Licu Mihai George Grupa 162 Saptamana 01

Notite lab01

Semnal logic (buffer)
Normal open apasat 1 on (Repetor)
Normal close apasat 1 off (Inversor)

NOT gate = 1 normal close; A’
AND gate = 2 normal open; A.B = A AND B
OR gate = 2 normal open; A+B = A OR B

Tabel de adevar lab01

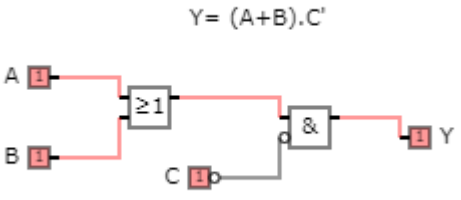
Tabelul 1. Functie 3 variabile **Y=(A+B).C'**

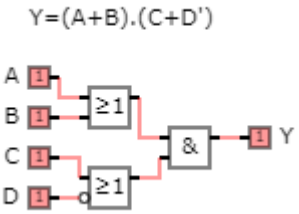
A	B	C	A+B	C'	(A+B).C'	Y
0	0	0	0	1	0	0
0	0	1	0	0	0	0
0	1	0	1	1	1	1
0	1	1	1	0	0	0
1	0	0	1	1	1	1
1	0	1	1	0	0	0
1	1	0	1	1	1	1
1	1	1	1	0	0	0

Tabel 2. Functie cu 4 variabile: **Y=(A+B).(C+D')**

A	B	C	D	A+B	D’	C+D’	**(A+B).(C+D')**	Y
0	0	0	0	0	1	1	0	0
0	0	0	1	0	0	0	0	0
0	0	1	0	0	1	1	0	0
0	0	1	1	0	0	1	0	0
0	1	0	0	1	1	1	1	1
0	1	0	1	1	0	0	0	0
0	1	1	0	1	1	1	1	1
0	1	1	1	1	0	1	1	1
1	0	0	0	1	1	1	1	1
1	0	0	1	1	0	0	0	0
1	0	1	0	1	1	1	1	1
1	0	1	1	1	0	1	1	1
1	1	0	0	1	1	1	1	1
1	1	0	1	1	0	0	0	0
1	1	1	0	1	1	1	1	1
1	1	1	1	1	0	1	1	1

Circuite Wronex lab01





Licu Mihai George Grupa 162 Saptamana 02

Proiectare Logica Saptamana 02

Tema 1. Numere Intregi. Copletati tabelul de mai jos

Nr. initial	Baza initiala	Baza finala	Nr. final
236	10	2	11101100
		4	3230
		8	354
		16	ec
4507	8	2	100101000111
		4	211013
		10	2375
		16	947
1fda	16	2	0001111111011010
		4	01333122
		8	17732
		10	8154
111001010110	2	4	321112
		8	7126
		10	3670
		16	e56

Numar (Cat anterior)	Impartitor (baza)	Rest
236	2	0
118	2	0
59	2	1
29	2	1
14	2	0
7	2	1
3	2	1
12	2	1

4507_8 = 100 101 000 111

4507_8 => 7 * 8^0 + 0 + 5 * 8^2 + 4* 8^3

$1fda_{16}$ = 0001 1111 1101 1010

$1fda_{16}$ => 10* 16^0 + 13* 16 ^1 + 15* 16^2 + 1* 16^3

111001010110_2 => 2^1 + 2^2 + 2^4 + 2^6 + 2^9 + 2^10 + 2^11

Tema 2. Numere subunitare. Copletati tabelul de mai jos

Baza initiala	Baza finala	Numar initial	Numar final	Nr cifre dupa virgula
10	2	0.723	0.1011100	7
10	3	0.903	0.2201010	7
10	8	0.811	0.63716	5
10	16	0.523	0.85e35	5
10	7	0.604	0.41411	5
10	5	0.0452	0.01031	5
2	10	0.01011	0.34375	4
3	16	0.201	0.b42	3
5	8	0.3402	0.60660	5
7	14	0.5604	0.ba47d	5
8	10	0.4027	0.50561	5

0.01011_2=> 1 * 1/4 + 1 * 1/16 + 1 * 1/32 = 0.34375_{10}
0.201_3 => 2* 1/3 + 1 * 1/27 = 0.703703703...$_{10}$
0.3402_5 => 3* 1/5 + 4* 1/25 + 2* 1/625 = 0.7632_{10}
0.5604_7 => 5*1/7 + 6* 1/49 + 4* 1/2401 = 0.8384006663890045814244...$_{10}$
0.4027_8 => 4* 1/8 + 2 * 1/512 + 7* 1/4096 = 0.505615234375_{10}

Numar (Cat anterior)	Partea intreaga
0.723*2	1
0.446*2	0
0.892*2	1
0.784*2	1
0.568*2	1

0.136*2	0
0.272	0

Numar (Cat anterior)	Partea intreaga
0.903*3	2
0.709*3	2
0.127*3	0
0.381*3	1
0.143*3	0
0.429*3	1
0.287*3	0

Numar (Cat anterior)	Partea intreaga
0.811*8	6
0.488*8	3
0.904*8	7
0.232*8	1
0.856*8	6

Numar (Cat anterior)	Partea intreaga
0.523*16	8
0.368*16	5
0.888*16	e
0.208*16	3
0.328*16	5

Numar (Cat anterior)	Partea intreaga
0.604*7	4
0.228*7	1
0.596*7	4
0.172*7	1
0.204*7	1

Numar (Cat anterior)	Partea intreaga
0.0452*5	0
0.226*5	1
0.13*5	0
0.65*5	3
0.25*5	1

Numar (Cat anterior)	Partea intreaga
0.703703703*16	b
0.259259248*16	4
0.148147968*16	2

Numar (Cat anterior)	Partea intreaga
0.7632*8	6
0.1056*8	0
0.8448*8	6
0.7584*8	6
0.0672*8	0

Numar (Cat anterior)	Partea intreaga
0.8384006663890045814244*14	b
0.7376093294460641399416*14	a
0.3265306122448979591824*14	4
0.5714285714285714285536*14	7
0.9999999999999999997504*14	d

Tema 3. Complementi. Completati tabelul urmator.

Numar X	Baza b	Dim reg n	$[X]_{b-1}$	$[X]_b$
312	10	3	687	688
10101	2	6	101010	101011
721	8	4	7056	7057
dca	16	4	f235	f236
123	4	4	3210	3211
485	10	4	9514	9515
361	8	5	77416	77417
1011	2	6	110100	110101
1ac2	16	5	fe53d	fe53e
220	4	5	33113	33120

Tema 4. Demonstrati identitatile folosind metoda tabelului de adevar:

- $A + (B \cdot C) = (A + B) \cdot (A + C)$
- $A + A \cdot B = A$ si duala sa $A \cdot (A + B) = A$
- $A + A \cdot B' = A$ si duala sa $A \cdot (A + B') = A$
- $A \cdot C + B \cdot C' \equiv A \cdot C + B \cdot C' + A \cdot B$
- $C + ABC' + AB = C + ABC'$
- $C + ABC' = C + AB$

Tabelele trebuie sa le construiti singuri.

Metoda tabelului de adevar folosit pentru demonstrarea identitatilor logice

Tema. Demonstrati identitatea: $A + (B \cdot C) = (A + B) \cdot (A + C)$

Expresia din stanga egalitatii este: $A + (B \cdot C)$

Expresia din dreapta egalitatii este: $(A + B) \cdot (A + C)$

A	B	C	B.C	Expr. stanga	Expr. dreapta	A+B	A+C
0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	1
0	1	0	0	0	0	1	0
0	1	1	1	1	1	1	1
1	0	0	0	1	1	1	1
1	0	1	0	1	1	1	1
1	1	0	0	1	1	1	1
1	1	1	1	1	1	1	1

- $A + A \cdot B = A$

A	B	A.B	Expr. stanga	Expr. dreapta
0	0	0	0	0
0	1	0	0	0
1	0	0	1	1
1	1	1	1	1

- si duala sa $A \cdot (A + B) = A$

A	B	A+B	Expr. stanga	Expr. dreapta
0	0	0	0	0
0	1	1	0	0
1	0	1	1	1
1	1	1	1	1

- $A + A \cdot B' = A$

A	B	B’	A.B’	Expr. stanga	Expr. dreapta
0	0	1	0	0	0
0	1	0	0	0	0
1	0	1	1	1	1
1	1	0	0	1	1

- si duala sa $A \cdot (A + B') = A$

A	B	B’	A+B’	Expr. stanga	Expr. dreapta
0	0	1	1	0	0
0	1	0	0	0	0
1	0	1	1	1	1
1	1	0	1	1	1

- $A \cdot C + B \cdot C^{'} \equiv A \cdot C + B \cdot C^{'} + A \cdot B$

A	B	C	C’	B.C’	A.C	Expr. stanga	Expr. dreapta	A.B
0	0	0	1	0	0	0	0	0
0	0	1	0	0	0	0	0	0
0	1	0	1	1	0	1	1	0
0	1	1	0	0	0	0	0	0
1	0	0	1	0	0	0	0	0
1	0	1	0	0	1	1	1	0
1	1	0	1	1	0	1	1	1
1	1	1	0	0	1	1	1	1

- $C + ABC' + AB = C + ABC'$

A	B	C	C’	A.B.C’	A.B	Expr. stanga	Expr. dreapta
0	0	0	1	0	0	0	0
0	0	1	0	0	0	1	1
0	1	0	1	0	0	0	0
0	1	1	0	0	0	1	1
1	0	0	1	0	0	0	0
1	0	1	0	0	0	1	1
1	1	0	1	1	1	1	1
1	1	1	0	0	1	1	1

- $C + ABC^{'} = C + AB$

A	B	C	C’	A.B.C’	A.B	Expr. stanga	Expr. dreapta
0	0	0	1	0	0	0	0
0	0	1	0	0	0	1	1
0	1	0	1	0	0	0	0
0	1	1	0	0	0	1	1
1	0	0	1	0	0	0	0
1	0	1	0	0	0	1	1
1	1	0	1	1	1	1	1
1	1	1	0	0	1	1	1

Tema pentru acasa Lab 02:

Convertiti numerele:

- 133_{10} in baza 2 = 10000101_2
- $3d7_{16}$ in baza 8 = 0011 1101 0111_2 = 1727
- $3d7_{14}$ in baza 10 = 7 * 14^0 + 13*14^1 + 3*14^2 = 777
- un_{32} in baza 14 = 30* 32^0 + 23* 32^1 = 766_{10} = $3ca_{14}$
- $3d3_{16}$ in baza 6 = 3 * 16^0 + 13* 16^1 + 3*16^2 = 979_{10} = 4311_6
- $7a1_{11}$ in baza 4 = 1 + 10 * 11^1 + 7*11^2 = 958_{10} = 32332_4
- auu_{32} in baza 15 = 30* 32^0 + 30*32^1 + 10*32^2 = 11230_{10} = $34da_{15}$

Numar (Cat anterior)	Impartitor (baza)	Rest
133	2	1
66	2	0
33	2	1
16	2	0
8	2	0
4	2	0
2	2	0
1	2	1

Numar (Cat anterior)	Impartitor (baza)	Rest
766	14	a
54	14	c
3	14	3

Numar (Cat anterior)	Impartitor (baza)	Rest
979	6	1
163	6	1
27	6	3
4	6	4

Numar (Cat anterior)	Impartitor (baza)	Rest
958	4	2
239	4	3
59	4	3
14	4	2
3	4	3

Numar (Cat anterior)	Impartitor (baza)	Rest
11230	15	a
748	15	d
49	15	4
3	15	3

Baza initiala	Baza finala	Numar initial	Numar final	Nr cifre dupa virgula
10	2	0.723	0.1011100	7
10	3	0.1903	0.0120102	7

10	8	0.98	0.76560	5
10	16	0.2523	0.4096b	5
10	7	0.763	0.52246	5
10	5	0.545	0.23303	5

Numar (Cat anterior)	Partea intreaga
0.1903*3	0
0.5709*3	1
0.7127*3	2
0.1381*3	0
0.4143*3	1
0.2429*3	0
0.7287*3	2

Numar (Cat anterior)	Partea intreaga
0.98*8	7
0.84*8	6
0.72*8	5
0.76*8	6
0.08*8	0

Numar (Cat anterior)	Partea intreaga
0.2523*16	4

0.0368*16	0
0.5888*16	9
0.4208*16	6
0.7328*16	b

Numar (Cat anterior)	Partea intreaga
0.763*7	5
0.341*7	2
0.387*7	2
0.709*7	4
0.963*7	6

Numar (Cat anterior)	Partea intreaga
0.545*5	2
0.725*5	3
0.625*5	3
0.125*5	0
0.625*5	3

