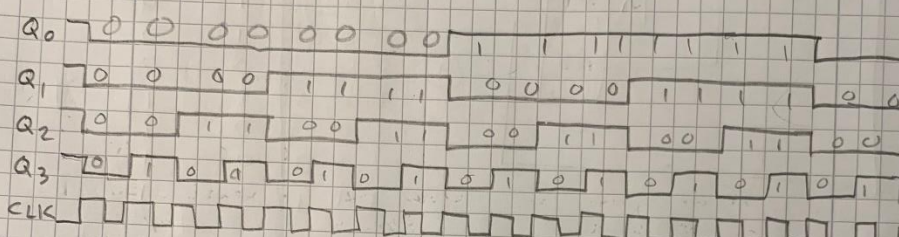
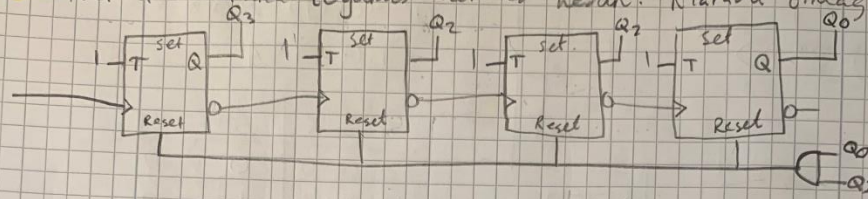


GHSR

Ásdís Valtýsdóttir

Asv29@hi.is

15) Hver er teikningarin teljarsins hér að neðan? Klárðu tímargreifi!

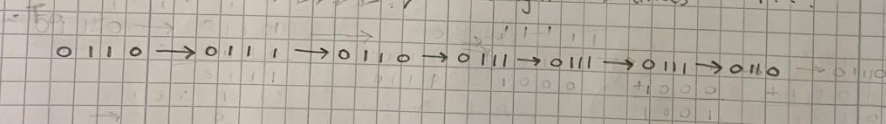


T	Q
0	no change
1	toggle

$$\begin{array}{r} 22.9 \\ 3 \overline{) 22.9} \\ \underline{21} \\ 19 \\ \underline{18} \\ 10 \\ \underline{9} \\ 1 \dots \end{array}$$

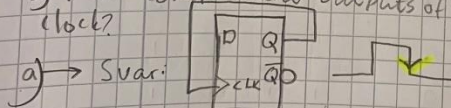
Damaskarnitur 6

6.4 Serial input: 1011100 to the right six times

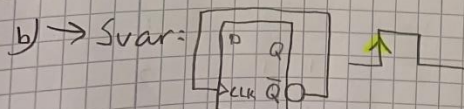


6.11 A binary ripple counter uses flip-flops that trigger on the positive edge of the clock. What will be the count if

- The normal outputs of the flip-flops are connected to the clock.
- The complement outputs of the flip-flops are connected to the clock.



Fallandi klukkupúls



Rísandi klukkupúls

6.14 How many flip-flops will be complemented in a 10-bit binary ripple counter to reach the next count after the following counts?

a) 1001100111 Svar: 4

b) 1111000111 Svar: 9

c) 0000001111 Svar: 10

6.19 The flip-flop input equations for a BCD counter using T flip-flops are given in s.64. Obtain the input equations for a BCD counter that uses a) J-K flip-flops and b) D flip-flop. Compare the 3 designs to determine which one is the most efficient

$$T_{Q1} = 1$$

$$T_{Q2} = \overline{Q_8} Q_1$$

$$T_{Q4} = Q_2 Q_1$$

$$T_{Q8} = Q_8 Q_1 + Q_4 Q_2 Q_1$$

$$y = Q_8 Q_1$$

Present state				Next state				Flip-flop inputs			
A	A	A	A	A	A	A	A	J	K	J	K
0	0	0	0	0	0	0	1	0	X	0	X
0	0	0	1	0	0	1	0	0	X	1	X
0	0	1	0	0	0	1	1	0	X	0	X
0	0	1	1	0	1	0	0	0	X	1	X
0	1	0	0	0	1	0	1	0	X	0	X
0	1	0	1	0	1	1	0	0	X	1	X
0	1	1	0	0	1	1	1	0	X	0	X
0	1	1	1	1	0	0	0	1	X	1	X
1	0	0	0	1	0	0	1	X	0	0	X
1	0	0	1	0	0	0	0	X	1	0	X

