Homework 7 question 4 (12.17)

Truth Table for D Flip Flop

A	B	C	D	A^+	B^+	C^+	D^+	D_A	D_B	D_C	D_D
0	0	0	0	0	0	0	1	0	0	0	1
0	0	0	1	0	0	1	0	0	0	1	0
0	0	1	0	0	0	1	1	0	0	1	1
0	0	1	1	0	1	0	0	0	1	0	0
0	1	0	0	0	1	0	1	0	1	0	1
0	1	0	1	0	1	1	0	0	1	1	0
0	1	1	0	0	1	1	1	0	1	1	1
0	1	1	1	1	0	0	0	1	0	0	0
1	0	0	0	1	0	0	1	1	0	0	1
1	0	0	1	0	0	0	0	0	0	0	0
1	0	1	0	X	X	X	X	X	X	X	X
1	0	1	1	X	X	X	X	X	X	X	X
1	1	0	0	X	X	X	X	X	X	X	X
1	1	0	1	X	X	X	X	X	X	X	X
1	1	1	0	X	X	X	X	X	X	X	X
1	1	1	1	X	X	X	X	X	X	X	X

$D_A = BCD + AD'$

CD\AB	00	01	11	10
00	0	0	X	1
01	0	0	X	0
11	0	1	X	X
10	0	0	X	X

$D_B = B'CD + BC' + BD'$

CD\AB	00	01	11	10
00	0	1	X	0
01	0	1	X	0
11	1	0	X	X
10	0	1	X	X

$D_C = A'C'D' + CD'$

CD\AB	00	01	11	10
00	0	0	X	0
01	1	1	X	0
11	0	0	X	X
10	1	1	X	X

$D_D = D'$

CD\AB	00	01	11	10
00	1	1	X	1
01	0	0	X	0
11	0	0	X	X
10	1	1	X	X

Truth Table for JK Flip Flop
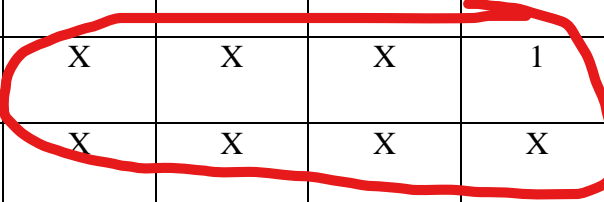
A	B	C	D	A^+	B^+	C^+	D^+	J_A	K_A	J_B	K_B	J_C	K_C	J_D	K_D
0	0	0	0	0	0	0	1	0	X	0	X	0	X	1	X
0	0	0	1	0	0	1	0	0	X	0	X	1	X	X	1
0	0	1	0	0	0	1	1	0	X	0	X	X	0	1	X
0	0	1	1	0	1	0	0	0	X	1	X	X	1	X	1
0	1	0	0	0	1	0	1	0	X	X	0	0	X	1	X
0	1	0	1	0	1	1	0	0	X	X	0	1	X	X	1
0	1	1	0	0	1	1	1	0	X	X	0	X	0	1	X
0	1	1	1	1	0	0	0	1	X	X	1	X	1	X	1
1	0	0	0	1	0	0	1	X	0	0	X	0	X	1	X
1	0	0	1	0	0	0	0	X	1	0	X	0	X	X	1
1	0	1	0	X	X	X	X	X	X	X	X	X	X	X	X
1	0	1	1	X	X	X	X	X	X	X	X	X	X	X	X
1	1	0	0	X	X	X	X	X	X	X	X	X	X	X	X
1	1	0	1	X	X	X	X	X	X	X	X	X	X	X	X
1	1	1	0	X	X	X	X	X	X	X	X	X	X	X	X
1	1	1	1	X	X	X	X	X	X	X	X	X	X	X	X