Tema curs 1.1 - 1.12 pdf

1.1 a) 10101101_2 = 2^0 + 2^2 + 2^3 + 2^5 + 2^7 = 173

b) 110110.1_2 = 1/2 + 2^1 + 2^2+ 2^4 + 2^5 = 54.5

c) 1.00101_2 = 2^0 + 1/8 + 1/32 = 1.15625

1.2 a) 273_8 = 3*8^0 + 7* 8^1 + 2*8^2 = 187

b) 1021_8 = 8^0 + 2*8^1 + 8^3 = 529

c) 16.432_8 = 6*8^0 + 8^1 + 4 * 1/8 + 3 * 1/64 + 2 * 1/512 = 14.55078125

1.3 a) 145_{16} = 5 + 4 * 16^1 + 16^2 = 325

b) $A2C1_{16}$ = 1 + 12 * 16 + 2 * 16^2 + 10 * 16^3 = 41665

c) 1A.B2 = 10 + 16 + 11 * 1/16 + 2 * 1/(16^2) =26.6953125

1.4 a)122 = 1111010

0	1	0	1	1	1	1
122	61	30	15	7	3	1

b) 98 = 1100010

0	1	0	0	0	1	1
98	49	24	12	6	3	1

c) 48.45 = 110000.01110

48 =>	0	0	0	0	1	1
	48	24	12	6	3	1

0.45 => 0.45 *2 = 0

0.9 *2 = 1

0.8 *2 = 1

0.6 *2 = 1

0.2 *2 = 0

1.5 a)522 = 1012_8

Numar (Cat anterior)	Impartitor (baza)	Rest
522	8	2
65	8	1
8	8	0
1	8	1

b)1119 = 2137_8

Numar	Impartitor	Rest

(Cat anterior)	(baza)	
1119	8	7
139	8	3
17	8	1
2	8	2

c) $129.25 = 201.2_8$

Numar (Cat anterior)	Impartitor (baza)	Rest
129	8	1
16	8	0
2	8	2

Numar (Cat anterior)	Partea intreaga
0.25*8	2

1.6 a) $1145 = 479_{16}$

Numar (Cat anterior)	Impartitor (baza)	Rest
1145	16	9
71	16	7
4	16	4

b) $2421 = 975_{16}$

Numar (Cat anterior)	Impartitor (baza)	Rest
2421	16	5
151	16	7

9	16	9

c)192.86 = c0.dc28...$_8$

Numar (Cat anterior)	Impartitor (baza)	Rest
192	16	0
12	16	c

Numar (Cat anterior)	Partea intreaga
0.86*16	d
0.76*16	c
0.16*16	2
0.56*16	8

1.7 a) 3142 + 2413 = 5555 ; orice baza >= 6

b) 51/3 = 13

(5b^1 +1 b^0)/ (3*b^0) = 1*b^1 + 3*b^0

5b+1 = 3b + 9

2b = 8 => b=4

c) 23 +44 +14 + 32 = 223

2b + 3 +4b +4 +b+4 +3b +2 = 2b^2 + 2b + 3

-2b^2 +8b +10 = 0 =>b1 = -1 ; nu coresp

b2 = 5 ; coresp

d) sqrt(51) = 6

sqrt(5b + 1) = 6 ; b>0 => 5b+1 > 1

5b+1 = 36

5b = 35 => b = 7

1.8 a) $361_{10} = 551_b$

361 % b = 1 => 361 = x*b +1 => 360 = x*b ...?

b) c) ?

1.9 a) 101011+ 10111 = 1000010

b)1101 + 1110 + 1001 = 100100

c)11101 - 10110 = 111

d) 1100.010 - 1000.111= 11011

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Tabele de adevar cu XOR

1.(A+B)(A+C) = A+B.C

2. A⊕B = A'B + AB'

3. (A⊕B)' = AB + A'B'

4. A⊕B⊕AB = A+B

5. A(B⊕C) = AB⊕AC

6. (A⊕B)' = (A'+B)(A+B')

1.(A+B)(A+C) = A+B.C

A	B	C	A+B	A+C	Stanga	Dreapta	B.C
0	0	0	0	0	0	0	0
0	0	1	0	1	0	0	0
0	1	0	1	0	0	0	0
0	1	1	1	1	1	1	1
1	0	0	1	1	1	1	1
1	0	1	1	1	1	1	1
1	1	0	1	1	1	1	1
1	1	1	1	1	1	1	1

2. A⊕B = A'B + AB'

A	B	A⊕B	Stanga	Dreapta	A'B	AB'
0	0	0	0	0	0	0
0	1	1	1	1	1	0
1	0	1	1	1	0	1

1	1	0	0	0	0	0

3. (A⊕B)' = AB + A'B'

A	B	A⊕B	(A⊕B)'	Stanga	Dreapta	AB	A'B'
0	0	0	1	1	1	0	1
0	1	1	0	0	0	0	0
1	0	1	0	0	0	0	0
1	1	0	1	1	1	1	0

4. A⊕B⊕AB = A+B

A	B	AB	A⊕B	Stanga	Dreapta
0	0	0	0	0	0
0	1	0	1	1	1
1	0	0	1	1	1
1	1	1	0	1	1

5. A(B⊕C) = AB⊕AC

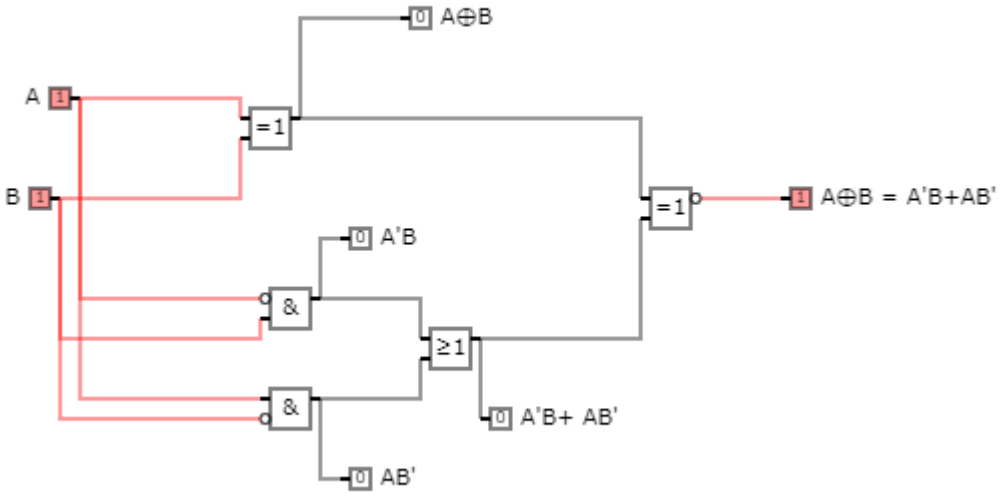
A	B	C	B⊕C	Stanga	Dreapta	AB	AC
0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0
0	1	0	1	0	0	0	0
0	1	1	1	0	0	0	0
1	0	0	0	0	0	0	0
1	0	1	1	1	1	0	1
1	1	0	0	0	1	1	0
1	1	1	0	0	0	1	1

6. (A⊕B)' = (A'+B)(A+B')

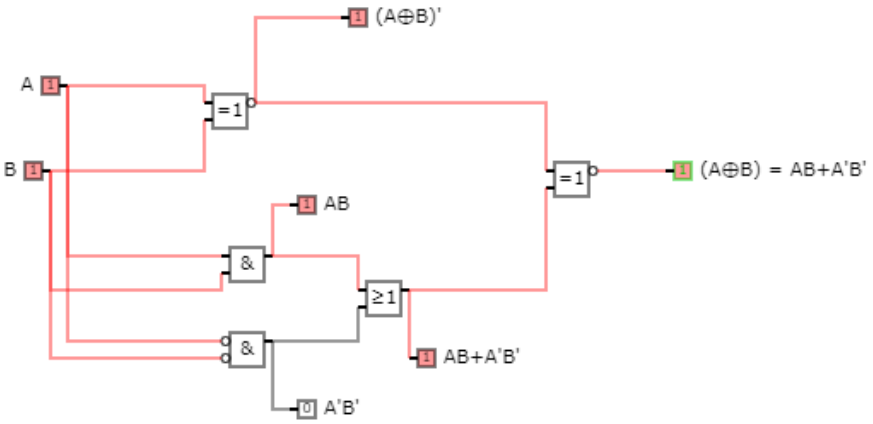
A	B	A⊕B	Stanga	Dreapta	A'+B	A+B'
0	0	0	1	1	1	1
0	1	1	0	0	1	0
1	0	1	0	0	0	1
1	1	0	1	1	1	1

Wronex XOR

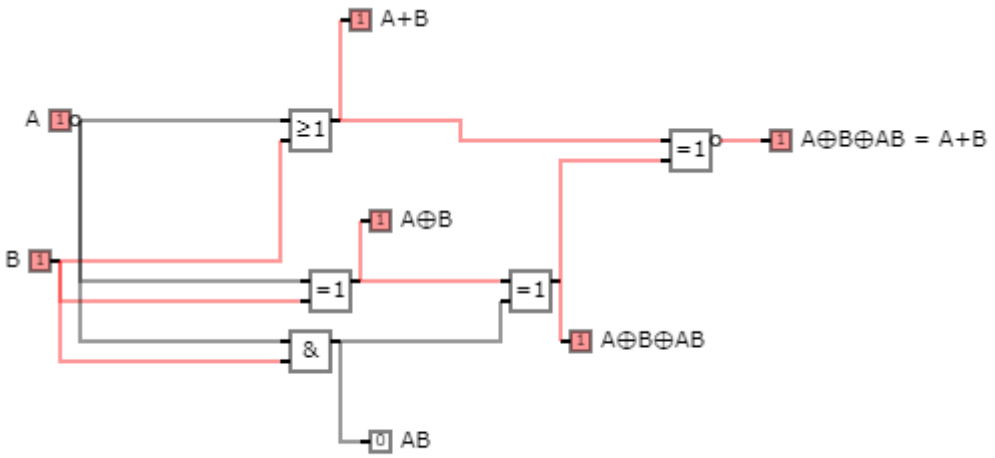
1.A⊕B = A'B+AB'



2.(A⊕B) = AB+A'B'



3. A⊕B⊕AB = A+B



FCC si FCD

f=01001110

i	A	B	C	f	mintermeni (m_i)	Maxtermeni (M_i)
0	0	0	0	0	A'B'C'	A+B+C
1	0	0	1	1	A'B'C	A+B+C'
2	0	1	0	0	A'BC'	A+B'+C
3	0	1	1	0	A'BC	A+B'+C'
4	1	0	0	1	AB'C'	A'+B+C
5	1	0	1	1	AB'C	A'+B+C'
6	1	1	0	1	ABC'	A'+B'+C
7	1	1	1	0	ABC	A'+B'+C'

FCD = ∑m(1,4,5,6) = A'B'C + AB'C' + AB'C + ABC'

FCC = ∏M(0,2,3,7) = (A+B+C)(A+B'+C)(A+B'+C')(A'+B'+C')

f=01110111

FCD = ∑m(1,2,3,5,6,7) = A’B’C + A’BC’ + A’BC + AB’C + ABC’ + ABC

FCC = ∏M(0,4) = (A+B+C)(A’+B+C)

f= 01011010

FCD = ∑m(1,3,4,6)= A’B’C + A’BC + AB’C’ + ABC’

FCC = ∏M(0,2,5,7)= (A+B+C)(A+B’+C)(A’+B+C’)(A’+B’+C’)

f=01101101

FCD = ∑m(1,2,4,5,7)= A’B’C + A’BC’ + AB’C’ + AB’C + ABC

FCC = ∏M(0,3,6)=(A+B+C)(A+B’+C’)(A’+B’+C)

f=10010101

FCD = ∑m(0,3,5,7)= A’B’C’ + A’B’C + AB’C + ABC

FCC = ∏M(1,2,4,6)= (A+B+C’)(A+B’+C)(A’+B+C)(A’+B’+C)

f=11111011

FCD = ∑m(0,1,2,3,4,6,7)= A’B’C’+A’B’C+A’BC’+A’BC+AB’C’+ABC’+ABC

FCC = ∏M(5)= A’+B+C’

Tema curs 2.1 - 2.14 pdf

2.1 f1(A, B, C, D) = B + BCD + B’CD + AB + A’B + B’C => B + B’CD + AB + A’B + B’C =

B + CD + AB + A’B + B’C = B + C + CD + AB + A’B = B + C + AB + A’B = B + C + B(A+A’) =

B + C

f2(A,B,C,D,E) = (AB + C +D)(C’+D)(C’+D)(C’ + D+ E’) = (AB + C +D)(C’+D)(C’ + D+ E’) =(AB + C +D)(C’+D)= ABC’ + CC’ +DC’ +ABD + CD + DD = ABC’ + DC + ABD + CD + D = ABC’ + D + ABD = ABC’ + D

f3(A,B,C) = BC’(C+AC’) + (A’ + C’)(A’B+A’C) = B(C’C) + BAC’ +A’B + A’C+ A’BC’ +A’(CC’) = BAC’ + A’(B+C+BC’) = BAC’ + A’(B+(C+B)(C+C’)) = BAC’ + A’(B+C) = BAC’ + A’B + A’C

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Conversii binary64

x= -54.375 => semn = 1
er = [log(|x|)/log2] = 5
exp = er + 1023 = 1028 = 10000000100
man = |x|/2^er -1 = 0.69921875
x in binary64 = 11000000010010110010...

