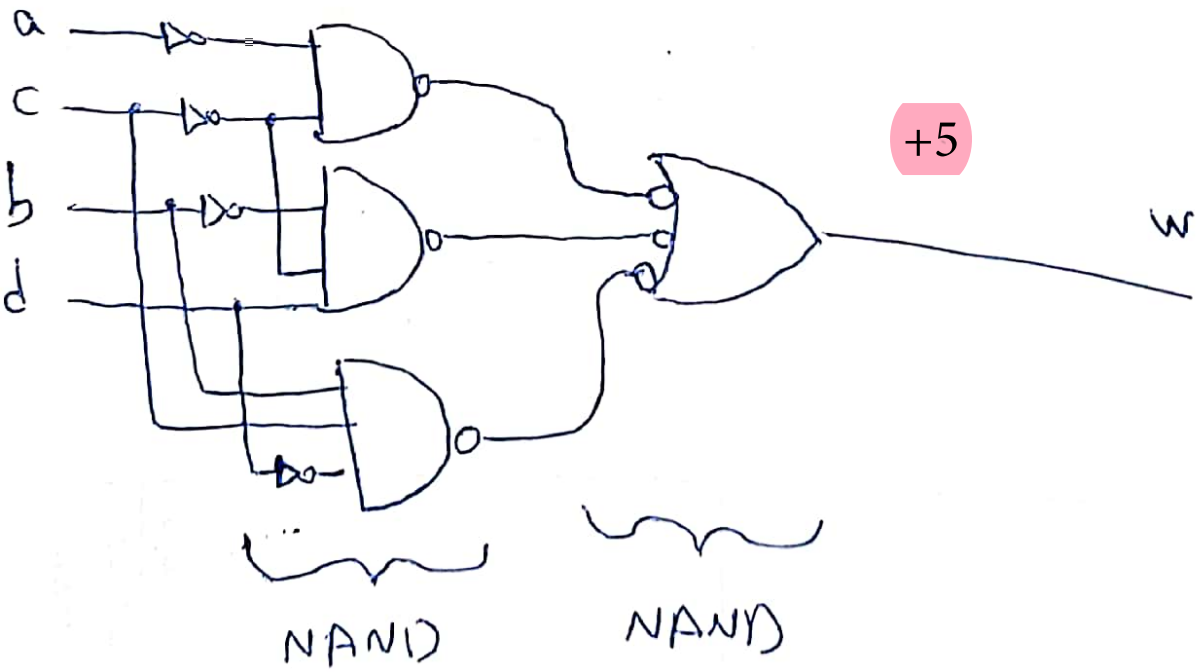
$w = \bar{a}\bar{c} + b\bar{c}d + bc\bar{d}$

ب)

ابتدا AND-OR رسم کرده و از روی آن NAND-NAND را می‌سازیم

به SOP نیاز داریم.

$w = \bar{a}\bar{c} + b\bar{c}d + bc\bar{d}$



+5

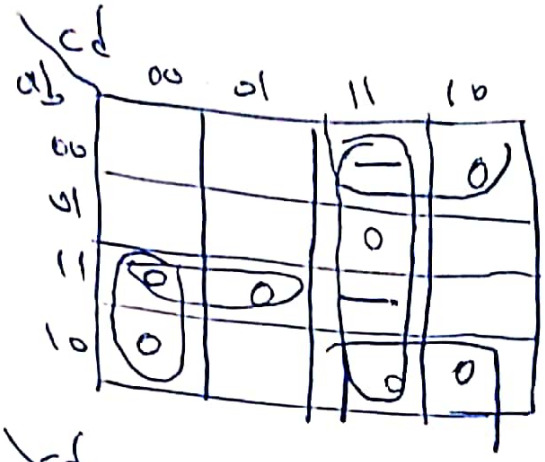
Scanned with CamScanner

OR-AND-Invert

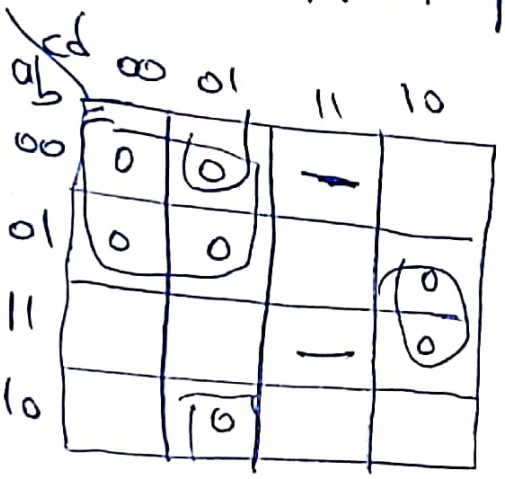
$F(a,b,c,d) = \prod M(2,7,8,10,11,12,13) \cdot D(3,15)$