b) $D_{Q1} = \overline{Q_1}$

$$D_{Q2} = \sum(1, 2, 5, 6)$$

$$D_{Q4} = \sum(3, 4, 5, 6)$$

$$D_{Q8} = \sum(7, 8)$$

Don't care: $d = \sum(10, 11, 12, 13, 14, 15)$

$$D_{Q2} = Q_2 \overline{Q_1} + \overline{Q_8} \overline{Q_2} Q_1$$

$$D_{Q4} = Q_4 \overline{Q_1} + Q_4 \overline{Q_2} + \overline{Q_4} Q_2 Q_1$$

$$D_{Q8} = Q_8 \overline{Q_1} + Q_4 Q_2 Q_1$$

$$J_{A1} = 1$$

$$K_{A1} = 1$$

$$J_{A2} = A_1 A_8$$

$$K_{A2} = A_1$$

$$J_{A4} = A_1 A_2$$

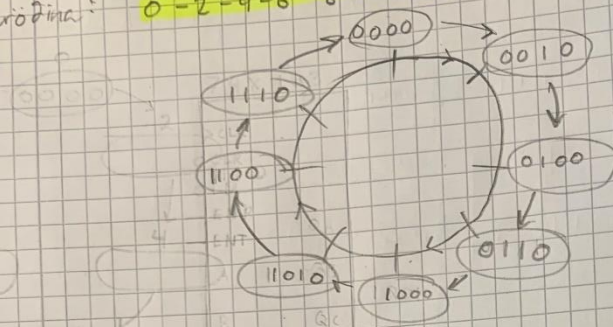
$$K_{A4} = A_1 A_2$$

$$J_{A8} = A_1 A_2 A_4$$

$$K_{A8} = A_1$$

$$d(A_3, A_4, A_2, A_1) = \sum(10, 11, 12, 13, 14, 15)$$

6.AO Útfarið taktvísan (e. synchronous) binary counter sem hefur
tölnariðina: 0-2-4-6-8-10-12-14



Present State		Next State
$Q_3 Q_2 Q_1 Q_0$		$Q_3 Q_2 Q_1 Q_0$
0000	0	0010
0010	2	0100
0100	4	0110
0110	6	1000
1000	8	1010
1010	10	1100
1100	12	1110
1110	14	0000

Flip-flop inputs				
D_3	D_2	D_1	D_0	
0	0	1	0	
0	1	0	0	
0	1	1	0	
1	0	0	0	
1	0	1	0	
1	1	0	0	
1	1	1	0	
0	0	0	0	

$D_3 \quad Q(t+1) = \overline{Q_2} \overline{Q_1} \overline{Q_0} + Q_3 \overline{Q_0}$

$Q_3 Q_2$	$Q_1 Q_0$	00	01	11	10
00	00	1	0	0	0
00	01	0	0	0	0
00	11	0	0	0	0
00	10	0	0	0	0
01	00	0	0	0	0
01	01	0	0	0	0
01	11	0	0	0	0
01	10	0	0	0	0

$D_2 \quad Q(t+1) = \overline{Q_2} \overline{Q_1} \overline{Q_0} + \overline{Q_2} Q_1 \overline{Q_0}$

$Q_3 Q_2$	$Q_1 Q_0$	00	01	11	10
00	00	0	0	0	1
00	01	0	0	0	0
00	11	0	0	0	0
00	10	0	0	0	0
01	00	0	0	0	0
01	01	0	0	0	0
01	11	0	0	0	0
01	10	0	0	0	0

$D_1 \quad Q(t+1) = \overline{Q_1} \overline{Q_0}$

$Q_3 Q_2$	$Q_1 Q_0$	00	01	11	10
00	00	1	0	0	0
00	01	1	0	0	0
00	11	1	0	0	0
00	10	1	0	0	0
01	00	1	0	0	0
01	01	1	0	0	0
01	11	1	0	0	0
01	10	1	0	0	0

$D_0 \quad Q(t+1) = 0$

$Q_3 Q_2$	$Q_1 Q_0$	00	01	11	10
00	00	0	0	0	0
00	01	0	0	0	0
00	11	0	0	0	0
00	10	0	0	0	0
01	00	0	0	0	0
01	01	0	0	0	0
01	11	0	0	0	0
01	10	0	0	0	0

$$P_3 \rightarrow Q(t+1) = \overline{Q_2} \overline{Q_1} \overline{Q_0} + Q_3 \overline{Q_0} \rightarrow D_3$$

$$D_2 \rightarrow Q(t+1) = Q_2 \overline{Q_1} \overline{Q_0} + \overline{Q_2} Q_1 \overline{Q_0} \rightarrow D_1$$

$$D_1 \rightarrow Q(t+1) = \overline{Q_1} \overline{Q_0} \rightarrow D_0$$

$$D_0 \rightarrow Q(t+1) = 0$$

y?