Numar (Cat anterior)	Partea intreaga
0.69921875*2	1
0.3984375*2	0
0.796875*2	1
0.59375*2	1
0.1875*2	0
0.375*2	0
0.75*2	1
0.5*2	0

x= -5.875 => semn = 1
er = [log(|x|)/log2] = 2
exp = er + 1023 =1025 = 10000000001
man = |x|/2^er -1 = 0.46875
x in binary64 = 11000000000101110

Numar (Cat anterior)	Partea intreaga
0.46875*2	0
0.9375*2	1
0.875*2	1
0.75*2	1

0.5*2	0

x= -23.75 => semn = 1
er = [log(|x|)/log2] = 4
exp = er + 1023 = 1027 = 10000000011
man = |x|/2^er -1 = 0.484375
x in binary64 = 1100000000011011111

Numar (Cat anterior)	Partea intreaga
0.484375*2	0
0.96875*2	1
0.9375*2	1
0.875*2	1
0.75*2	1
0.5*2	1

x= -11.6875 => semn = 1
er = [log(|x|)/log2] = 3
exp = er + 1023 = 1026 = 10000000010
man = |x|/2^er -1 = 0.4609375
x in binary64 =1100000000100111011

Numar (Cat anterior)	Partea intreaga
0.4609375*2	0
0.921875*2	1
0.84375*2	1
0.6875*2	1
0.375*2	0
0.75*2	1
0.5*2	1

x= 1.7578125 => semn = 0
er = [log(|x|)/log2] =0

exp = er + 1023 = 1023 = 1111111111
man = |x|/2^er -1 = 0.7578125
x in binary64 = 0111111111111100001

Numar (Cat anterior)	Partea intreaga
0.7578125*2	1
0.515625*2	1
0.03125*2	0
0.0625*2	0
0.125*2	0
0.25*2	0
0.5*2	1

x=2.421875 => semn = 0
er = [log(|x|)/log2] = 1
exp = er + 1023 = 1024 = 10000000000
man = |x|/2^er -1= 0.2109375
x in binary64 = 0100000000000000110110

Numar (Cat anterior)	Partea intreaga
0.2109375*2	0
0.421875*2	0
0.84375*2	1
0.6875*2	1
0.375*2	0
0.75*2	1
0.5*2	1
0	0

x = -20.4375 => semn = 1
er = [log(|x|)/log2] = 4
exp = er + 1023 = 1027 = 10000000011
man = |x|/2^er -1= 0.27734375
x in binary64 = 1100000000111010001111

Numar (Cat anterior)	Partea intreaga
0.27734375*2	0
0.5546875*2	1
0.1093755*25	0
0.218751*2	0
0.437502*2	0
0.875004*2	1
0.750008*2	1
0.500016*2	1

x= -17.4375 => semn = 1

er = [log(|x|)/log2] = 4

exp = er + 1023 = 1027 = 10000000011

man = |x|/2^er -1 = 0.08984375

x in binary64 = 1100000000111000101111

Numar (Cat anterior)	Partea intreaga
0.08984375*2	0
0.1796875*2	0
0.359375*2	0

0.71875*2	1
0.4375*2	0
0.875*2	1
0.75*2	1
0.5*2	1

x= -28.375 => semn = 1
er = [log(|x|)/log2] = 4
exp = er + 1023 = 1027 = 10000000011
man = |x|/2^er -1 = 0.7734375
x in binary64 = 1100000000111110011

Numar (Cat anterior)	Partea intreaga
0.7734375*2	1
0.546875*2	1
0.1875*2	0
0.375*2	0
0.75*2	1
0.5*2	1

x= -52.75 => semn = 1
er = [log(|x|)/log2] = 5
exp = er + 1023 = 1028 = 10000000100
man = |x|/2^er -1 = 0.6484375
x in binary64 =1100000001001010011

Numar (Cat anterior)	Partea intreaga
0.6484375*2	1
0.296875*2	0
0.59375*2	1
0.1875*2	0
0.375*2	0
0.75*2	1

0.5*2	1

x= -6.4375 => semn = 1
er = [log(|x|)/log2] = 2
exp = er + 1023 = 1025 = 10000000001
man = |x|/2^er -1 =
x in binary64 = 1100000000011100111

Numar (Cat anterior)	Partea intreaga
0.609375*2	1
0.21875*2	0
0.4375*2	0
0.875*2	1
0.75*2	1
0.5*2	1

x= −21.375 => semn = 1
er = [log(|x|)/log2] = 4
exp = er + 1023 = 1027 = 10000000011
man = |x|/2^er -1 = 0.3359375
x in binary64 = 1100000000110101011

Numar (Cat anterior)	Partea intreaga
0.3359375*2	0
0.671875*2	1
0.34375*2	-0
0.6875*2	1
0.375*2	0
0.75*2	1
0.5*2	1

x=47.9375 => semn =0
er = [log(|x|)/log2] = 5
exp = er + 1023 = 1028 =10000000100

man = |x|/2^er -1 = 0.498046875
x in binary64 =0100000000100011111111

Numar (Cat anterior)	Partea intreaga
0.498046875 *2	0
0.99609375* 2	1
.9921875*2	1
.984375*2	1
.96875*2	1
.875*2	1
0.75*2	1
0.5*2	1

x= 7.6875 => semn = 0
er = [log(|x|)/log2] = 2
exp = er + 1023 = 1025 = 10000000001
man = |x|/2^er -1 = 0.921875
x in binary64 = 0100000000001111011

Numar (Cat anterior)	Partea intreaga
0.921875*2	1
0.84375*2	1
0.6875*2	1
0.375*2	0
0.75*2	1
0.5*2	1

x = -54.375 => semn = 1
x = -1 * (2^5 + 2^4 + 2^2 +2^1 + 2^-1 +2^-2)
x = -1 * 2^5(2^0 + 2^-1 + 2^-3 + 2^-4 + 2^-6 + 2^-7)
x = -1 * 2^(1028-1023)(2^0 + 2^-1 + 2^-3 + 2^-4 + 2^-6 + 2^-7)

1100000001001011011

x =-5.875
x = -1 * (2^2 + 2^0 + 2^-1 + 2^-2+ 2^-3)
x = -1 * 2^2(2^0 + 2^-2 + 2^-3 + 2^-4+ 2^-5)
x = -1 * 2^(1025-1023)(2^0 + 2^-2 + 2^-3 + 2^-4+ 2^-5)
11000000000101111

x = -23.75
x = -1 * (2^4+2^2 + 2^1 + 2^0 + 2^-1 + 2^-2)
x = -1 * 2^(1027-1023)(+2^-2 + 2^-3 + 2^-4 + 2^-5 + 2^-6)
1100000000011011111

x = -11.6875
x = -1 * (2^3 + 2^1 + 2^0 + 2^-1+ 2^-3+ 2^-4)
x = -1 * 2^(1026-1023)(2^0 + 2^-2 + 2^-3 + 2^-4+ 2^-6+ 2^-7)
1100000000100111011

x = 1.7578125
x = 1 * (2^0 + 2^-1 + 2^-2 + 2^-7)
x = 1 * 2^(1023-1023)(2^0 + 2^-1 + 2^-2 + 2^-7)
0011111111111110001

x = 2.421875
x = 1 * (2^1 + 2^-2 + 2^-3 + 2^-5 + 2^-6)
x = 1* 2^(1024-1023)(2^0 + 2^-3 + 2^-4 + 2^-6 + 2^-7)
x= 0100000000000011011

x = -20.4375
x = -1* (2^4 + 2^2+ 2^-2 + 2^-3 + 2^-4)
x = -1* 2^(1-27-1023)(2^0 + 2^-2+ 2^-6 + 2^-7 + 2^-8)
1100000000011010000111

x = -17.4375
x = -1* (2^4 + 2^1+ 2^-2 + 2^-3 + 2^-4)
x = -1* 2^(1027-1023)(2^0 + 2^-2+ 2^-6 + 2^-7 + 2^-8)
1100000000011000101111

x = -28.375
x = -1 * (2^2 + 2^3 + 2^4 + 2^-2 + 2^-3)

x = -1 * 2^(1027-1023)(2^-2 + 2^-1 + 2^0 + 2^-6
+2^-7)11000000000111100011

Tabela de adevar

A	B	C	F (ABC)
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	0

Tabele de adevar

minterm = A’B’C + A’BC’ + AB’C+ABC’
maxterm = (A+B+C)(A+B’+C’)(A’+B+C)(A’+B’+C’)

Tabela de adevar

A	B	C	F (ABC)
0	0	0	1
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

minterm = A’B’C’ + A’BC+ AB’C’ + ABC
maxterm = (A+B+C’)(A+B’+C)(A’+B+C’)(A’+B’+C)

Tabela de adevar

A	B	C	F (ABC)
0	0	0	1
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	0

minterm = ABC+ABC'+AB'C+A'BC+A'BC'+A'B'C
maxterm= (AB'C')(A'B'C')

Tabela de adevar

A	B	C	D	F (ABCD)
0	0	0	0	0
0	0	0	1	1
0	0	1	0	1
0	0	1	1	1
0	1	0	0	0
0	1	0	1	0
0	1	1	0	1
0	1	1	1	0
1	0	0	0	0
1	0	0	1	1
1	0	1	0	1
1	0	1	1	1
1	1	0	0	0
1	1	0	1	0
1	1	1	0	1
1	1	1	1	0

Tabela de adevar

A	B	C	D	F (ABCD)
0	0	0	0	1
0	0	0	1	1
0	0	1	0	1
0	0	1	1	1
0	1	0	0	0
0	1	0	1	1
0	1	1	0	0
0	1	1	1	1
1	0	0	0	1
1	0	0	1	1
1	0	1	0	1
1	0	1	1	1
1	1	0	0	0
1	1	0	1	1
1	1	1	0	0
1	1	1	1	1

Tabela de adevar

A	B	C	D	F (ABCD)
0	0	0	0	1
0	0	0	1	0
0	0	1	0	1
0	0	1	1	0
0	1	0	0	1
0	1	0	1	1
0	1	1	0	1
0	1	1	1	1
1	0	0	0	1
1	0	0	1	0
1	0	1	0	1
1	0	1	1	0
1	1	0	0	1
1	1	0	1	0
1	1	1	0	1
1	1	1	1	0

Tabela de adevar

A	B	C	D	F (ABCD)
0	0	0	0	1
0	0	0	1	0
0	0	1	0	1
0	0	1	1	0
0	1	0	0	1
0	1	0	1	1
0	1	1	0	0
0	1	1	1	0
1	0	0	0	1
1	0	0	1	1
1	0	1	0	1
1	0	1	1	1
1	1	0	0	0
1	1	0	1	0
1	1	1	0	0
1	1	1	1	0

1. minterm = A'B'C'D+A'B'CD'+A'B'CD+A'BCD+AB'C'D+AB'CD'+AB'CD+ABCD'

maxterm = (A+B+C+D) (A+B’+C+D) (A+B’+C’+D’) (A’+B+C+D) (A’+B’+C+D) (A’+B’+C+D’) (A’+B’+C’+D’)

2. minterm = A’B’C’D’+A’B’C’D+A’B’CD’+A’B’CD+A’BC’D+A’BCD+AB’C’D’+AB’C’D+AB’CD’+AB’CD+ABC’D+ABCD

maxterm = (A+B’+C+D)(A+B’+C’+D)(A’+B’+C+D)(A’+B’+C’+D)

3. minterm = A’B’C’D’+A’B’CD’+A’BC’D’+A’BC’D+A’BCD’+A’BCD+AB’C’D’+AB’CD’+ABC’D’+ABCD’

maxterm = (A+B+C+D’)(A+B+C’+D’)(A’+B+C+D’)(A’+B’+C+D’)(A’+B’+C’+D’)

4. minterm = A’B’C’D’+A’B’CD’+A’BC’D’+A’BC’D+AB’C’D’+AB’C’D+AB’CD’+AB’CD

maxterm = (A+B+C+D’)(A+B+C’+D’)(A+B’+C’+D)(A+B’+C’+D’)(A’+B’+C+D)(A’+B’+C+D’)(A’+B’+C’+D)(A’+B’+C’+D’)