بیایید F را به صورت OR-AND بنویسیم

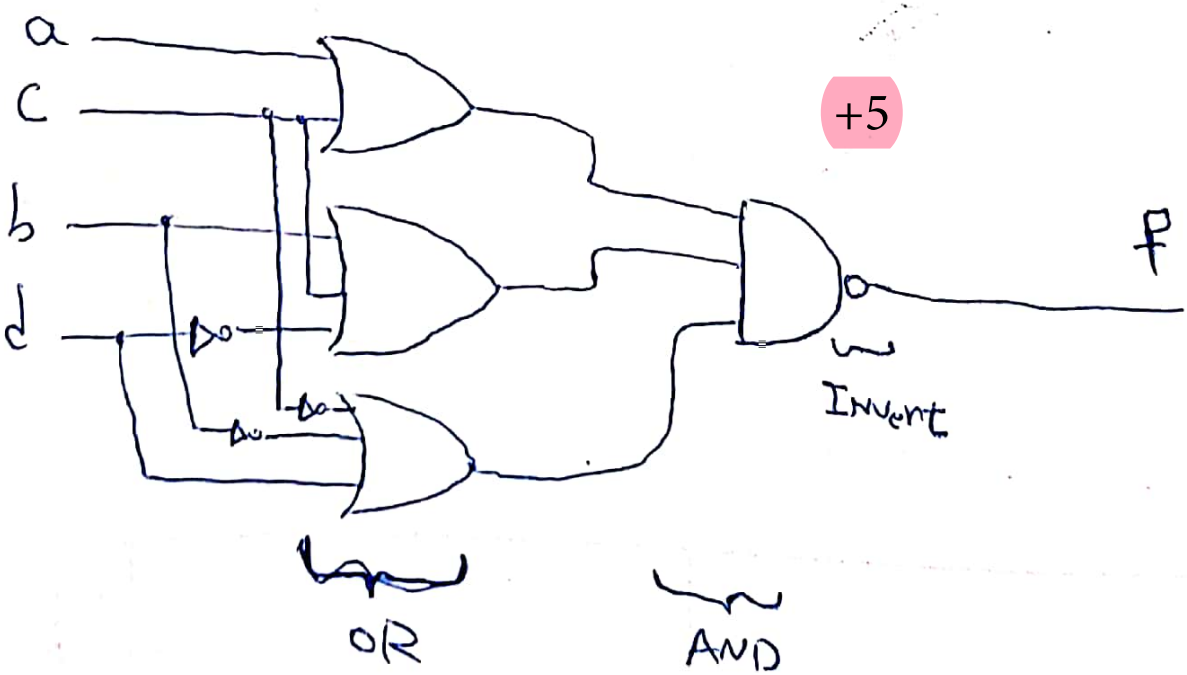
← به Pos نیاز داریم



$$\Rightarrow w = (\bar{c}+\bar{d}) \cdot (b+\bar{c}) \cdot (\bar{a}+\bar{b}+c) \cdot (\bar{a}+c+d)$$



