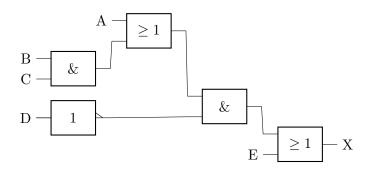Voorbereiding Labo 4 digitale technieken

Haroen Viaene — 1EO-ICT 10 — 17 maart 2015

4.3.1. Worst-case-waarde van de weerstand

	Actief Hoog	Actief laag
74LS	$R_{max} = 2.22k\Omega \rightarrow 2.7k\Omega$	$R_{max} = 10k\Omega$
74HCT	$R_{max} = 10k\Omega$	$R_{max} = 10k\Omega$
74HC	$R_{max} = 10k\Omega$	$R_{max} = 10k\Omega$
40XXBC	$R_{max} = 10k\Omega$	$R_{max} = 10k\Omega$

4.3.2. $X = (A + B \cdot C) \cdot \overline{D} + E$

IEC Poortschema

Waarheidstabel

E	D	C	B	A	X
0	0	0	0	0	0
0	0	0	0	1	1
0	0	0	1	0	0
0	0	0	1	1	1
0	0	1	0	0	0
0	0	1	0	1	0
0	0	1	1	0	0
0	0	1	1	1	0
0	1	0	0	0	0
0	1	0	0	1	1
0	1	0	1	0	1
0	1	0	1	1	1
0	1	1	0	0	0
0	1	1	0	1	0
0	1	1	1	0	0
0	1	1	1	1	0
1	0	0	0	0	0
1	0	0	0	1	1
1	0	0	1	0	0
1	0	0	1	1	1
1	0	1	0	0	0
1	0	1	0	1	1
1	0	1	1	0	0
1	0	1	1	1	1
1	1	0	0	0	0
1	1	0	0	1	1
1	1	0	1	0	1
1	1	0	1	1	1
1	1	1	0	0	0
1	1	1	0	1	1
1	1	1	1	0	1
1	1	1	1	1	1

Logische vergelijking met NEN

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

$$X = A \cdot \overline{D} + B \cdot C \cdot \overline{D} + E$$

$$X = \overline{\overline{A \cdot \overline{D}} \cdot \overline{B \cdot C \cdot \overline{D}}} + E$$

$$X = \overline{\overline{\overline{\overline{\overline{A \cdot \overline{D}} \cdot \overline{B \cdot C \cdot \overline{D}}}} \cdot \overline{E}}}$$

$$X = \overline{\overline{\overline{\overline{A \cdot \overline{D}} \cdot \overline{B \cdot C \cdot \overline{D}}}} \cdot \overline{E}}$$

Logische vergelijking met NOF

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

$$X = A \cdot \overline{D} + B \cdot C \cdot \overline{D} + E$$

$$X = \overline{\overline{\overline{A} + D}} + \overline{\overline{B} + \overline{C} + D} + E$$

IEC-poortschema met *NEN*

IEC-poortschema met *NOF*

4.3.3

Waarheidstabel

D	C	B	A	X
0	0	0	0	0
0	0	0	1	0
0	0	1	0	0
0	0	1	1	1
0	1	0	0	0
0	1	0	1	1
0	1	1	0	1
0	1	1	1	X
1	0	0	0	0
1	0	0	1	1
1	0	1	0	1
1	0	1	1	X
1	0	0	0	1
1	0	0	1	X
1	0	1	0	X
1	0	1	1	X

SOP-vorm

D	C	B	A	X	MINTERM
0	0	0	0	0	$\overline{D} \cdot \overline{C} \cdot \overline{B} \cdot \overline{A}$
0	0	0	1	0	$\overline{D} \cdot \overline{C} \cdot \overline{B} \cdot A$
0	0	1	0	0	$\overline{D} \cdot \overline{C} \cdot B \cdot \overline{A}$
0	0	1	1	1	$\overline{D} \cdot \overline{C} \cdot B \cdot A$
0	1	0	0	0	$\overline{D} \cdot C \cdot \overline{B} \cdot \overline{A}$
0	1	0	1	1	$\overline{D} \cdot C \cdot \overline{B} \cdot A$
0	1	1	0	1	$\overline{D} \cdot C \cdot B \cdot \overline{A}$
0	1	1	1	X	$\overline{D} \cdot C \cdot B \cdot A$
1	0	0	0	0	$D \cdot \overline{C} \cdot \overline{B} \cdot \overline{A}$
1	0	0	1	1	$D \cdot \overline{C} \cdot \overline{B} \cdot A$
1	0	1	0	1	$D \cdot \overline{C} \cdot B \cdot \overline{A}$
1	0	1	1	X	$D \cdot \overline{C} \cdot B \cdot A$
1	0	0	0	1	$D \cdot C \cdot \overline{B} \cdot \overline{A}$
1	0	0	1	X	$D \cdot C \cdot \overline{B} \cdot A$
1	0	1	0	X	$D \cdot C \cdot B \cdot \overline{A}$
1	0	1	1	X	$D \cdot C \cdot B \cdot A$

$$X = \overline{D}\cdot\overline{C}\cdot B\cdot A + \overline{D}\cdot C\cdot \overline{B}\cdot A + \overline{D}\cdot C\cdot B\cdot \overline{A} + D\cdot \overline{C}\cdot \overline{B}\cdot A + D\cdot \overline{C}\cdot B\cdot \overline{A} + D\cdot C\cdot \overline{B}\cdot \overline{A}$$

Karnaugh-kaart

	$\overline{B}\cdot\overline{A}$	$\overline{B}\cdot A$	$B\cdot A$	$B\cdot\overline{A}$
$\overline{D}\cdot\overline{C}$	0	0	1	0
$\overline{D}\cdot C$	0	1	X	1
$D\cdot C$	1	X	X	X
$D\cdot\overline{C}$	0	1	X	1

IEC-schema

4.3.4 Opgave 2

Waarheidstabel

C	B	A	X	Y
0	0	0	0	0
0	0	1	0	0
0	1	0	0	0
0	1	1	1	0
1	0	0	0	0
1	0	1	0	1
1	1	0	0	0
1	1	1	1	1

SOP-vorm

$$X = \overline{C} \cdot B \cdot A + C \cdot D \cdot A$$
$$Y = C \cdot \overline{B} \cdot A + C \cdot D \cdot A$$

Karnaugh-kaart

X

	$\overline{B} \cdot \overline{A}$	$\overline{B} \cdot A$	$B \cdot A$	$B \cdot \overline{A}$
$\overline{C}$	0	0	1	0
C	0	0	1	0

Y

	$\overline{B} \cdot \overline{A}$	$\overline{B} \cdot A$	$B \cdot A$	$B \cdot \overline{A}$
$\overline{C}$	0	0	0	0
C	0	1	1	0

IEC-poortschema