Diagrame Veitch - Karnaugh

CD \ AB	A'B'	A'B	AB	AB'
	00	01	11	10
C'D' 00	0	0	0	0
C'D 01	1	0	0	1
CD 11	1	0	0	1
CD' 10	1	1	1	1

CD \ AB	A'B'	A'B	AB	AB'
	00	01	11	10
C'D' 00	1	0	0	1
C'D 01	1	1	1	1
CD 11	1	1	1	1
CD' 10	1	0	0	1

A	B	C	D	F(ABCD)
0	0	0	0	0
0	0	0	1	1
0	0	1	0	1
0	0	1	1	1
0	1	0	0	0
0	1	0	1	0
0	1	1	0	1
0	1	1	1	0
1	0	0	0	0
1	0	0	1	1
1	0	1	0	1
1	0	1	1	1
1	1	0	0	0
1	1	0	1	0
1	1	1	0	1
1	1	1	1	0

A	B	C	D	F(ABCD)
0	0	0	0	1
0	0	0	1	1
0	0	1	0	1
0	0	1	1	1
0	1	0	0	0
0	1	0	1	1
0	1	1	0	0
0	1	1	1	1
1	0	0	0	1
1	0	0	1	1
1	0	1	0	1
1	0	1	1	1
1	1	0	0	0
1	1	0	1	1
1	1	1	0	0
1	1	1	1	1

CD	AB	A'B'	A'B	AB	AB'
		00	01	11	10
C'D'	00	1	1	1	1
C'D	01	0	1	0	0
CD	11	0	1	0	0
CD'	10	1	1	1	1

CD	AB	A'B'	A'B	AB	AB'
		00	01	11	10
C'D'	00	1	1	0	1
C'D	01	0	1	0	1
CD	11	0	0	0	1
CD'	10	1	0	0	1

A	B	C	D	F (ABCD)
0	0	0	0	1
0	0	0	1	0
0	0	1	0	1
0	0	1	1	0
0	1	0	0	1
0	1	0	1	1
0	1	1	0	1
0	1	1	1	1
1	0	0	0	1
1	0	0	1	0
1	0	1	0	1
1	0	1	1	0
1	1	0	0	1
1	1	0	1	0
1	1	1	0	1
1	1	1	1	0

A	B	C	D	F (ABCD)
0	0	0	0	1
0	0	0	1	0
0	0	1	0	1
0	0	1	1	0
0	1	0	0	1
0	1	0	1	1
0	1	1	0	0
0	1	1	1	0
1	0	0	0	1
1	0	0	1	1
1	0	1	0	1
1	0	1	1	1
1	1	0	0	0
1	1	0	1	0
1	1	1	0	0
1	1	1	1	0

Tabela de adevar

A	B	C	F (ABC)
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	0

Tabela de adevar

A	B	C	F (ABC)
0	0	0	1
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

Tabela de adevar

A	B	C	F (ABC)
0	0	0	1
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	0

C	AB	A'B'	A'B	AB	AB'
		00	01	11	10
C'	0	0	1	1	0
C	1	1	0	0	1

C	AB	A'B'	A'B	AB	AB'
		00	01	11	10
C'	0	1	0	0	1
C	1	0	1	1	0

C	AB	A'B'	A'B	AB	AB'
		00	01	11	10
C'	0	1	1	1	1
C	1	1	0	0	1

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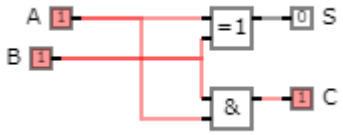
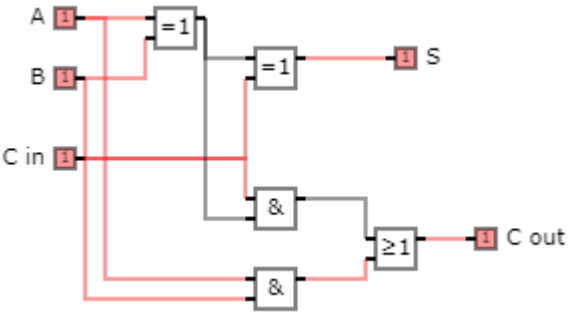
Implementari Wronex

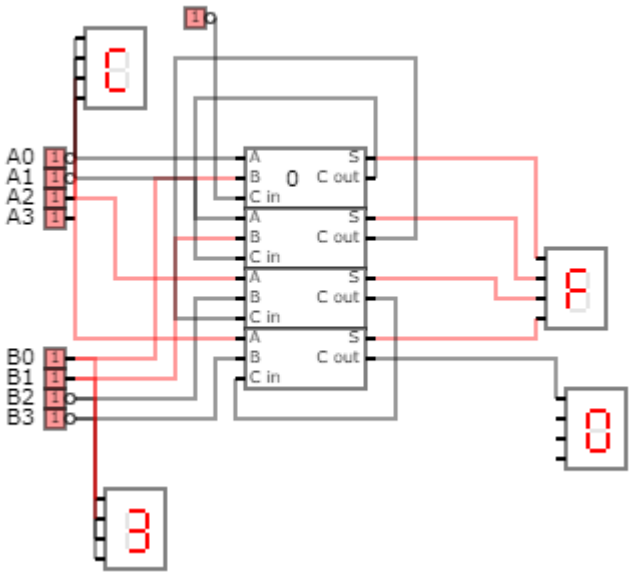
semisumator



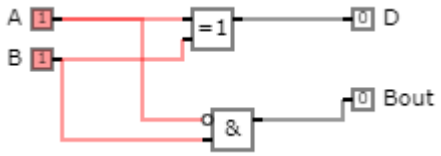
Sumator Complet



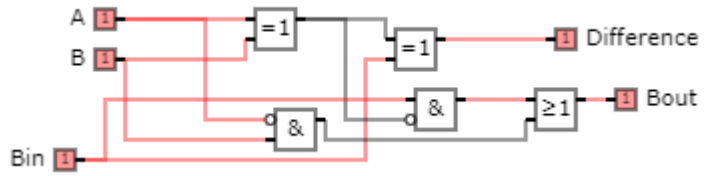
Sumator 4 biti



Semiscazator



Scazator complet



Scazator 4 biti

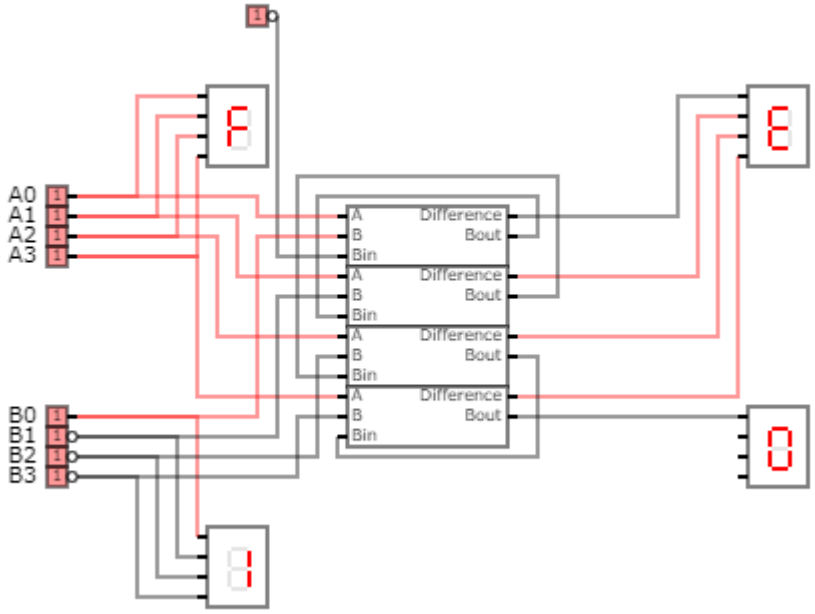
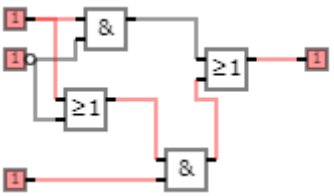


Tabela de adevar

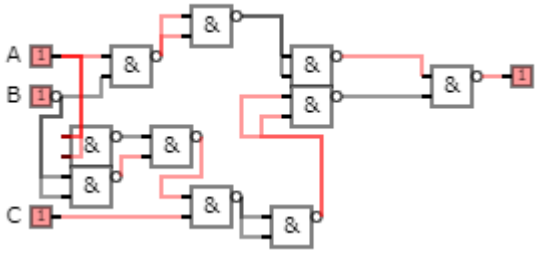
A	B	C	F (ABC)
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

1. Se cere optimizarea FCD
2. Schema folosind simbolurile clasice
3. Transformarea schemei in schema NUMAI cu NAND-uri

	AB	A'B'	A'B	AB	AB'
C		00	01	11	10
C'	0	0	0	1	0
C	1	0	1	1	1



AB + C.'(A'B') = AB + C.(A+B)



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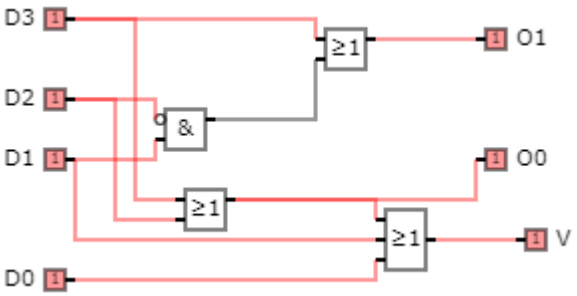
4 to 2 priority encoder

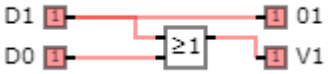
D3	D2	D1	D0	0_1	0_2	V
0	0	0	0	0	0	0
0	0	0	1	0	0	1
0	0	1	0	0	1	1
0	0	1	1	0	1	1
0	1	0	0	1	0	1
0	1	0	1	1	0	1
0	1	1	0	1	0	1
0	1	1	1	1	0	1
1	0	0	0	1	1	1
1	0	0	1	1	1	1
1	0	1	0	1	1	1
1	0	1	1	1	1	1
1	1	0	0	1	1	1
1	1	0	1	1	1	1
1	1	1	0	1	1	1
1	1	1	1	1	1	1



