1.

T flip-flop

T	Q_{next}
0	Q
1	Q'

Q	Q_{next}	T
0	0	0
0	1	1
1	0	1
1	1	0

JK flip-flop

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

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

SR flip-flop

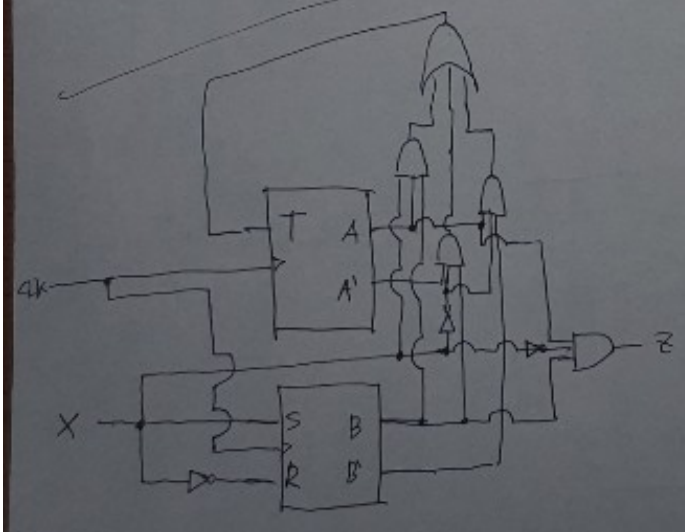
S	R	Q_{next}
0	0	Q
0	1	0
1	0	1
1	1	X

Q	Q_{next}	S	R
0	0	0	X
0	1	1	0
1	0	0	1
1	1	X	0

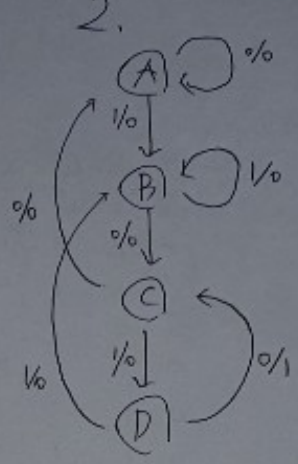
D flip-flop

D	Q_{next}
0	0
1	1

Q	Q_{next}	D
0	0	0
0	1	1
1	0	0
1	1	1



2.



	AB
A=	00
B=	01
C=	10
D=	11

A	B	X	A*	B*	Z	T_A	S_B	R_B
0	0	0	0	0	0	0	0	X
0	0	1	0	1	0	0	1	0
0	1	0	1	0	0	1	0	1
0	1	1	0	1	0	0	X	0
1	0	0	0	0	0	1	0	X
1	0	1	1	1	0	0	1	0
1	1	0	1	0	1	0	0	1
1	1	1	0	1	0	1	X	0

T_A:

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

$= ABX' + ABX + AB'X'$

S_B:

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

$= X$

R_B:

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

$= X'$

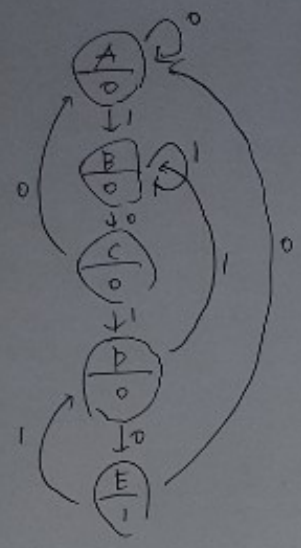
Z:

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

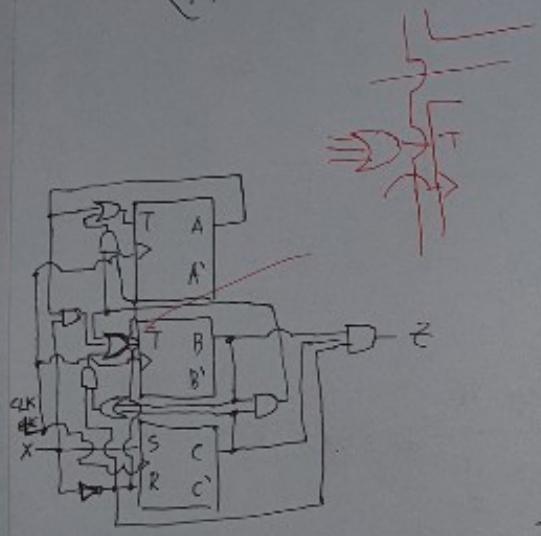
$= ABX'$

3.

