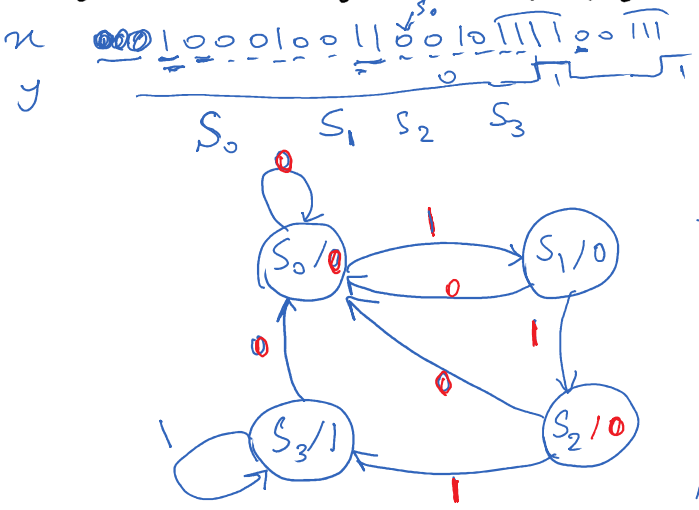
Design of Sequential Circuits

Tuesday, May 12, 2020 3:53 PM

می‌خواهیم مداری طراحی کنیم که به کمک آن سه 1 (و یا بیشتر) متوالی در یک رشته بیتی وارده از طریق یک خط ورودی شناسایی شوند. نمودار حالت مدار در شکل ۲۴-۵ نشان داده شده است. این



حالت فعلی		ورودی	حالت بعدی		خروجی
A_t	B_t	x	A_{t+1}	B_{t+1}	y
0	0	0	0	0	0
0	0	1	0	1	0
0	1	0	0	0	0
0	1	1	1	0	0
1	0	0	0	0	0
1	0	1	1	1	0
1	1	0	0	0	1
1	1	1	1	1	1

D_A D_B

جدول حالت

با فلیپ فلاپ D طراحی را انجام میدهیم

D	Q_{t+1}
0	0
1	1

$Q_{t+1} = D$

Q_{t+1}	D
0	0
1	1

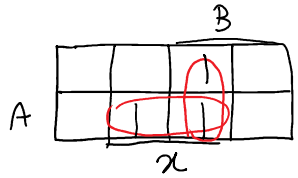
$D = Q_{t+1}$

$\begin{cases} D_A = A_{t+1} \\ D_B = B_{t+1} \end{cases}$

A_{t+1}	B_{t+1}	x	D_A	D_B	y
0	0	0	0	0	0
0	0	1	0	1	0
0	1	0	0	0	0
m_3 0	1	1	1	0	0
1	0	0	0	0	0
1	0	1	1	1	0
1	1	0	0	0	1
1	1	1	1	1	1

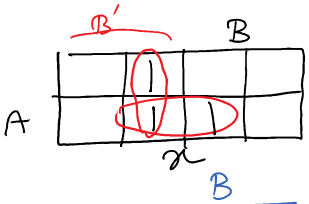
$D_A = \sum(3,5,7)$

$D_B = \sum(1,5,7)$



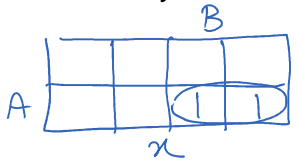
$D_A = Ax + Bx$

$= (A+B)x$

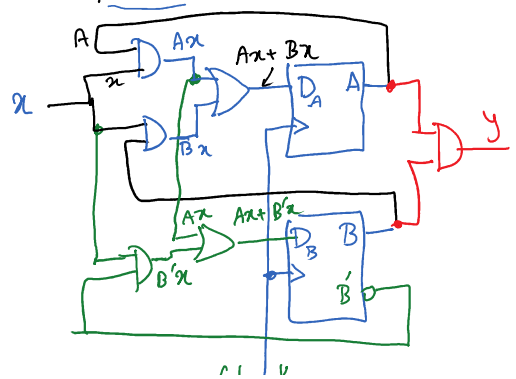


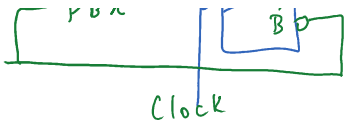
$D_B = Ax + B\acute{x}$

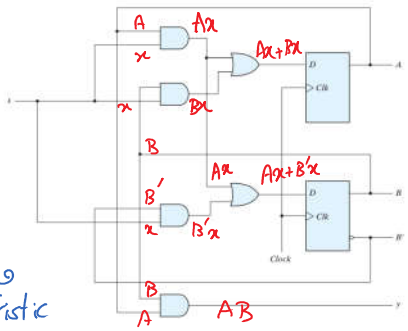
$= (A+\acute{B})x$



$y = AB$







D	Q_{t+1}
0	0
1	1

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

جدول مشخصه Characteristic Table

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

Q_t	Q_{t+1}	D
0	0	0
1	1	1

Q, P مدار قبلی با استفاده از JK FF

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

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

جدول تحریک Excitation Table

A_t	B_t	x	A_{t+1}	B_{t+1}	y	J_A	K_A	J_B	K_B
0	0	0	0	0	0	0	X	0	X
0	0	1	0	1	0	0	X	1	X
0	1	0	0	0	0	0	X	X	1
0	1	1	1	0	0	1	X	X	1
1	0	0	0	0	0	X	1	0	X
1	0	1	1	1	0	X	0	1	X
1	1	0	0	0	1	X	1	X	1
1	1	1	1	1	1	X	0	X	0

