Design of Sequential Circuits-2

Monday, May 18, 2020 9:52 AM

JK ل JK

J	K	Q_{t+1}
0	0	Q_t
0	1	0
1	0	1
1	1	Q'_t

Characteristic Table

Q_t	Q_{t+1}	J	K
0	0	0	X
0	1	1	X
1	0	X	1
1	1	X	0

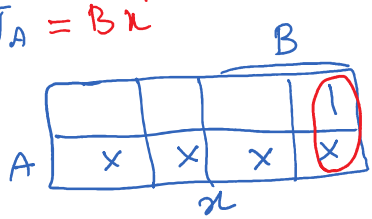
Excitation Table

Present State A_t	Present State B_t	Input x	Next State A_{t+1}	Next State B_{t+1}	J_A	K_A	J_B	K_B
0	0	0	0	0	0	X	0	X
0	0	1	0	1	0	X	1	X
0	1	0	1	0	1	X	X	1
0	1	1	0	1	0	X	X	0
1	0	0	1	0	X	0	0	X
1	0	1	1	1	X	0	1	X
1	1	0	1	1	X	0	X	0
1	1	1	0	0	X	1	X	1

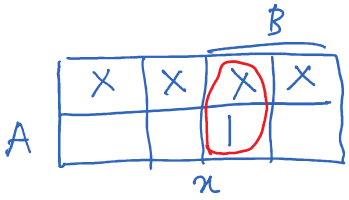
$J_A = \sum(2)$ $d = \sum(4,5,6,7)$ $K_A = \sum(7)$ $d = \sum(0,1,2,3)$

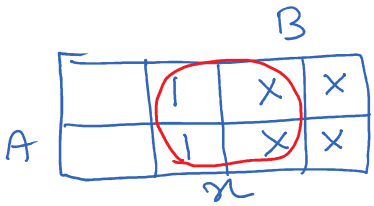
$J_B = \sum(1,5)$ $d = \sum(2,3,6,7)$ $K_B = \sum(2,7)$ $d = \sum(0,1,4,5)$

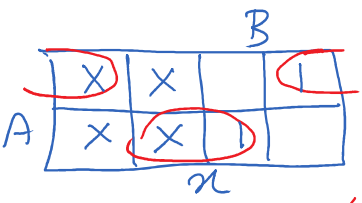
$J_A = Bx'$



$K_A = Bx$



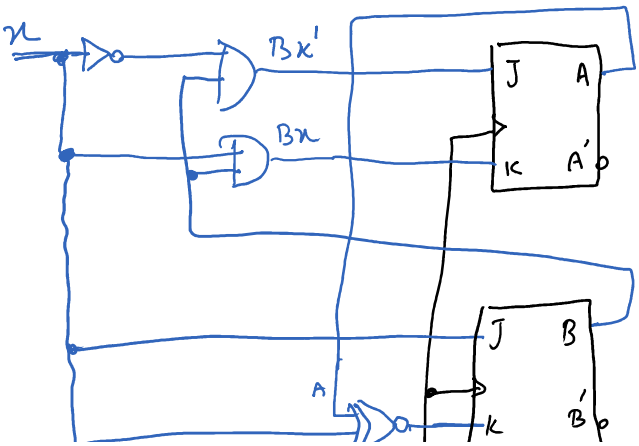


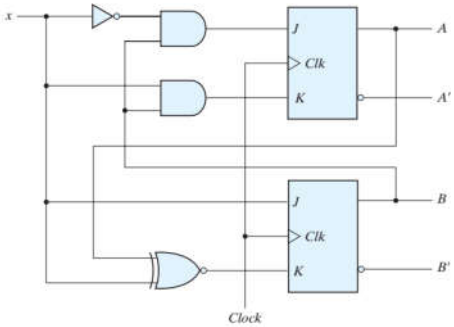


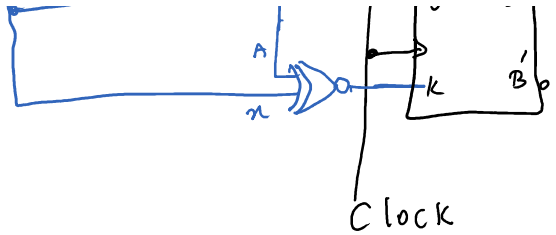
$J_B = x$

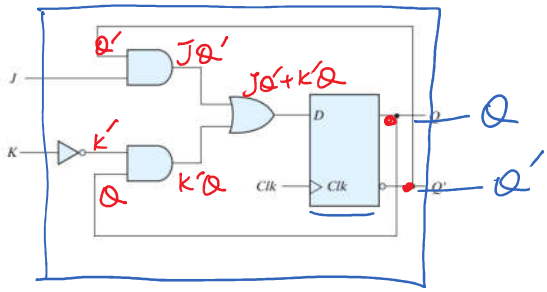
$K_B = Ax + A'x' = A \odot x = (A \oplus x)'$

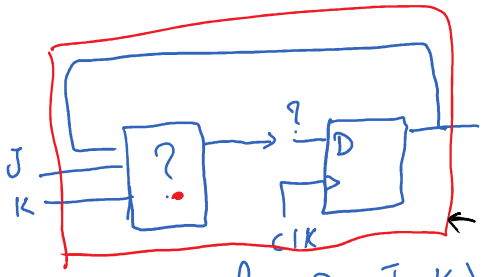
$J_A = Bx'$ $K_A = Bx$











$D = f(Q_t, J, K)$

$D = ?$

تبدیل فلیپ فلاپ به یکدیگر

می خواهیم با استفاده از یک D.FF، یک JK FF درست کنیم.