	A B C
A =	0 0 0
B =	0 0 1
C =	0 1 0
D =	0 1 1
E =	1 0 0



A	B	C	X	A*	B*	C*	Z	T_A	T_B	S_C	R_C
0	0	0	0	0	0	0	0	0	0	0	X
0	0	0	1	0	0	1	0	0	0	1	0
0	0	1	0	0	1	0	0	0	1	0	1
0	0	1	1	0	0	1	0	0	0	X	0
0	1	0	0	0	0	0	0	0	1	0	X
0	1	0	1	0	1	1	0	0	0	1	0
0	1	1	0	1	0	0	1	1	1	0	1
0	1	1	1	0	0	1	0	0	1	X	0
1	0	0	0	0	0	0	0	1	0	0	X
1	0	0	1	0	1	1	0	1	1	1	0



Z =

AB \ CX	00	01	11	10
00	0	0	-	0
01	0	0	-	0
11	0	0	-	-
10	0	1	-	-

$= \cancel{ABCX'}$

BCX'

T_A =

AB \ CX	00	01	11	10
00	0	0	-	1
01	0	0	-	1
11	0	0	-	-
10	0	1	-	-

$= A + BCX'$

T_B

AB \ CX	00	01	11	10
00	0	1	-	0
01	0	0	-	1
11	0	1	-	-
10	1	1	-	-

$= BX' + AX + BC + CX'$

R_C

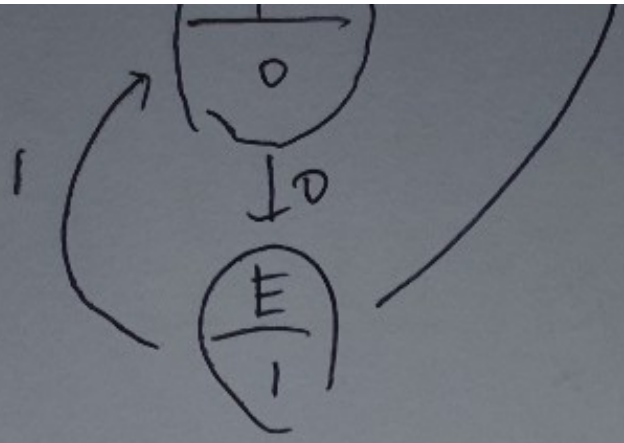
AB \ CX	00	01	11	10
00	X	X	-	X
01	0	0	-	0
11	0	0	-	-
10	1	1	-	-