m_3

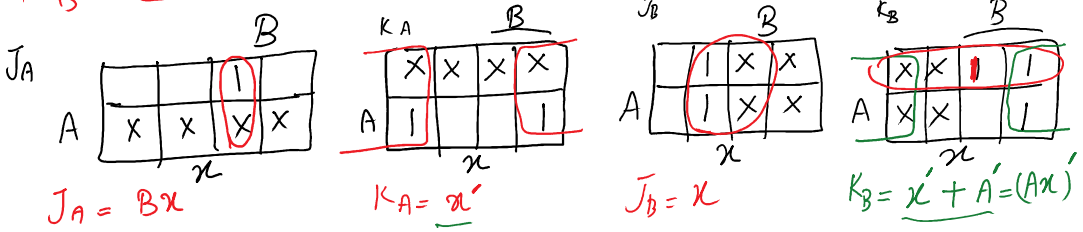
$y = \sum(6,7)$

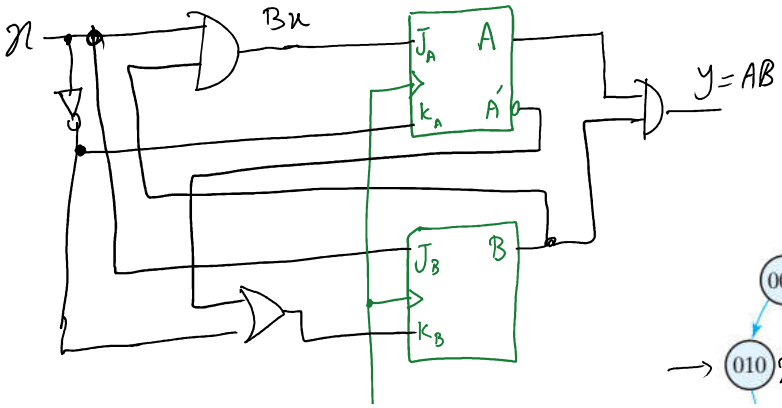
$J_A = \sum(3), \ d\sum(4,5,6,7)$

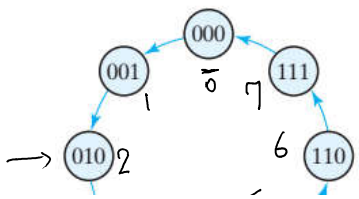
$K_A = \sum(4,6) \ d\sum(0,1,2,3)$

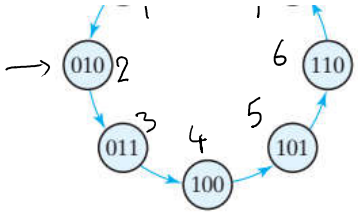
$J_B = \sum(1,5) \ d\sum(2,3,6,7)$

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









شمارنده
Counter

طرح مدار با استفاده از T FF

حالت فعلی A_2	A_1	A_0	حالت بعدی A_2	A_1	A_0	T_{A_2}	T_{A_1}	T_{A_0}
0 → 0	0	0	0	0	1	0	0	1
1 → 0	0	1	0	1	0	0	1	1
2 → 0	1	0	0	1	1	0	0	1
3 → 0	1	1	1	0	0	1	1	1
4 → 1	0	0	1	0	1	0	0	1
5 → 1	0	1	1	1	0	0	1	1
6 → 1	1	0	1	1	1	0	0	1
7 → 1	1	1	0	0	0	1	1	1

State Table جدول حالت

T	Q_{t+1}
→ 0	Q_t
1	Q'_t

جدول تحریک

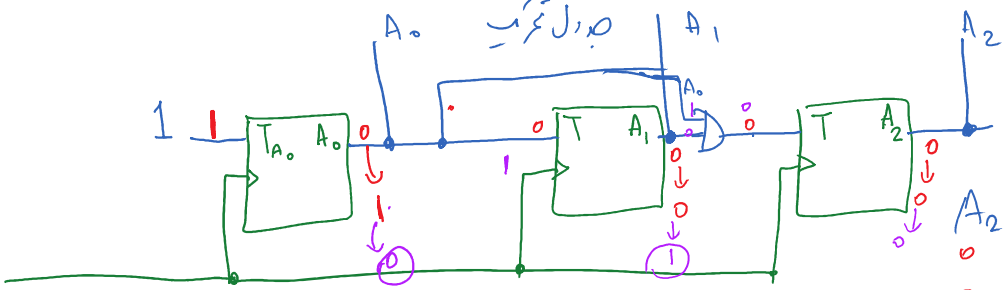
Q_t	Q_{t+1}	T
→ 0	0	0
→ 0	1	1
→ 1	0	1
→ 1	1	0

$T_{A_2} = \sum(3,7)$

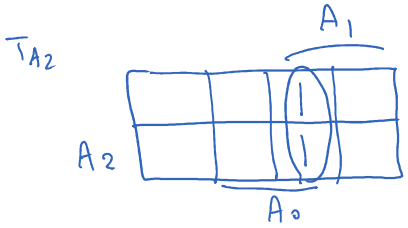
$T_{A_1} = \sum(1,3,5,7)$

$T_{A_0} = 1$

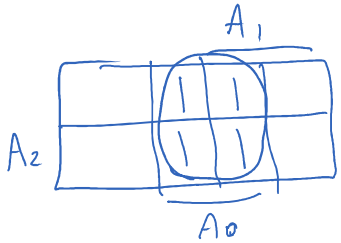
$A_2\ A_1\ A_0$



A_2	A_1	A_0
0	0	0
0	0	1
0	1	0
⋮		
1	1	1



$T_{A_2} = A_1 A_0$



$T_{A_1} = A_0$

$T_{A_0} = 1$