O1(D3,D2,D1,D0) = D3+D2
O0(D3,D2,D1,D0) = D3 + D2'.D1
V(D3,D2,D1,D0) = D3+D2+D1+D0

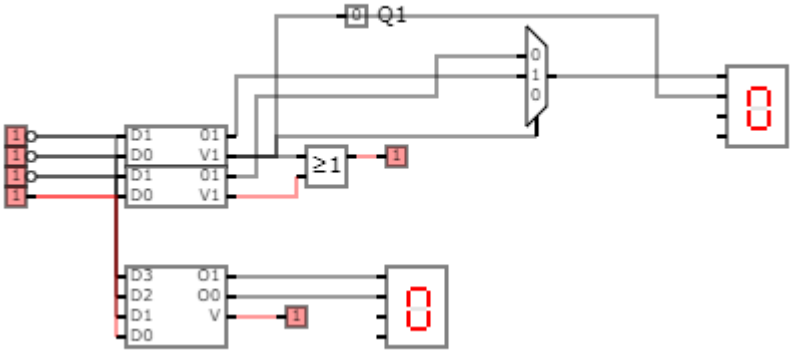
2 to 1 priority encoder

D1	D0	O_1	V
0	0	0	0
0	1	0	1
1	0	1	1
1	1	1	1



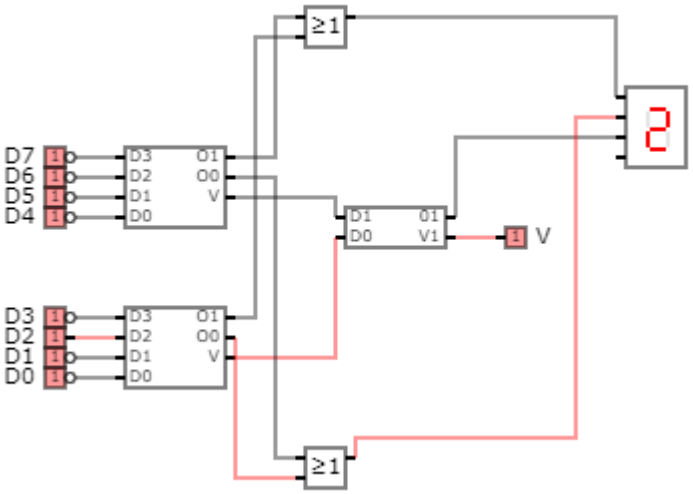
V(D1,D2) = D1 + D2

01 = D1

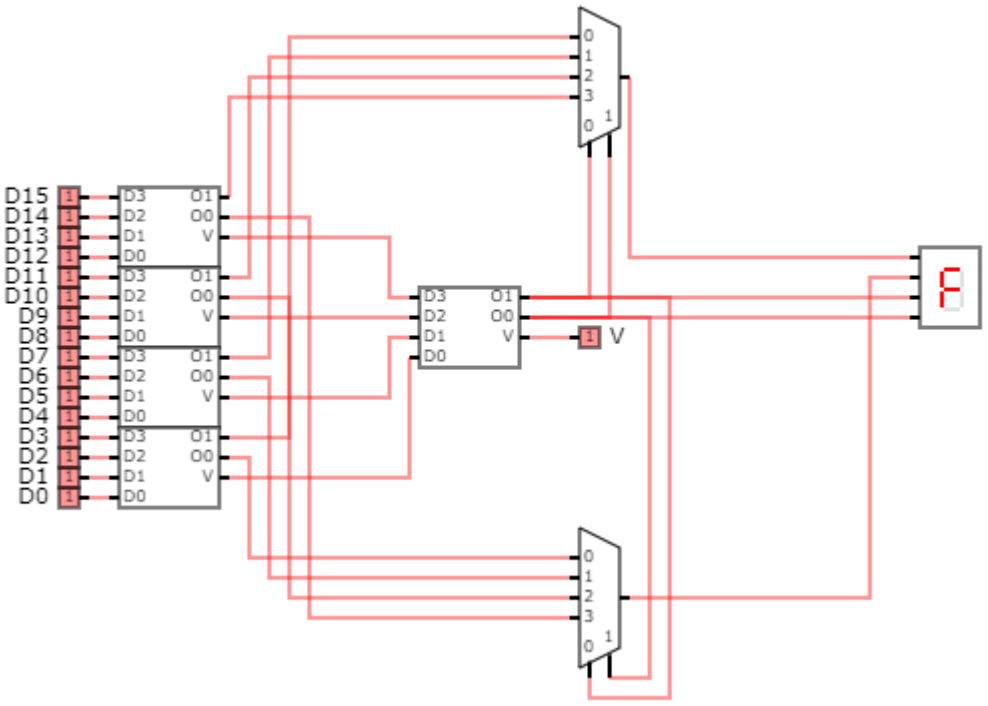


8 to 3 priority encoder

D7	D6	D5	D4	D3	D2	D1	D0	O_1	O_2	O_3	V
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	1	0	0	0	1
0	0	0	0	0	0	1	x	0	0	1	1
0	0	0	0	0	1	x	x	0	1	0	1
0	0	0	0	1	x	x	x	0	1	1	1
0	0	0	1	x	x	x	x	1	0	0	1
0	0	1	x	x	x	x	x	1	0	1	1
0	1	x	x	x	x	x	x	1	1	0	1
1	x	x	x	x	x	x	x	1	1	1	1



16 to 4 priority encoder



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Subiecte partial

Digit	A	B	C	D	F(A,B,C,D)
0	0	0	0	0	1
1	0	0	0	1	1
2	0	0	1	0	1
3	0	0	1	1	1
4	0	1	0	0	0
5	0	1	0	1	1
6	0	1	1	0	1
7	0	1	1	1	1
8	1	0	0	0	0
9	1	0	0	1	0
10	1	0	1	0	1
11	1	0	1	1	1
12	1	1	0	0	0
13	1	1	0	1	1
14	1	1	1	0	1
15	1	1	1	1	1

C + A’B’ + BD ; nr op = 6

AB \ CD	C'D' (00)	C'D (01)	CD (11)	CD' (10)
A'B' (00)	1	1	1	1
A'B (01)	0	1	1	1
AB (11)	0	1	1	1
AB' (10)	0	0	1	1

F = C + A’B’+ BD

CD \ AB	A'B' (00)	A'B (01)	AB (11)	AB' (10)
C'D' (00)	1	0	0	0
C'D (01)	1	1	1	0
CD (11)	1	1	1	1
CD' (10)	1	1	1	1

F’ = AB’C’ + C’D’B

(F’)’ = F = (A’+B+C)(C+D+B’) nr op = 7

M=(9,2,15,3,13,8,10,11,14,4,0,12)

Digit	A	B	C	D	F(A,B,C,D)
0	0	0	0	0	0
1	0	0	0	1	1
2	0	0	1	0	0
3	0	0	1	1	0
4	0	1	0	0	0
5	0	1	0	1	1
6	0	1	1	0	1
7	0	1	1	1	1
8	1	0	0	0	0
9	1	0	0	1	0
10	1	0	1	0	0
11	1	0	1	1	0
12	1	1	0	0	0
13	1	1	0	1	0
14	1	1	1	0	0
15	1	1	1	1	0

AB	CD	C'D'	C'D	CD	CD'
		00	01	11	10
A'B'	00	0	1	0	0
A'B	01	0	1	1	1
AB	11	0	0	0	0
AB'	10	0	0	0	0

C’DA’ + A’BC nr op = 2not 1or 4and = 7

F’ = A +C’D’+ B’C => 3not + 2or + 2and = 7

AB	CD	C'D'	C'D	CD	CD'
		00	01	11	10
A'B'	00	1	0	1	1
A'B	01	1	0	0	0
AB	11	1	1	1	1
AB'	10	1	1	1	1

(F’)’ = A’.(C+D).(B+C’) = 2not 2or 2and = 6

m=(12,3,0,10,15,14,8,4,7,2,9,11)

Digit	A	B	C	D	F(A,B,C,D)
0	0	0	0	0	1
1	0	0	0	1	0
2	0	0	1	0	1
3	0	0	1	1	1
4	0	1	0	0	1
5	0	1	0	1	0
6	0	1	1	0	0
7	0	1	1	1	1
8	1	0	0	0	1
9	1	0	0	1	1
10	1	0	1	0	1
11	1	0	1	1	1
12	1	1	0	0	1
13	1	1	0	1	0
14	1	1	1	0	1

15	1	1	1	1	1

F = AB’ + C’D’ + CD + AC + B’C = 3not + 5and + 4or = 12op

CD	AB	A'B'	A'B	AB	AB'
		00	01	11	10
C'D'	00	1	1	1	1
C'D	01	0	0	0	1
CD	11	1	1	1	1
CD'	10	1	0	1	1

F’ = A’C’D + BC’D + A’BCD’ = 3not + 7and + 2or = 12op

F’ = (C’D)(A’+B) + A’BCD’ = 3not + 2or + 5and = 10op

CD	AB	A'B'	A'B	AB	AB'
		00	01	11	10
C'D'	00	0	0	0	0
C'D	01	1	1	1	0
CD	11	0	0	0	0
CD'	10	0	1	0	0

(F’)’ = (A+C+D’).(B’+C+D’).(A+B’+C’+D) = 3not + 2and + 7or = 12op

M = (12,5,1,13,9,10,14,3,15,7,2,6)

Digit	A	B	C	D	F(A,B,C,D)
0	0	0	0	0	1
1	0	0	0	1	0
2	0	0	1	0	0
3	0	0	1	1	0
4	0	1	0	0	1
5	0	1	0	1	0
6	0	1	1	0	0
7	0	1	1	1	0
8	1	0	0	0	1
9	1	0	0	1	0
10	1	0	1	0	0
11	1	0	1	1	1
12	1	0	0	0	0
13	1	1	0	1	0
14	1	1	1	0	0
15	1	1	1	1	0

CD	AB	A'B'	A'B	AB	AB'
		00	01	11	10
C'D'	00	1	1	0	1
C'D	01	0	0	0	0
CD	11	0	0	0	1
CD'	10	0	0	0	0

C’D’A’ + C’D’B’ + AB’CD

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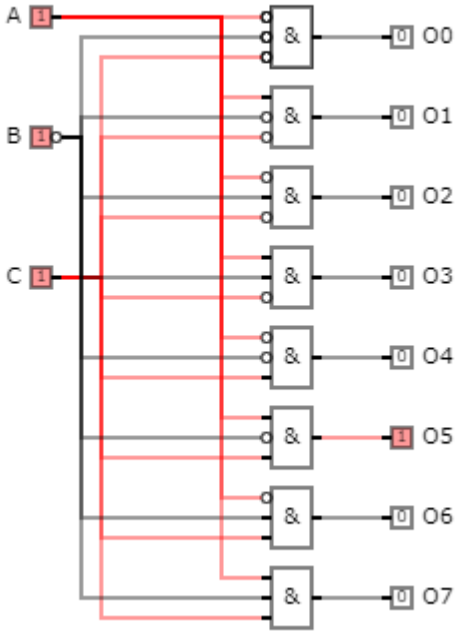
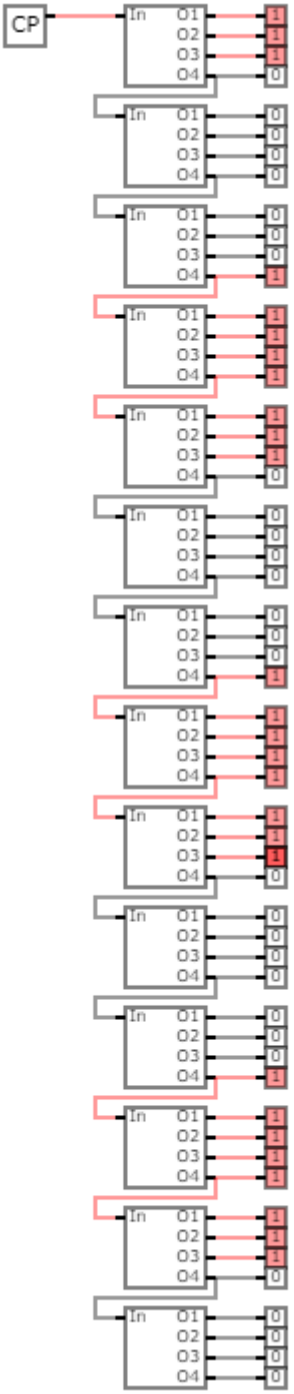
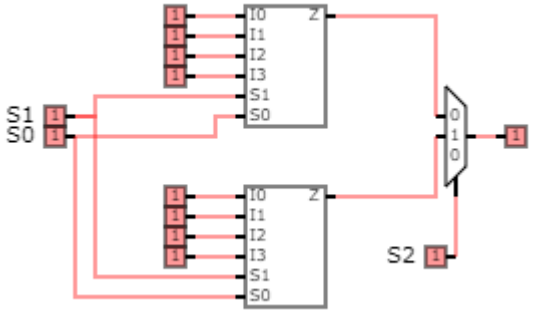
Decod 3-8



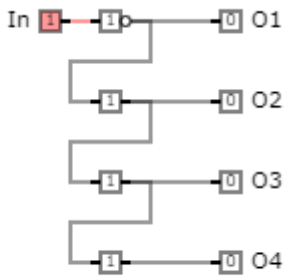
Repetor



2x mux 4



Inversor



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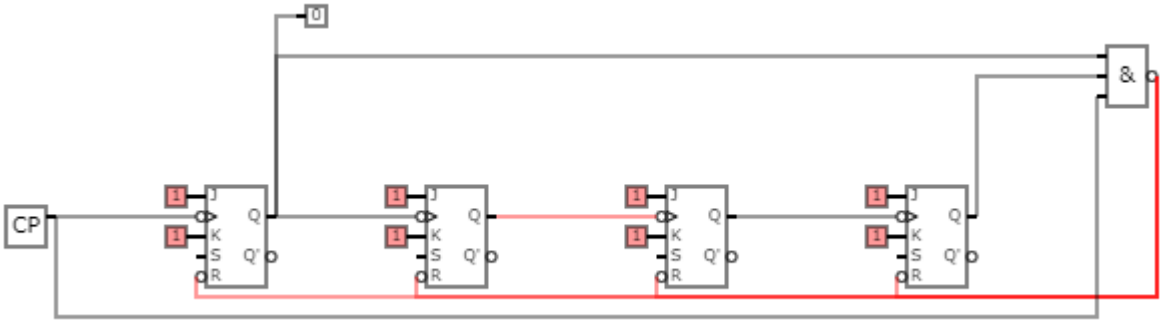