$$\Rightarrow \bar{w} = (a+c) \cdot (b+c+\bar{d}) \cdot (\bar{b}+\bar{c}+d)$$



+5

2) $f(a,b,c,d) = \prod M(2,7,8,10,11,12,13) \cdot D(3,15)$

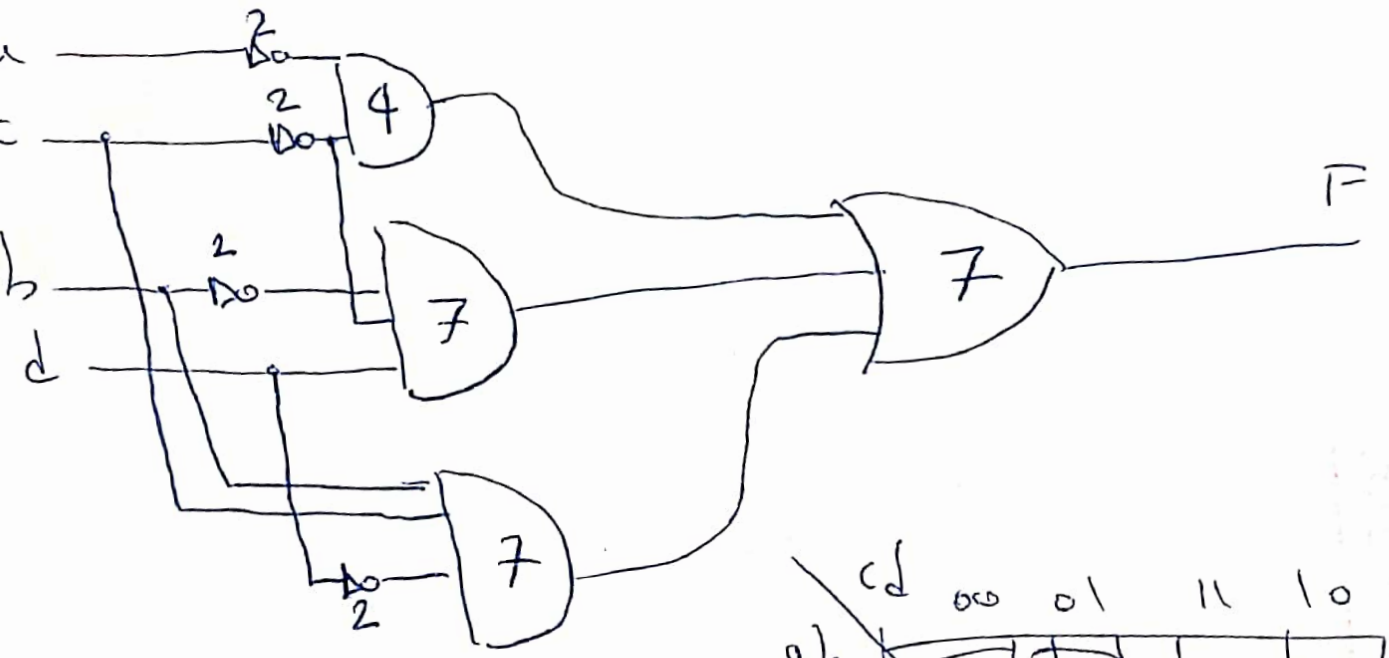
$= \sum m(0,1,4,5,6,9,14) + d(3,15)$

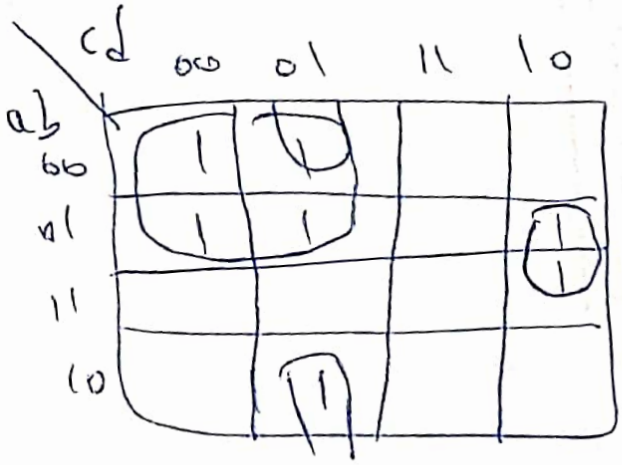
✓ 0000	✓ 000 – (0,1)	0 – 0 – (0,1,4,5)
✓ 0001	✓ 0 – 00 (0,4)	0 – 0 – (0,4,1,5)
✓ 0100	✓ 0 – 01 (1,5)	
✓ 0101	– 001 (1,9)	
✓ 0110	00 – 1 (1,3)	+8
✓ 1001	✓ 010 – (4,5)	
✓ 0011	01 – 0 (4,6)	
✓ 1110	– 110 (6,14)	
✓ 1111	111 – (14,15)	

$F = \bar{a}\bar{c} + \bar{b}\bar{c}d + \bar{a}\bar{b}d + \bar{a}b\bar{d} + bc\bar{d} + abc$ +6

-6 for missed Table and F

e) $F = \bar{a}\bar{c} + b\bar{c}d + bc\bar{d}$





+12

abcd ⟷ abcd

0100 0110

Logical Hazard

التأخير = (2+7+7) − (2+4+7)

= 3 ns