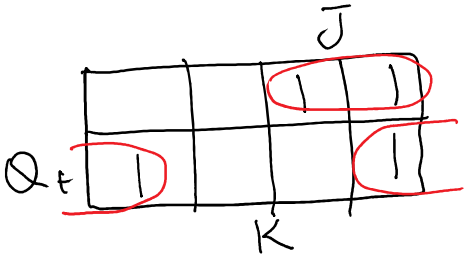
Q_t	Q_{t+1}	J	K	D	T	S	R	S	R
0	0	0	X	0	0	0,0	0,1	0	X
0	1	1	X	1	1	1	0	1	0
1	0	X	1	0	1	0	1	0	1
1	1	X	0	1	0	0,1	0,0	X	0

S	R	Q_{t+1}
0	0	Q_t
0	1	0
1	0	1
1	1	غیرمجاز X

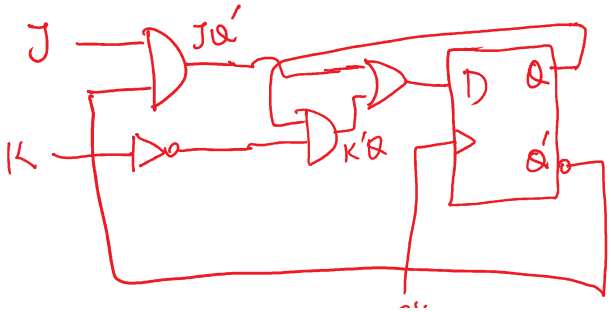
Q_t	J	K	D
0	0	X	0
0	1	X	1
1	X	1	0
1	X	0	1

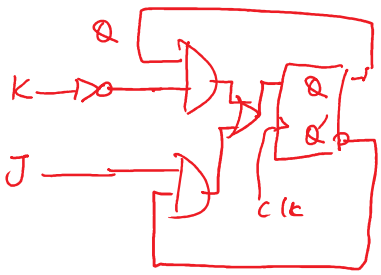
Q_t	J	K	
0	1	X	0 1 0 m_2
			0 1 1 m_3
1	X	0	1 0 0 m_4
			1 1 0 m_6