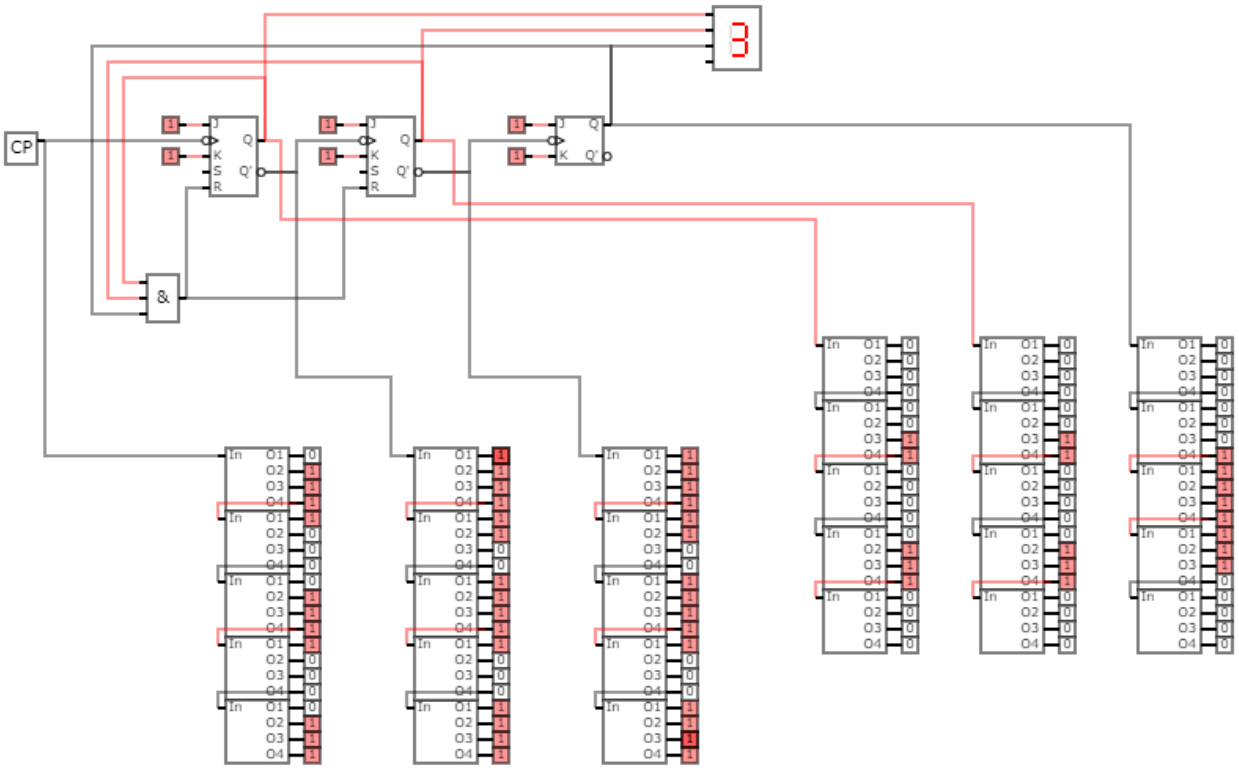

A	B	F (AB)
0	0	X
0	1	0
1	0	X
1	1	1

	B	B’	B
A			
A’		1	0
A		0	1

F_{10} = A’B’ + AB = A xnor B = (A xor B)’

	B	B’	B
A			
A’		1	0
A		1	1

F_{11} = A'B' + A

	B	B’	B
A			
A’		0	0
A		1	1

F_{01} = A

	B	B’	B
A			
A’		0	0
A		0	1

F_{00} = AB

A	B	C	F (ABC)
0	0	0	0
0	0	1	X
0	1	0	1
0	1	1	1
1	0	0	0
1	0	1	X
1	1	0	X
1	1	1	0

$F(ABC)_{000} = A'B$
$F(ABC)_{001} = A'B + ABC'$
$F(ABC)_{010} = A'B + AB'C$
$F(ABC)_{011} = A'B + ABC' + AB'C$
$F(ABC)_{100} = A'B + A'C$
$F(ABC)_{101} = A'B + ABC' + A'B'C$
$F(ABC)_{110} = A'B + B'C$
$F(ABC)_{111} = A'B + BC' + B'C$

	AB	00	01	11	10
C					
0		0	1	x	0
1		x	1	0	x

A	B	C	F (ABC)
0	0	0	0
0	0	1	X
0	1	0	1
0	1	1	1
1	0	0	0
1	0	1	X
1	1	0	X
1	1	1	1

$F(ABC)_{000} = A'B + BC$
$F(ABC)_{001} = B$
$F(ABC)_{010} = A'B + AC$
$F(ABC)_{011} = B + AB'C$
$F(ABC)_{100} = A'B + BC + A'C$
$F(ABC)_{101} = A'C + B$
$F(ABC)_{110} = A'B + C$
$F(ABC)_{111} = B + C$

	AB	00	01	11	10
C					
0		0	1	x	0
1		x	1	1	x

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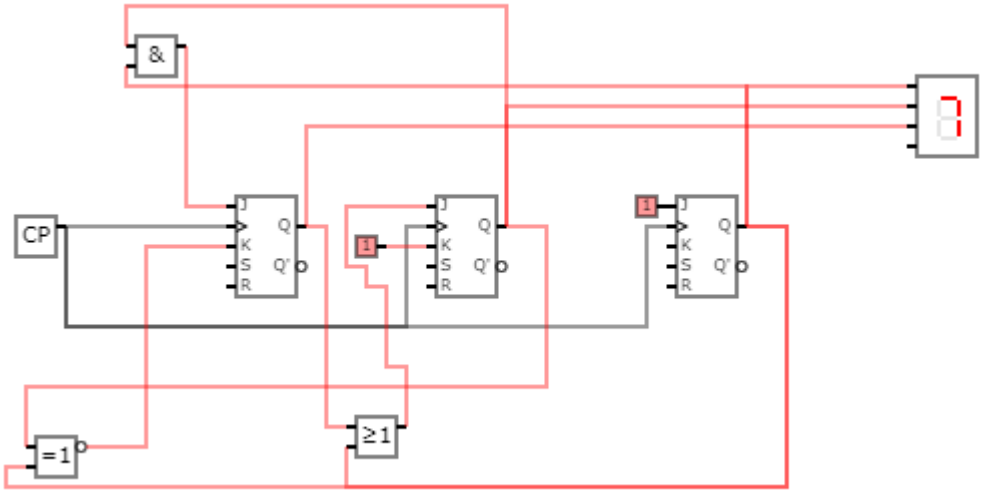
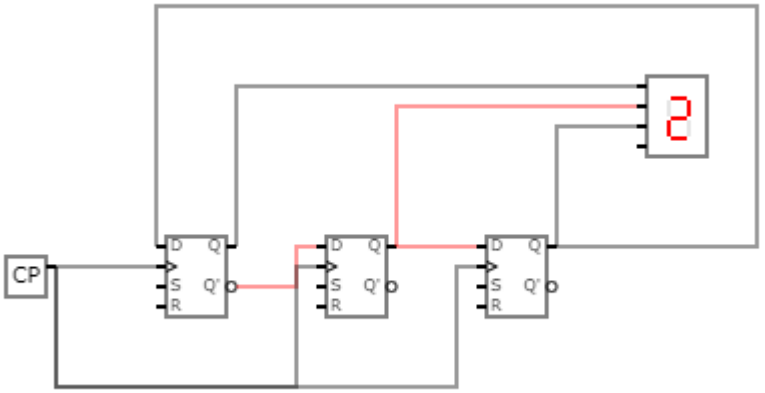
Z	Q2	Q1	Q0	D2	D1	D0	Z*
0	0	0	0	0	0	1	1
1	0	0	1	0	1	1	3
2	0	1	0	0	0	1	1
3	0	1	1	1	0	1	5
4	1	0	0	0	1	1	3
5	1	0	1	1	1	1	7
6	1	1	0	1	0	1	5
7	1	1	1	0	0	1	1

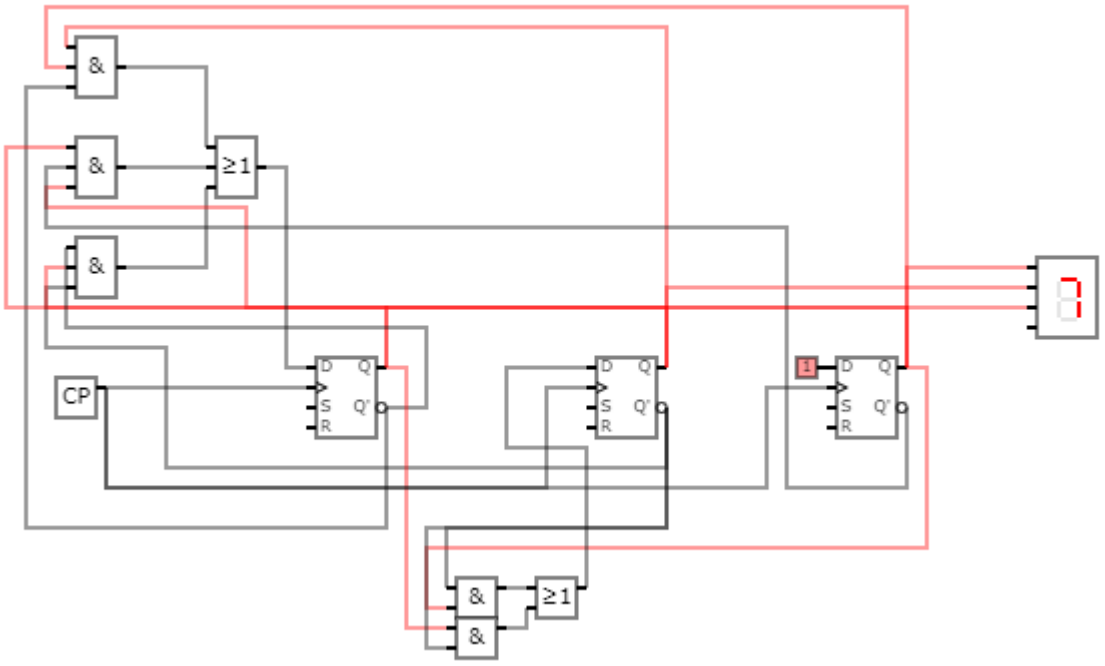
D2 = Q2`Q1Q0 + Q2Q1Q0` + Q2Q1'Q
D1 = Q1'Q0 + Q2Q1'
D0 = 1

Z	Q2	Q1	Q0	Q2*	Q1*	Q0*	J2	K2	J1	K1	J0	K0
0	0	0	0	0	0	1	0	X	0	X	1	X
1	0	0	1	0	1	1	0	X	1	X	X	0
2	0	1	0	0	0	1	0	X	X	1	1	X
3	0	1	1	1	0	1	1	X	X	1	X	0
4	1	0	0	0	1	1	X	1	1	X	1	X
5	1	0	1	1	1	1	X	0	1	X	X	0
6	1	1	0	1	0	1	X	0	X	1	1	X
7	1	1	1	0	0	1	X	1	X	1	X	0

J2= Q1Q0
K2=Q1 xnor Q0
J1= Q2+Q0
K1=1
J0=1
K0=0


&
CP
J
K
S
R
Q
Q'
1
=1
≥1


CP
D
S
R
Q
Q'
2


&
≥1
CP
D
S
R
Q
Q'
1

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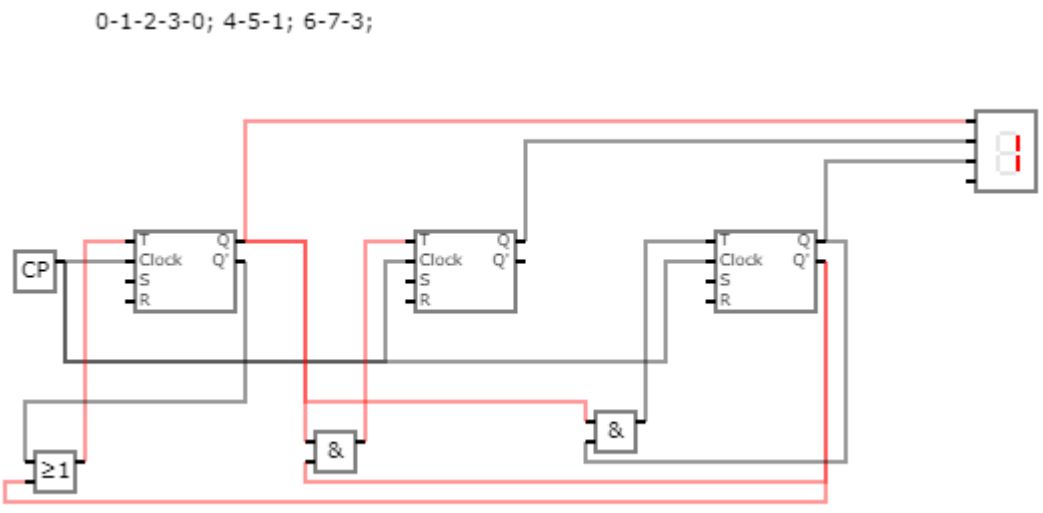
0-7-2-0; 6-4-9-7; 15-13-9

