

ENEL 353 Section 02 Lecture

Fri Oct 11 2019

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next week

- no quiz in tutorial period
- no lab periods

Set 5, Slide 57

Design 1: All segments should be OFF for input patterns 1010, 1011, ..., 1111.

Design 2: We don't care what would be displayed for input patterns 1010, 1011, ..., 1111.

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For design 1

		$D_3 D_2$			
		00	01	11	10
$D_1 D_0$	00	1	1*		1*
	01	1			1*
	11	1	1*		
	10	*			

Minimal SOP: $\bar{D}_3 \bar{D}_2 + \bar{D}_2 \bar{D}_1 + \bar{D}_3 \bar{D}_1 \bar{D}_0 + \bar{D}_3 D_1 D_0$

For design 2

$D_3 D_2$

$D_1 D_0$

not EPI

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

Minimal SOP: $\bar{D}_2 + \bar{D}_1 \bar{D}_0 + D_1 D_0$

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Slide 60 - don't-care inputs

In words

If $(A, B) = (0, 1)$ then $(F_1, F_0) = (1, 0)$
regardless of the value of C

If $A = 1$, then $(F_1, F_0) = (1, 1)$
regardless of the values of B and C.

Slide 62

Def'n of minimal POS expression for F

- Among all POS expressions for F, none have fewer sums than a minimal POS expression
- Among all POS expressions for F that have the same number of sums as a

minimal POS expression, none have fewer literals.

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- smallest number of OR gates
- smallest count of OR gate inputs
- AND gate with the smallest possible number of inputs

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Slide 64

$$(1) F = \overline{\overline{F}} = \overline{A\overline{B} + \overline{A}CD} = (\overline{A+B})(A+\overline{C}+\overline{D})$$

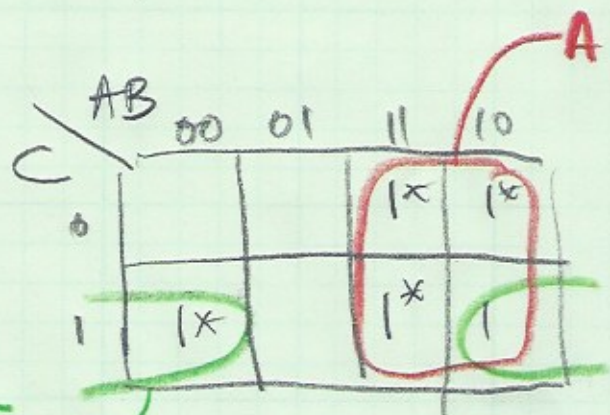
$$(2) F = \overline{\overline{F}} = \overline{\overline{A}C + B} = (A+\overline{C})\overline{B}$$

Slide 69

Let's add a column to the truth table...

A	B	C	F	\overline{F}
0	0	0	1	0
0	0	1	0	1
0	1	0	1	0
0	1	1	1	0
1	0	0	0	1
1	0	1	0	1
1	1	0	0	1
1	1	1	0	1

Now let's make a map for \overline{F}



Minimal SOP for \overline{F} is $A + \overline{B}C$

So minimal POS for F is $\overline{A + \overline{B}C} = \overline{A}(B + \overline{C})$

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The 1-cells of \bar{F} are the 0-cells of F .

Map for F

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AB	00	01	11	10
CD				
00				
01		1*	1	1*
11	1*	1	1*	
10	1*	1*		

Minimal SOP for \bar{F} is

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

So minimal POS for F is $\bar{A}C + BD + A\bar{C}\bar{D}$

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

Slide 72 Map for \bar{F}

AB	00	01	11	10
CD				
00			X	
01	1*		X	
11	1	1*	X	X
10	1*		X	X

Minimal SOP for \bar{F} is

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

Minimal POS for F is $CD + \bar{B}C + \bar{A}\bar{B}D$

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