$J_A = BCD$

CD\AB	00	01	11	10
00	0	0	X	X
01	0	0	X	X
11	0	1	X	X
10	0	0	X	X
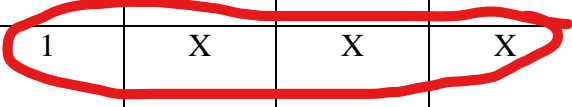
$K_A = D$

CD\AB	00	01	11	10
00	X	X	X	0
01	X	X	X	1
11	X	X	X	X
10	0	X	X	X

$J_B = CD$

CD\AB	00	01	11	10
00	0	X	X	0
01	0	X	X	0
11	1	X	X	X
10	0	X	X	X

$K_B = CD$

CD\AB	00	01	11	10
00	X	0	X	X
01	X	0	X	X
11	X	1	X	X
10	X	0	X	X

$J_C = A'D$

CD\AB	00	01	11	10
00	0	0	X	0
01	1	1	X	0
11	X	X	X	X
10	X	X	X	X

$K_C = D$
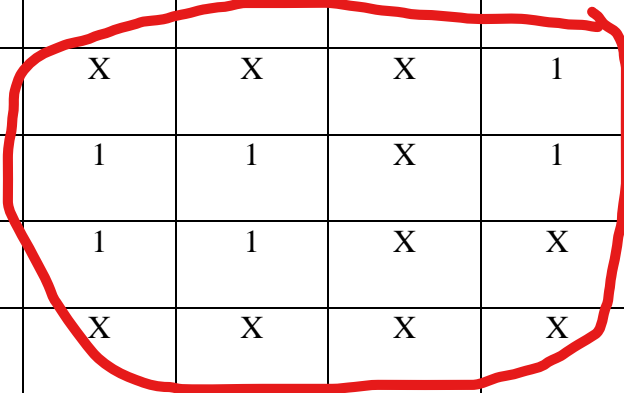
CD\AB	00	01	11	10
00	X	X	X	0
01	X	X	X	X
11	1	1	X	X
10	0	0	X	X

$J_D = 1$

CD\AB	00	01	11	10
00	1	1	X	1
01	X	X	X	X
11	X	X	X	X
10	1	1	X	X

$K_D = 1$

CD\AB	00	01	11	10
00	X	X	X	1
01	1	1	X	1
11	1	1	X	X
10	X	X	X	X

Truth Table for SR Flip Flop
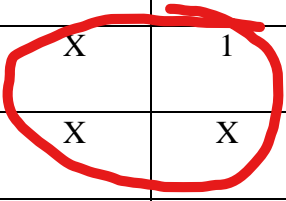
A	B	C	D	A^+	B^+	C^+	D^+	S_A	R_A	S_B	R_B	S_C	R_C	S_D	R_D
0	0	0	0	0	0	0	1	0	X	0	X	0	X	1	0
0	0	0	1	0	0	1	0	0	X	0	X	1	0	0	1
0	0	1	0	0	0	1	1	0	X	0	X	X	0	1	0
0	0	1	1	0	1	0	0	0	X	1	0	0	1	0	1
0	1	0	0	0	1	0	1	0	X	X	0	0	X	1	0
0	1	0	1	0	1	1	0	0	X	X	0	1	0	0	1
0	1	1	0	0	1	1	1	0	X	X	0	X	0	1	0
0	1	1	1	1	0	0	0	1	0	0	1	0	1	0	1
1	0	0	0	1	0	0	1	X	0	0	X	0	X	1	0
1	0	0	1	0	0	0	0	0	1	0	X	0	X	0	1
1	0	1	0	X	X	X	X	X	X	X	X	X	X	X	X
1	0	1	1	X	X	X	X	X	X	X	X	X	X	X	X
1	1	0	0	X	X	X	X	X	X	X	X	X	X	X	X
1	1	0	1	X	X	X	X	X	X	X	X	X	X	X	X
1	1	1	0	X	X	X	X	X	X	X	X	X	X	X	X
1	1	1	1	X	X	X	X	X	X	X	X	X	X	X	X