N in	Q3	Q2	Q1	Q0	I3 !Q2	I2 Q0	I1 Q3	I0 !Q1	N out
6	0	1	1	0	0	0	0	0	0
13	1	1	0	1	0	1	1	1	7
14	1	1	1	0	0	0	1	0	2
6;	0	1	1	0	0	0	0	0	0;
15	1	1	1	1	0	1	1	0	6
7	0	1	1	1	0	1	0	0	4
0	0	0	0	0	1	0	0	1	9
13;	1	1	0	1	0	1	1	1	7
9	1	0	0	1	1	1	1	1	15
1	0	0	0	1	1	1	0	1	13
0;	0	0	0	0	1	0	0	1	9

bb de tip T
0-1-2-3-0; 4-5-1; 6-7-3;



Nr in	Q2	Q1	Q0	Nr out	Q2	Q1	Q0	T2	T1	T0
0	0	0	0	1	0	0	1	0	0	1
1	0	0	1	2	0	1	0	0	1	1
2	0	1	0	3	0	1	1	0	0	1
3	0	1	1	0	0	0	0	0	1	1
4	1	0	0	5	1	0	1	0	0	1
5	1	0	1	1	0	0	1	1	0	0
6	1	1	0	7	1	1	1	0	0	1
7	1	1	1	3	0	1	1	1	0	0

T2 = Q2.Q0

T1 = Q2'.Q0

T0 = Q2' + Q0'

Tabela de excitare pentru BB de tip T

Q	Q*	T
0	0	0
0	1	1
1	0	1
1	1	0

XY = 00 3-3; 0-3; 1-2-2;
XY = 01 1-1; 3-0-2-2;
XY = 10 3-0-2-1-3
XY = 11 1-2-3-0-1

X	Y	Stare prezenta		Stare viitoare		J1	K1	D0	In
		Q1	Q0	Q1*	Q0*				
0	0	0	0	1	1	1	X	1	0
0	0	0	1	1	0	1	X	0	1
0	0	1	0	1	0	X	0	0	2
0	0	1	1	1	1	X	0	1	3
0	1	0	0	1	0	1	X	0	4
0	1	0	1	0	1	0	X	1	5
0	1	1	0	1	0	X	0	0	6
0	1	1	1	0	0	X	1	0	7
1	0	0	0	1	0	1	X	0	8
1	0	0	1	1	1	1	X	1	9
1	0	1	0	0	1	X	1	1	10
1	0	1	1	0	0	X	1	0	11
1	1	0	0	0	1	0	X	1	12
1	1	0	1	1	0	1	X	0	13
1	1	1	0	1	1	X	0	1	14
1	1	1	1	0	0	X	1	0	15

JK Excitation table

Q	Q_{next}	J	K
0	0	0	X
0	1	1	X
1	0	X	1
1	1	X	0

	XY	X'Y'	X'Y	XY	XY'
Q1Q0		00	01	11	10
Q1'Q0'	00	1	1	0	1
Q1'Q0	01	1	0	1	1
Q1Q0	11	x	x	x	x
Q1Q0'	10	x	x	x	x

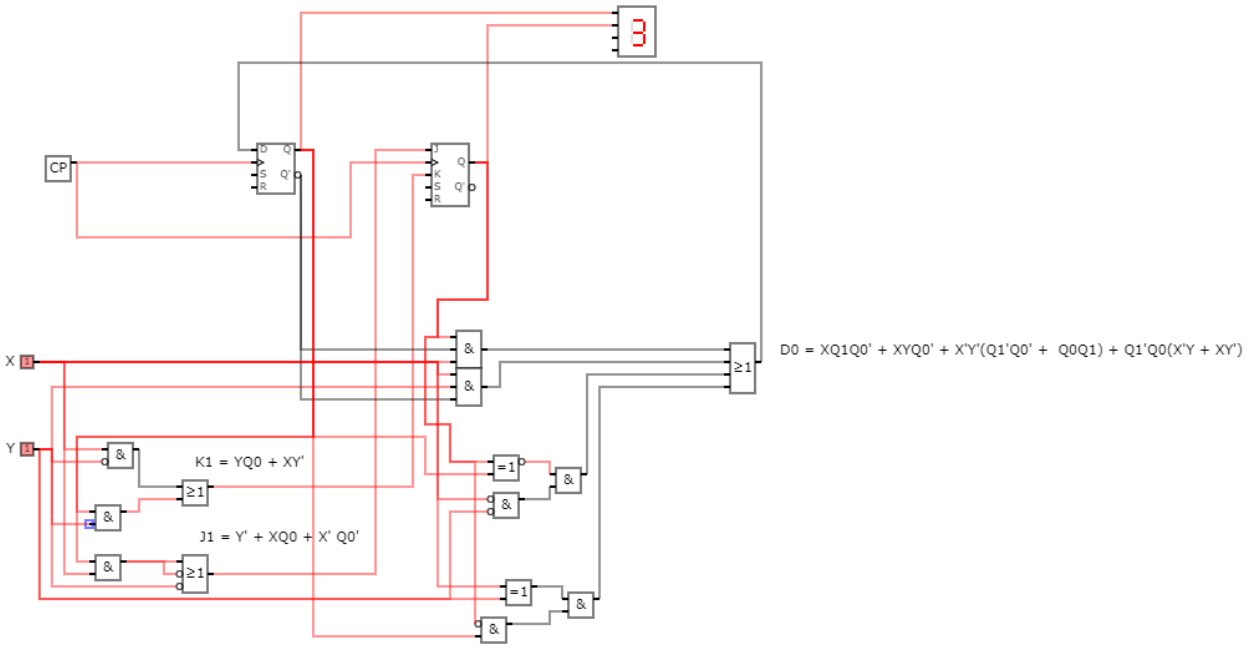
J1 = Y' + XQ0 + X' Q0'

Q1Q0	XY	X'Y'	X'Y	XY	XY'
		00	01	11	10
Q1'Q0'	00	x	x	x	x
Q1'Q0	01	x	x	x	x
Q1Q0	11	0	1	1	1
Q1Q0'	10	0	0	0	1

K1 = YQ0 + XY'

Q1Q0	XY	X'Y'	X'Y	XY	XY'
		00	01	11	10
Q1'Q0'	00	1	0	1	0
Q1'Q0	01	0	1	0	1
Q1Q0	11	1	0	0	0
Q1Q0'	10	0	0	1	1

D0 = XQ1Q0' + XYQ0' + X'Y'Q1'Q0' + X'Y'Q0Q1 + X'YQ1'Q0 + XY'Q1'Q0 =
XQ1Q0' + XYQ0' + X'Y'(Q1'Q0' + Q0Q1) + Q1'Q0(X'Y + XY')



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Fie un BB de tip JK sensibil la tranzitia "-" a semnalului de ceas C. Starea initiala a BB este Q=1. Semnalul S=0. Semnalele de intrare evolueaza in ordinea: RJKC=47324523C26C. Care este secventa de stari pentru iesirea Q a acestui BB? (3p)

N	R	J	K	C	Q	Obs.
4	0	1	0	0	1	-

Bistabilul JK						
S	R	J	K	CK	Q	Q*
1	0	X	X	X	X	1
0	1	X	X	X	X	0
0	0	0	0	↑	Q	Q
0	0	0	1	↑	X	0
0	0	1	0	↑	X	1
0	0	1	1	↑	Q	!Q

Set
Reset
M
R
S
T

7	0	1	1	1	1	**M**
3	0	0	1	1	1	**M**
2	0	0	0	1	0	**R**
4	0	1	0	0	0	**M**
5	0	1	0	1	0	**M**
2	0	0	0	1	1	**S**
3	0	0	1	1	1	**M**
C	1	1	0	0	0	**Reset R**
2	0	0	0	1	0	**M**
6	0	1	1	0	0	**M**
C	1	1	0	0	0	**Reset**

1110000110000

Bistabilul JK						
S	R	J	K	CK	Q	Q*
1	0	X	X	X	X	1
0	1	X	X	X	X	0
0	0	0	0	↑	Q	Q
0	0	0	1	↑	X	0
0	0	1	0	↑	X	1
0	0	1	1	↑	Q	!Q

Set
Reset
M
R
S
T

Fie un BB de tip D sensibil la tranzitia "+" a semnalului de ceas C. Starea initiala a BB este Q=1. Semnalele de intrare evolueaza in ordinea: SRDC=017028312031. Care este secventa de stari pentru iesirea Q a acestui BB? (3p)

N	**S**	**R**	**D**	**C**	**Q**	**Obs.**
0	0	0	0	0	1	-
1	0	0	0	1	0	R
7	0	1	1	1	0	Reset
0	0	0	0	0	0	Mem
2	0	0	1	0	0	Mem
8	1	0	0	0	1	Set
3	0	0	1	1	0	R
1	0	0	0	1	0	Mem
2	0	0	1	0	0	Mem
0	0	0	0	0	0	Mem
3	0	0	1	1	0	R
1	0	0	0	1	0	Mem

100001000000

Bistabilul D					
S	R	D	CK	Q	Q*
1	0	X	X	X	1
0	1	X	X	X	0
0	0	0	↑	X	0
0	0	1	↑	X	1

Set
Reset
R
S

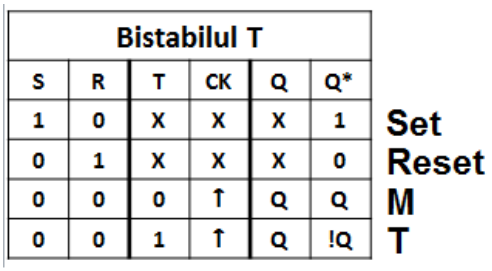
Bistabilul D					
S	R	D	CK	Q	Q*
1	0	X	X	X	1
0	1	X	X	X	0

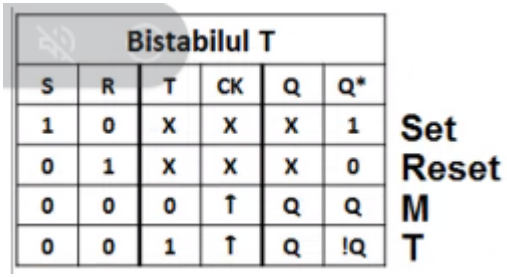
Set
Reset

Fie un BB de tip T sensibil la tranzitia "-" a semnalului de ceas C. Starea initiala a BB este Q=0. Semnalele de intrare evolueaza in ordinea: SRTC=126912302030. Care este secventa de stari pentru iesirea Q a acestui BB? (3p)

N	S	R	T	C	Q	Obs.
1	0	0	0	1	0	-
2	0	0	1	0	0	M
6	0	1	1	0	0	R
9	1	0	0	1	1	S
1	0	0	0	1	1	Mem
2	0	0	1	0	1	M
3	0	0	1	1	1	Mem
0	0	0	0	0	0	T
2	0	0	1	0	0	Mem
0	0	0	0	0	0	Mem
3	0	0	1	1	0	Mem
0	0	0	0	0	1	T

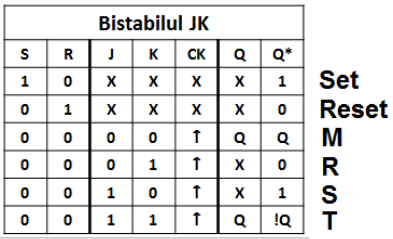
000111100001





Fie un BB de tip JK sensibil la tranzitia "-" a semnalului de ceas C. Starea initiala a BB este Q=0. Semnalul R=0. Semnalele de intrare evolueaza in ordinea: SJKC=15270E6E5201. Care este secventa de stari pentru iesirea Q a acestui BB? (3p)

N	S	J	K	C	Q	Obs.
1	0	0	0	1	0	-
5	0	1	0	1	0	Mem
2	0	0	1	0	1	S
7	0	1	1	1	1	Mem



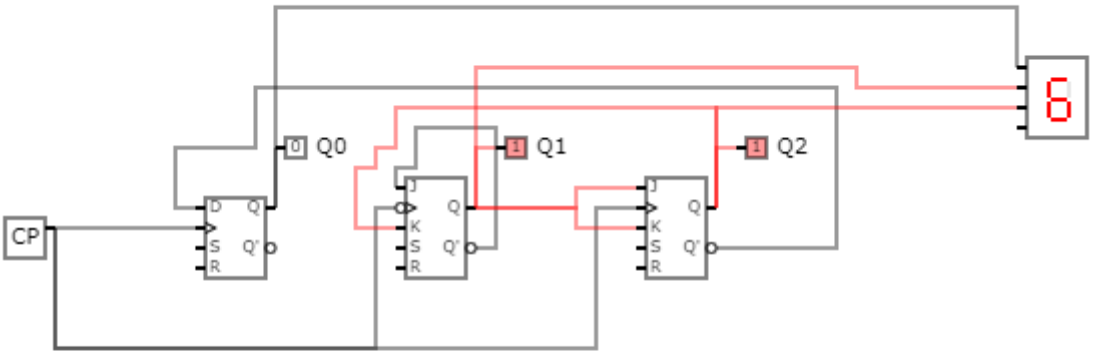
0	0	0	0	0	0	T
E	1	1	1	0	1	Set
6	0	1	1	0	1	Mem
E	1	1	1	0	1	Set
5	0	1	0	1	1	Mem
2	0	0	1	0	1	S
0	0	0	0	0	1	Mem
1	0	0	0	1	1	Mem