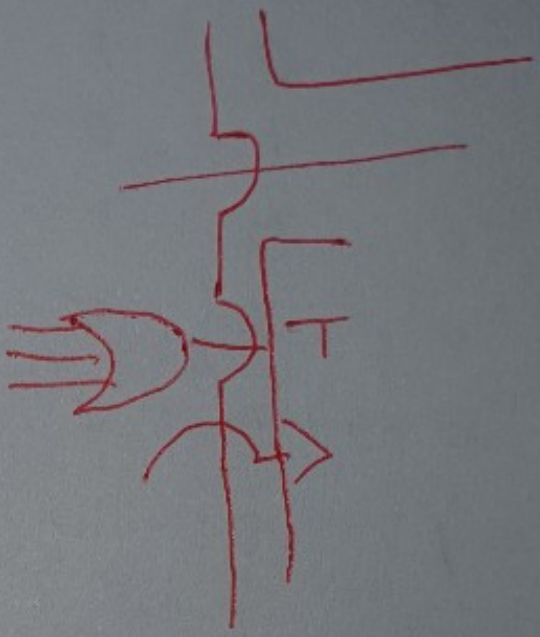
$= X'$

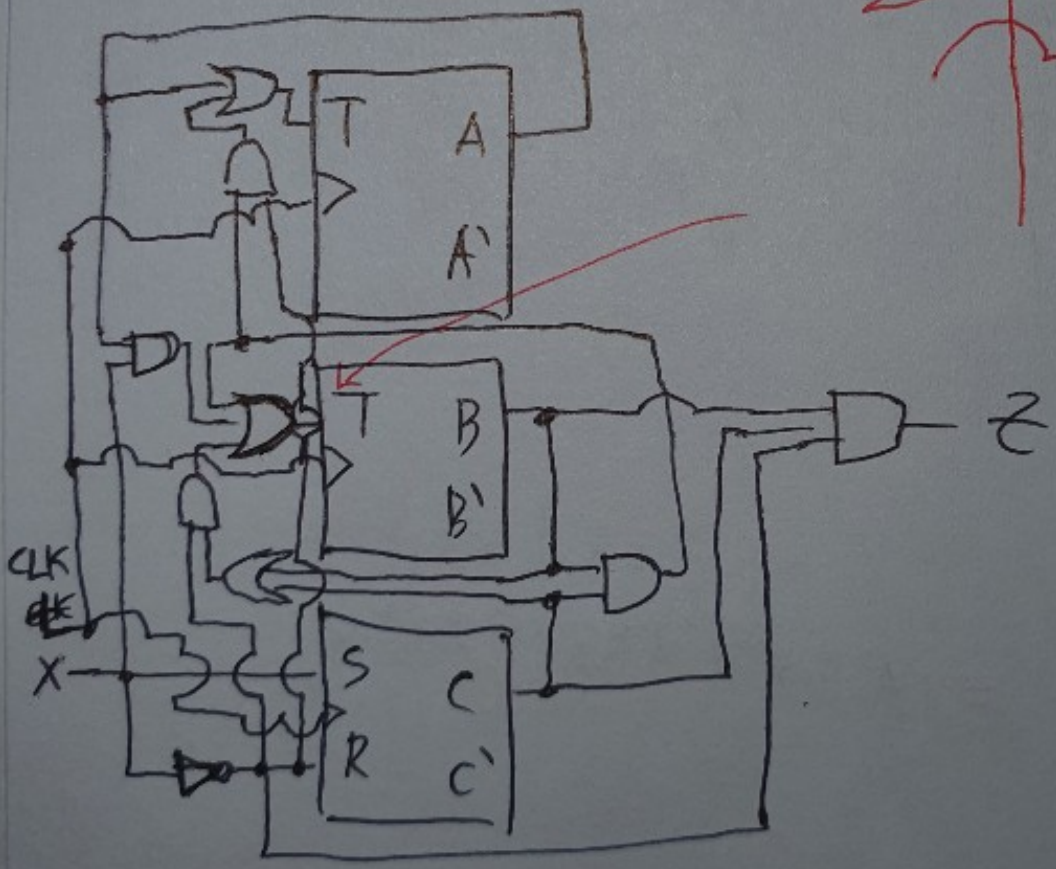
S_C

AB \ CX	00	01	11	10
00	0	0	-	0
01	1	1	-	1
11	X	X	-	-
10	0	0	-	-

$= X$







Z =

T_A =

CX

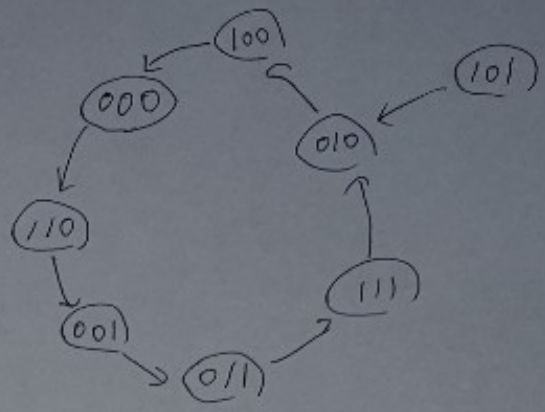
00

01

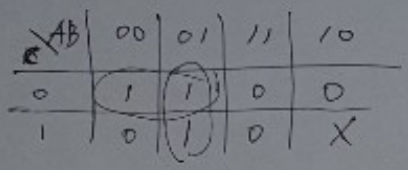
11

4. 0 6 1 3 7 2 4 0 ⋯ ⋯

ABC	$A^*B^*C^*$	D_A	D_B	D_C
000	110	1	1	0
001	011	0	1	1
010	100	1	0	0
011	111	1	1	1
100	000	0	0	0
101	XXX (010)	X	X	X (010)
110	001	0	0	1
111	010	0	1	0