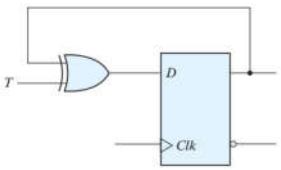
$D = f(Q_t, J, K) = \sum(2,3,4,6)$



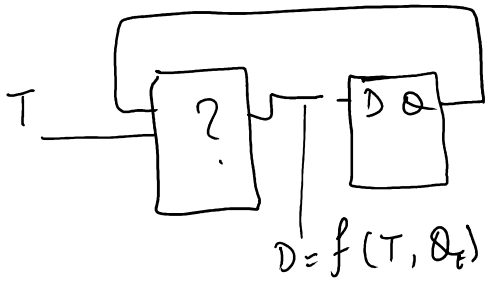
$D = K'Q + JQ'$





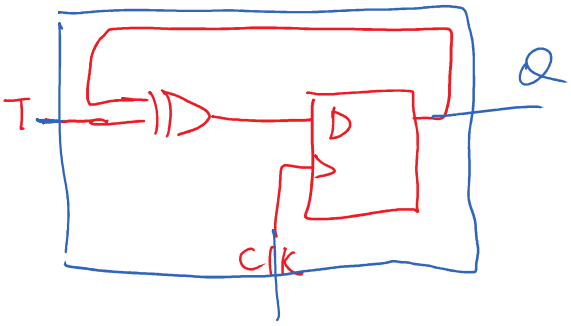


می خواهیم با استفاده از یک D FF یک T FF درست کنیم

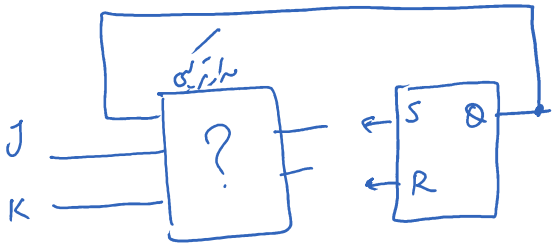


Q	T	D	
0	0	0	
0	1	1	←
1	1	0	
1	0	1	←

$D = Q'T + QT' = Q \oplus T$



می خواهیم با استفاده از SR FF یک JK FF درست کنیم



$S = f_1(Q_t, J, K) = ?$

$R = f_1(Q_t, J, K) = ?$

Q_t	J	K	S	R
0	0	X	0	⊗
0	1	X	1	0
1	X	1	0	1
1	X	0	⊗	0

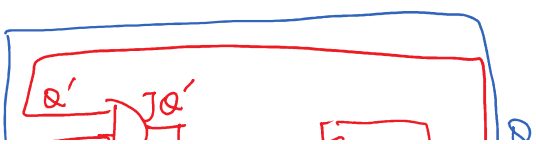
$S = \sum(2,3) + d = \sum(4,6)$

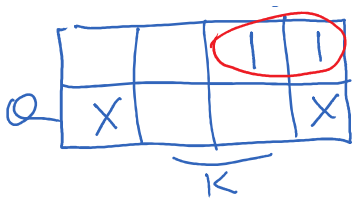
S:	1	0 1 X	0 1 0	m_2
	X	1 X 0	0 1 1	m_3
			1 0 0	m_4
			1 1 0	m_6

$R = \sum(5,7) + d = \sum(0,1)$

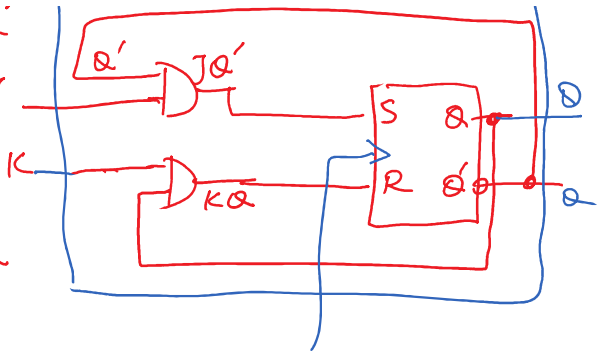
R:	1	1 X 1	1 0 1	m_5
	X	0 0 X	1 1 1	m_7
			0 0 0	m_0
			0 0 1	m_1

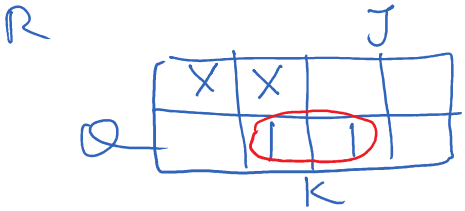
$S = JQ'$





$S = JQ'$





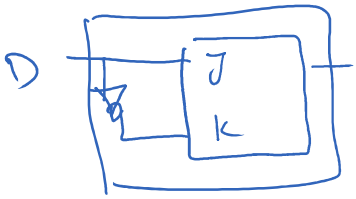
$R = KQ$

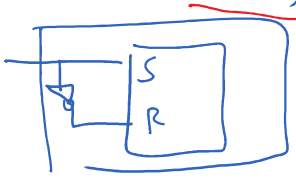
$JK \leftarrow T \leftarrow D \leftarrow \overline{SR}$

$SR \leftarrow T \leftarrow D \leftarrow JK$

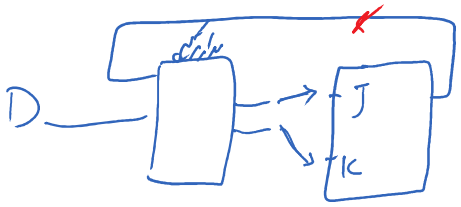
$SR \;,\; (T) \;,\; (JK) \leftarrow (D)$

$SR \;,\; D \;,\; JK \leftarrow T$





برای استفاده از یک JK به جای D می‌خواهیم



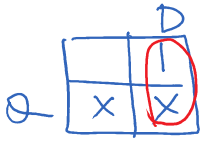
$J = f_1(Q, D) = D$

$K = f_2(Q, D) = D'$

Q	D	J	K
0	0	0	X
0	1	1	X
1	0	X	1
1	1	X	0

J : 1 0 1 m_1

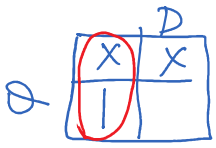
d { 1 0 m_2 ; 1 1 m_3



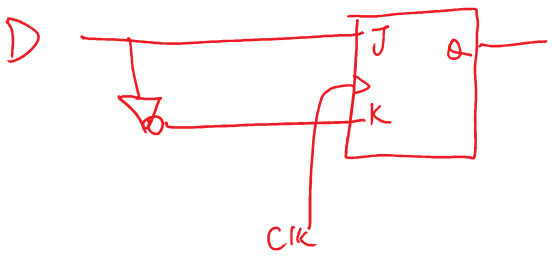
$J = D$

K : 1 1 0 m_2

d { 0 0 m_0 ; 0 1 m_1



$K = D'$



→ Registers


clk
Registers
Counters