

1. Preklopno funkcijo:  $f(x_1, x_2, x_3) = [f_1(x_1, x_2, x_3) \oplus f_2(x_1, x_2, x_3)] + f_3(x_1, x_2, x_3)$  realizirajte dvonivojsko z NAND elementi, če so  $f_1, f_2, f_3$  pragovne funkcije:

$$f_1(x_1, x_2, x_3) : P = -1, w_1 = -1, w_2 = w_3 = 1$$

$$f_2(x_1, x_2, x_3) : P = 1, w_1 = -1, w_2 = w_3 = 1$$

$$f_3(x_1, x_2, x_3) : P = 2, w_1 = w_2 = 2, w_3 = -1$$

$$f = \overline{x_1 \cdot x_3}$$

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2. Narišite PLA mrežo, ki realizira podani funkciji v minimalni obliki:

$$f_1(x_1, x_2, x_3) = S_1(x_1, \bar{x}_2, \bar{x}_3) \oplus [S_2(\bar{x}_1, x_2, \bar{x}_3) \rightarrow S_{0,3}(x_1, \bar{x}_2, x_3)]$$

$$f_2(x_1, x_2, x_3) = (x_1 + \bar{x}_3)(x_2 + x_3)(\bar{x}_1 + x_3)$$

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3. Določite diagram in tabelo prehajanja stanj sinhronskega sekvenčnega vezja Mealyjevega tipa, ki ima dva vhoda in en izhod. Vhoda  $x_1$  in  $x_2$  se nikoli ne moreta pojaviti istočasno. Začetno stanje naj bo vključeno v delovni cikel. Izhod  $z$  mora postati 1 sočasno z vhomom  $x_2$ , če je bil najprej  $x_1$  natančno tri urine periode enak 1, takoj za tem pa še  $x_2$  najmanj tri urine periode enak 1. Nov obhod delovnega cikla lahko sproži le ponoven pojav  $x_1$ . Stanja kodirajte z enokoračno kodo.

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4. Asinhronsko sekvenčno vezje je podano z naslednjo tabelo prehajanja stanj:

	$x = 0$	$x = 1$
$S_1$	$S_6/z_1$	$S_2/z_0$
$S_2$	$S_2/z_0$	$S_5/z_0$
$S_3$	$S_5/z_0$	$S_3/z_0$
$S_4$	$S_4/z_0$	$S_5/z_0$
$S_5$	$S_6/z_0$	$S_5/z_0$
$S_6$	$S_1/z_1$	$S_4/z_0$

Poiščite minimalno izvedbo z NOR elementi, podajte diagram prehajanja stanj in ugotovite nestabilne prehode.

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$$f(x_1, x_2, x_3) = (l_1(x_1, x_2, x_3) \oplus l_2) + l_3$$

- $l_1 \begin{cases} P = -1 \\ w_1 = -1 \\ w_2 = w_3 = 1 \end{cases} = 1$
- $l_2 \begin{cases} P = 1 \\ w_1 = -1 \\ w_2 = w_3 = 1 \end{cases}$
- $l_3 \begin{cases} P = 2 \\ w_1 = w_2 = 2 \\ w_3 = -1 \end{cases}$

A

1	1	0	0	0	0
1	1	0	0	0	1
1	1	0	1	1	2
1	1	0	0	0	3
1	0	1	1	1	3
1	1	0	0	0	5
1	1	0	1	1	5
1	1	0	1	1	5

1	1	1	1
1			

$$f = x_1 x_2 + x_3$$

$x_1$	$x_2$	$x_3$	$l_1$	$l_2$
0	0	0	1	0
0	0	1	1	1
0	1	0	1	1
0	1	1	1	2
1	0	0	1	-1
1	0	1	1	0
1	1	0	1	0
1	1	1	1	1

	$l_1$	$l_2$
0 0 0	1	0
0 0 1	1	1
0 1 0	1	1
0 1 1	1	2
1 0 0	0	-1
1 0 1	1	0
1 1 0	1	0
1 1 1	1	1

	$l_1$	$l_2, l_3$
0 0 0	0	0
0 0 1	0	-1
0 1 0	1	2
0 1 1	0	1
1 0 0	1	2
1 0 1	0	1
1 1 0	1	4
1 1 1	1	3

1	1	1	1
1	1	1	1

1	1	1
1		

100

$$l_2 = \bar{x}_1 + x_3 + x_2$$

$$l_3 = x_1 x_2 + x_1 \bar{x}_3 + x_2 \bar{x}_3$$

$$f = l_3 = x_1 x_2 + x_1 \bar{x}_3 + x_2 \bar{x}_3 = \boxed{x_1(x_2 + \bar{x}_3) + (x_2 + \bar{x}_3)}$$

