

Combinational Logic Project 1

Lab 2 – ETY - Akmal Ramadhan – 2206081534 – PSD B

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Truth Table

W	X	Y	Z	O(W,X,Y,Z)
0	0	0	0	0
0	0	0	1	1
0	0	1	0	1
0	0	1	1	1
0	1	0	0	1
0	1	0	1	0
0	1	1	0	1
0	1	1	1	0
1	0	0	0	1
1	0	0	1	0
1	0	1	0	0
1	0	1	1	0
1	1	0	0	1
1	1	0	1	0
1	1	1	0	0
1	1	1	1	0

Sum of Minterms (SOM)

$$O(W,X,Y,Z) = \sum_m (1,2,3,4,6,8,12)$$

$$= m1 + m2 + m3 + m4 + m6 + m8 + m12$$

$$= W'X'Y'Z + W'X'YZ' + W'X'YZ + W'XY'Z' + W'XYZ' + WX'Y'Z' + WXY'Z'$$

Product of Maxterms (POM)

$$O(W, X, Y, Z) = \prod_M (0, 5, 7, 9, 10, 11, 13, 14, 15)$$

$$= M0 + M5 + M7 + M9 + M10 + M11 + M13 + M14 + M15$$

$$= (W + X + Y + Z)(W + X' + Y + Z')(W + X' + Y' + Z')(W' + X + Y + Z')(W' + X + Y' + Z)(W' + X + Y' + Z') \\ + X + Y' + Z')(W' + X' + Y + Z')(W' + X' + Y' + Z)(W' + X' + Y' + Z')$$

Optimization

K-Map

		Y'		Y		
		00	01	11	10	
W'	00	0	1	1	1	X'
	01	1	0	0	1	X
W	11	1	0	0	0	
	10	1	0	0	0	X'
		Z'	Z	Z'		

$$O(W, X, Y, Z) = W'X'Z + W'X'Y + W'XZ' + WY'Z'$$