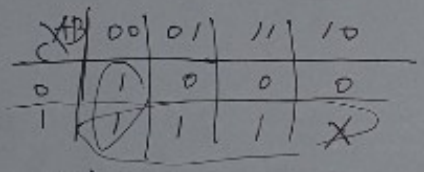


D_A :



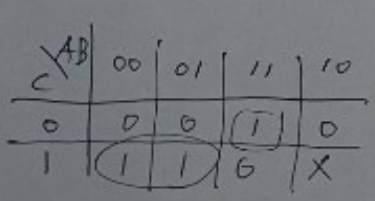
$A'C' + A'B$

D_B :



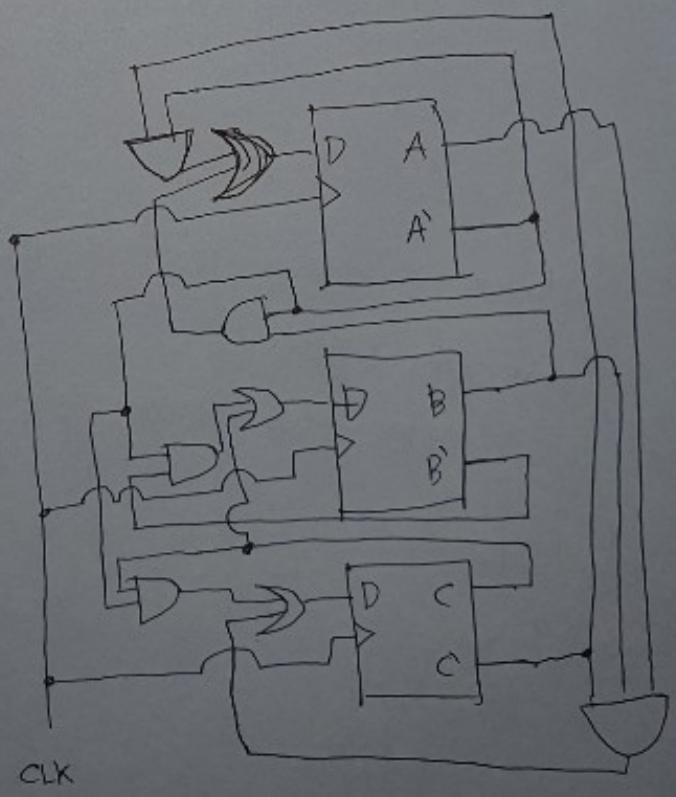
$A'B' + C$

D_C :



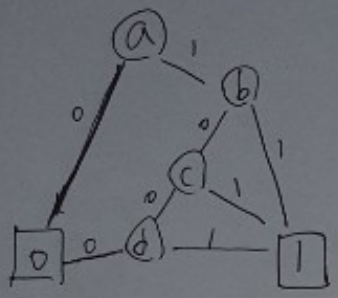
$A'C + ABC'$

∴ input ABC = 101 alan
$D_A D_B D_C$ = 010

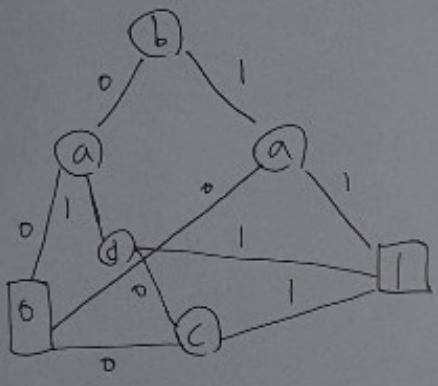


6.

(a) $f = ab + ac + ad$, $a \rightarrow b \rightarrow c \rightarrow d$



(b) 〃 , $b \rightarrow a \rightarrow d \rightarrow c$



5. power는 performance가 high하면 power역시 증가한다.

power는 Area가 커지면 증가한다.

power는 delay가 작아지면 power도 증가한다.

$Power = D_i S C V_{DD}^2 fN + Q_{sc} V_{DD} fN + I_{leak} V_{DD}$ 이므로

V_{DD}가 증가하면, 증가해 D, S, C, f, N이 증가하면 증가한다.