$$\boxed{(x_2 + \bar{x}_3)(1 + x_1)}$$

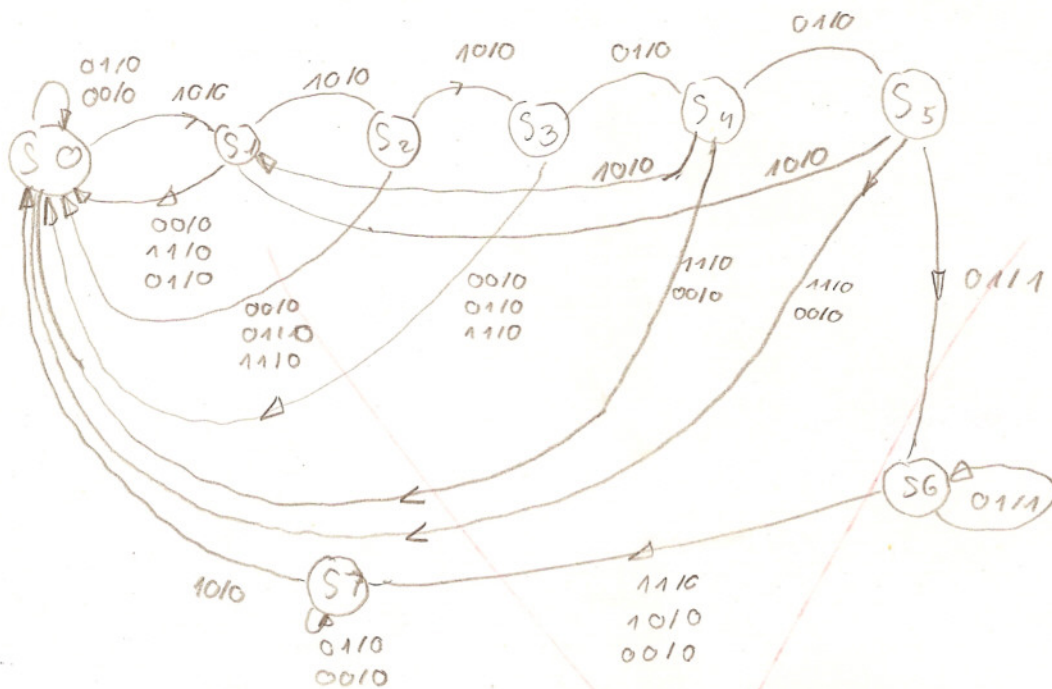
MMN

a)  $\boxed{\overline{(x_1 x_2)} (\overline{x_1 \bar{x}_3}) (\overline{x_2 \bar{x}_3})}$



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	00	01	10	11
S0	S0/0	S0/0	S1/0	/
S1	S0/0	S0/0	S2/0	S0/0
S2	S0/0	S0/0	S3/0	S0/0
S3	S0/0	S4/0	S0/0	S0/0
S4	S0/0	S5/0	S1/0	S0/0
S5	S0/0	S6/1	S1/0	S0/0
S6	S7/0	S6/1	S7/0	S7/0
S7	S7/0	S7/0	S0/0	/

	00	01	10	11
0	000	000/0	001/0	/
1	001	000/0	011/0	000/0
2	011	000/0	010/0	000/0
3	010	000/0	110/0	000/0
4	110	000/0	111/0	001/0
5	111	000/0	101/1	001/0
6	101	100/0	101/1	100/0
7	100	100/0	100/0	/

Pr. 13.6. 2007 B

20/30  
40  
2/4

		x=0	x=1
B	S <sub>1</sub>	S <sub>0</sub> /Z <sub>1</sub>	S <sub>2</sub> /Z <sub>0</sub>
A	S <sub>2</sub>	S <sub>2</sub> /Z <sub>0</sub>	S <sub>5</sub> /Z <sub>0</sub>
C	S <sub>3</sub>	S <sub>5</sub> /Z <sub>0</sub>	S <sub>3</sub> /Z <sub>0</sub>
A	S <sub>4</sub>	S <sub>4</sub> /Z <sub>0</sub>	S <sub>5</sub> /Z <sub>0</sub>
D	S <sub>5</sub>	S <sub>6</sub> /Z <sub>0</sub>	S <sub>5</sub> /Z <sub>0</sub>
B	S <sub>6</sub>	S <sub>1</sub> /Z <sub>1</sub>	S <sub>4</sub> /Z <sub>0</sub>

⇒ MIKE

(2/3) = (2/5), (3/5)  
 (2, 4) = (2, 4), (6, 5) ✓ A  
 (2, 5) = (2, 6), (3, 5)  
 (3/4) = (4, 5), (3/5)  
 (3/5) = (5/6), (3, 5)  
 (4, 5) = (4/6), (4, 5)  
 (1, 6) = (2, 4) ✓ B

minimálno uvedla z NOR  
 diagram prechajenje stanj  
 nestabilni prehode

		x=0	x=1
00	A	A/Z <sub>0</sub>	D/Z <sub>0</sub>
01	B	B/Z <sub>1</sub>	A/Z <sub>0</sub>
11	C	D/Z <sub>0</sub>	C/Z <sub>0</sub>
10	D	B/Z <sub>0</sub>	D/Z <sub>0</sub>

y <sub>1</sub> y <sub>2</sub> \ x	x=0	x=1
00	00/0	10/0
01	01/1	00/0
11	10/0	11/0
10	01/0	10/0

metabina stanja

	x=0	x=1
00	0	0
01	1	0
11	0	0
10	0	0

$Z = \overline{x} \overline{y_1} y_2$   
 $Z = \overline{(x + y_1 + y_2)}$

Kritični prehod

Y<sub>1</sub> :

y <sub>1</sub> y <sub>2</sub>	x=0	x=1
00	0	1
01	0	0
11	1	0
10	0	1

Y<sub>2</sub>

y <sub>1</sub> y <sub>2</sub> \ x	x=0	x=1
00	0	0
01	0	0
11	0	1
10	1	0

$Y_1 = y_1 y_2 + x y_2$

$Y_2 = \overline{x} (y_1 \overline{y_2} + \overline{y_1} y_2) + x y_1 y_2$

$Y_1 = \overline{(\overline{y_1} + \overline{y_2})} + (\overline{x} + \overline{y_2})$

$Y_2 = \overline{x} y_1 \overline{y_2} + \overline{x} \overline{y_1} y_2 + x y_1 y_2 =$   
 $= \overline{(x + y_1 + y_2)} + (\overline{x} + y_1 + \overline{y_2}) + (\overline{x} + \overline{y_1} + \overline{y_2})$