$S_A = BCD$

CD\AB	00	01	11	10
00	0	0	X	X
01	0	0	X	0
11	0	1	X	X
10	0	0	X	X
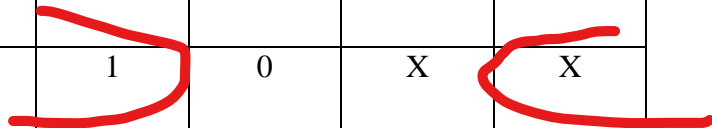
$R_A = AD$

CD\AB	00	01	11	10
00	X	X	X	0
01	X	X	X	1
11	X	0	X	X
10	X	X	X	X
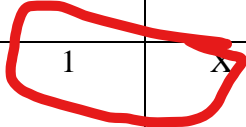
$S_B = B'CD$

CD\AB	00	01	11	10
00	0	X	X	0
01	0	X	X	0
11	1	0	X	X
10	0	X	X	X

$R_B = BCD$

CD\AB	00	01	11	10
00	X	0	X	0
01	X	0	X	0
11	0	1	X	X
10	X	0	X	X

$S_C = A'C'D$

CD\AB	00	01	11	10
00	X	0	X	0
01	X	1	X	0
11	0	0	X	X
10	X	X	X	X

$R_C = CD$
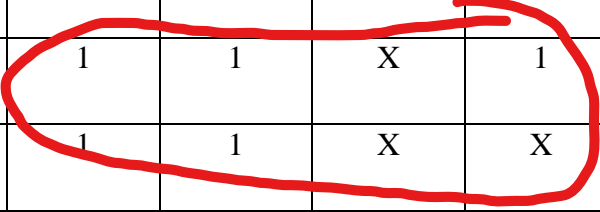
CD\AB	00	01	11	10
00	X	X	X	0
01	0	0	X	0
11	1	1	X	X
10	0	0	X	X

$S_D = D'$

CD\AB	00	01	11	10
00	1	1	X	1
01	0	0	X	0
11	0	0	X	X
10	1	1	X	X

$R_D = D$

CD\AB	00	01	11	10
00	0	0	X	0
01	1	1	X	1
11	1	1	X	X
10	0	0	X	X

Truth Table for T Flip Flop

A	B	C	D	A^+	B^+	C^+	D^+	T_A	T_B	T_C	T_D
0	0	0	0	0	0	0	1	0	0	0	1
0	0	0	1	0	0	1	0	0	0	1	1
0	0	1	0	0	0	1	1	0	0	0	1
0	0	1	1	0	1	0	0	0	1	1	1
0	1	0	0	0	1	0	1	0	0	0	1
0	1	0	1	0	1	1	0	0	0	1	1
0	1	1	0	0	1	1	1	0	0	0	1
0	1	1	1	1	0	0	0	1	1	1	1
1	0	0	0	1	0	0	1	0	0	0	1
1	0	0	1	0	0	0	0	1	0	0	1
1	0	1	0	X	X	X	X	X	X	X	X
1	0	1	1	X	X	X	X	X	X	X	X
1	1	0	0	X	X	X	X	X	X	X	X
1	1	0	1	X	X	X	X	X	X	X	X
1	1	1	0	X	X	X	X	X	X	X	X
1	1	1	1	X	X	X	X	X	X	X	X

$T_A = BCD + AD$

CD\AB	00	01	11	10
00	0	0	X	1
01	0	0	X	1
11	0	1	X	X
10	0	0	X	X

$T_B = CD$

CD\AB	00	01	11	10
00	0	0	X	0
01	0	0	X	0
11	1	1	X	X
10	0	0	X	X

$T_C = A'D$

CD\AB	00	01	11	10
00	0	0	X	0
01	1	1	X	0
11	1	1	X	X
10	0	0	X	X

$T_D = 1$

CD\AB	00	01	11	10
00	1	1	X	1
01	1	1	X	1
11	1	1	X	X
10	1	1	X	X