Bistabilul JK

S	R	J	K	CK	Q	Q*	
1	0	X	X	X	X	1	Set
0	1	X	X	X	X	0	Reset
0	0	0	0	↑	Q	Q	M
0	0	0	1	↑	X	0	R
0	0	1	0	↑	X	1	S
0	0	1	1	↑	Q	!Q	T

D0=!Q2; J1=!Q1; K1=Q2; T2=Q1

+-+



Clock = 1010101010101010

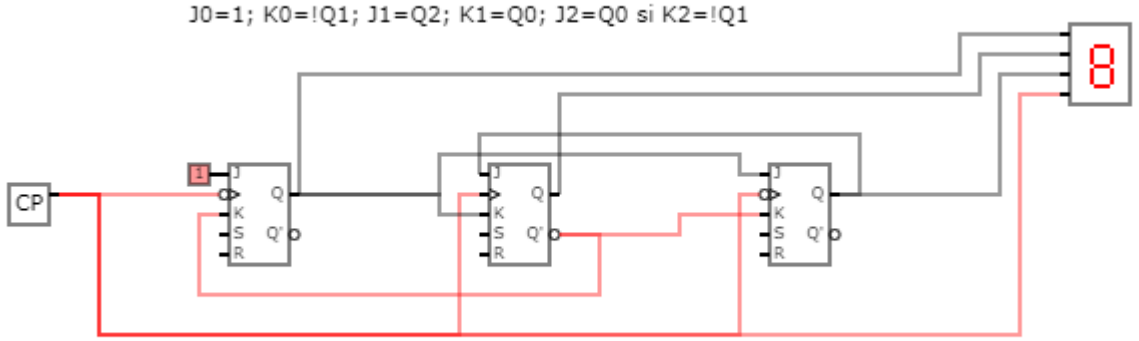
Q2 Q1 Q0= 0275462754627546

Licu Mihai George Grupa 162 Saptamana 14

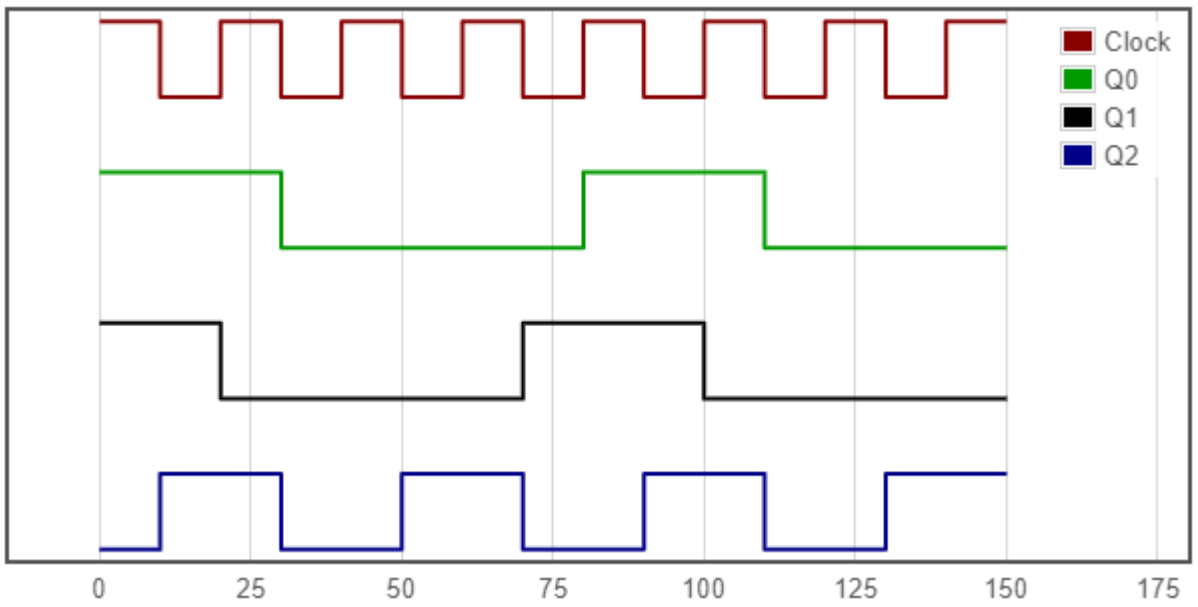
DS6

DS6

J0=1; K0=!Q1; J1=Q2; K1=Q0; J2=Q0 si K2=!Q1



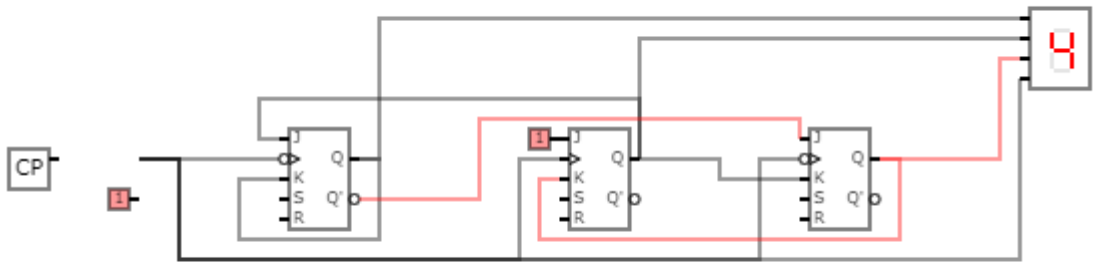
e7d08194 e7d08194



Pn DS6 (slide 7)

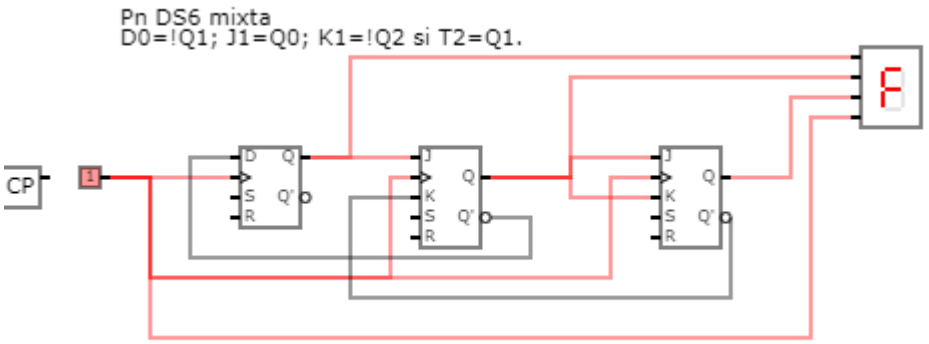
Pn DS6

J0=Q1; K0=Q0; J1=1; K1=Q2; J2=!Q0 si K2=Q1.

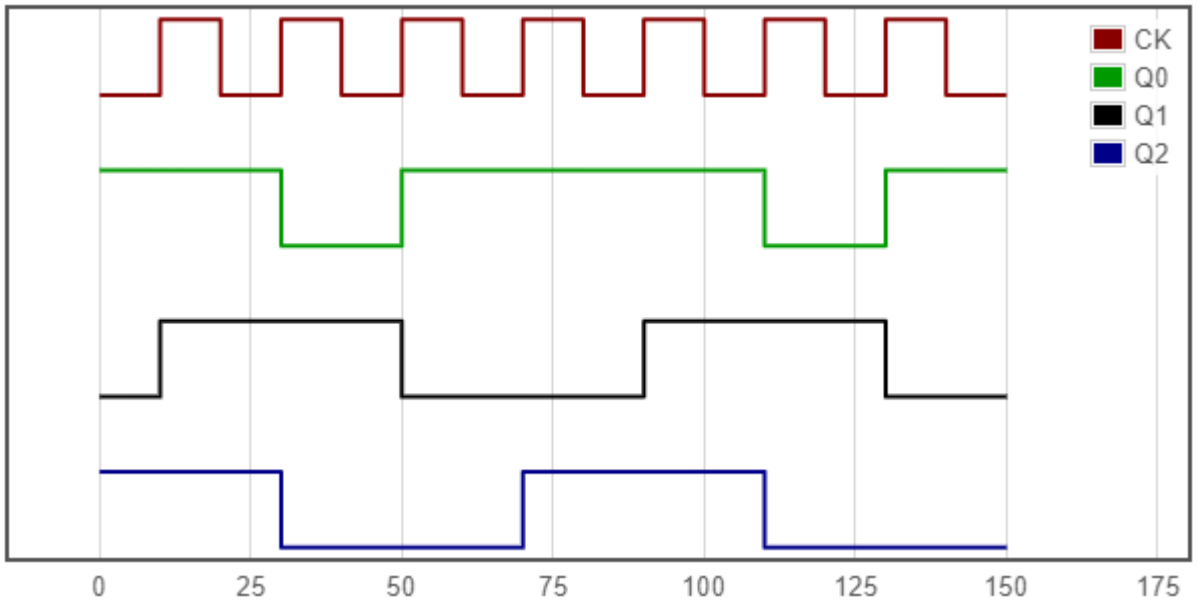


90a7d4e3b2a 7d4e3b2a

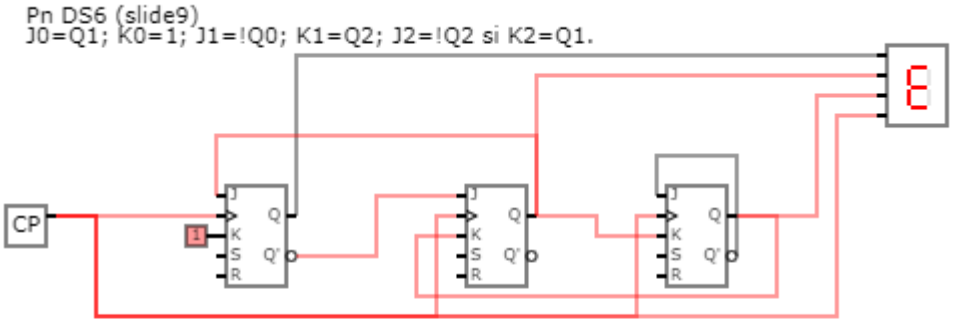
Pn DS6 mixta (slide 8)



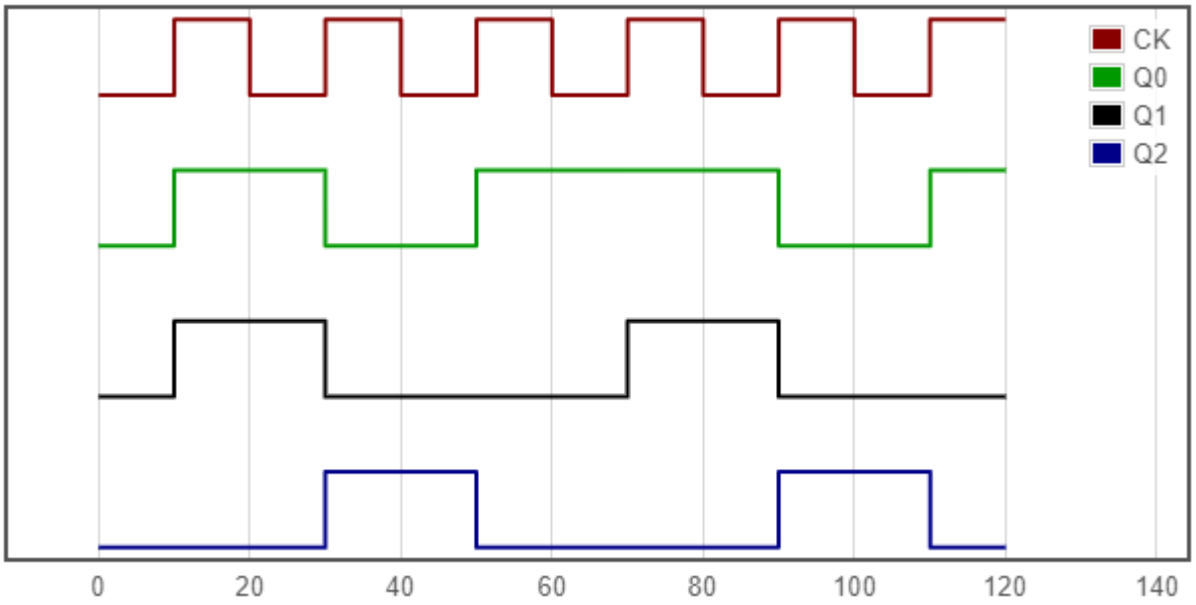
5f7a2c4d



Pn DS6 (slide 9)



0e691c4 e6


CK
Q0
Q1
Q2
0
20
40
60
80
100
120
140