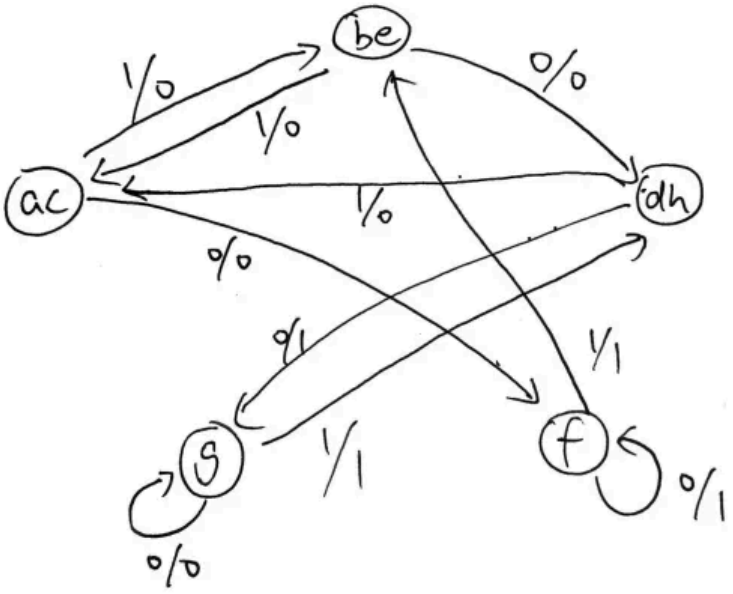
5.12

(a)



(b)

Present state	*Next state* 0	1	*Output* 0	1
a	*f*	*b*	0	0
b	*d*	*a*	0	0
D	*g*	*a*	1	0
F	*f*	*b*	1	1
G	*g*	*d*	0	1

5.13

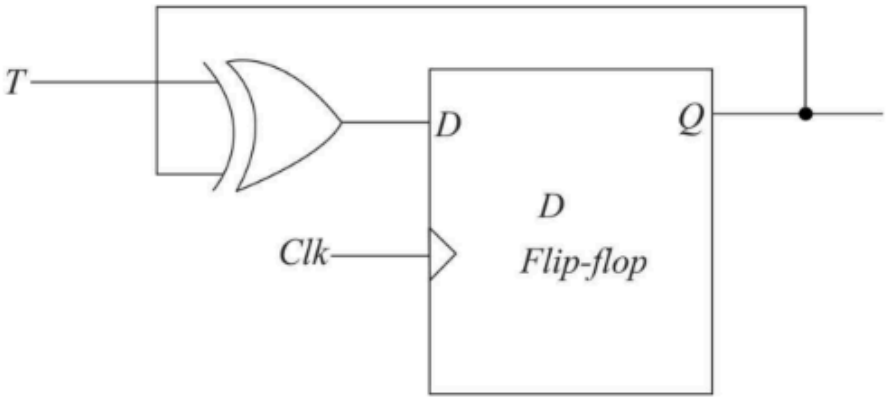
(a) output = 01000110000

Present state	Input	Next state	Output
a	0	f	0
f	1	b	1
b	0	d	0
d	1	a	0
a	0	f	0
f	0	f	1
f	1	b	1
b	0	d	0
d	1	a	0
a	1	b	0
b	1	c	0

(b) output = 01000110000

Present state	Input	Next state	Output
a	0	f	0
f	1	b	1
b	0	d	0
d	1	a	0
a	0	f	0
f	0	f	1
f	1	b	1
b	0	d	0
d	1	a	0
a	1	b	0
b	1	a	0

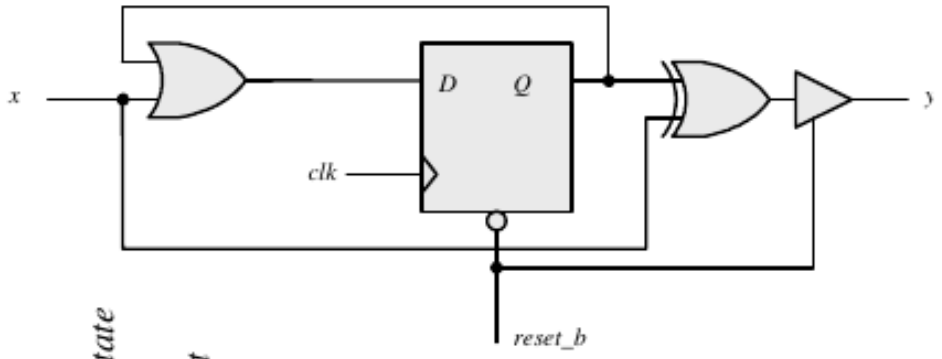
5.15



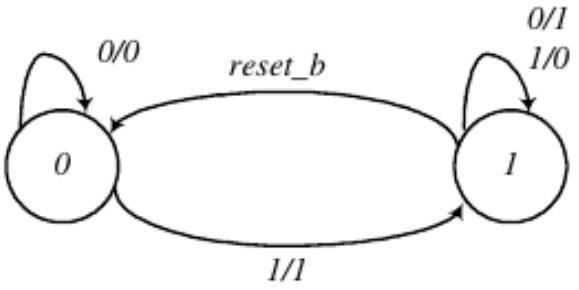
Present State (Q)	Input (T)	Next State (Q)
0	0	0
0	1	1
1	0	1
1	1	0

$$Q(t + 1) = T \oplus Q(t)$$

5.17 The output is 0 for all 0 inputs until the first 1 occurs, at which time the output is 1. Thereafter, the output is the complement of the input. The state diagram has two states. In state 0: output = input; in state 1: output = input'.



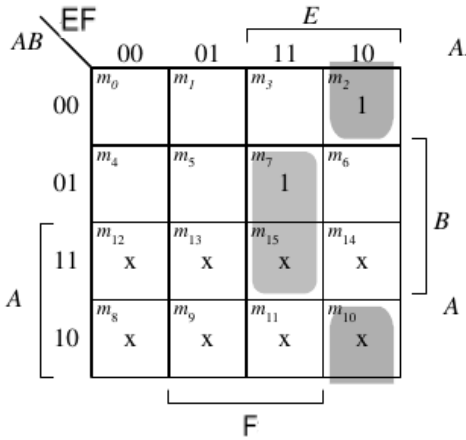
Present state	Input	Next state	Output
A	x	A	y
0	0	0	0
0	1	1	1
1	0	1	1
1	1	1	0



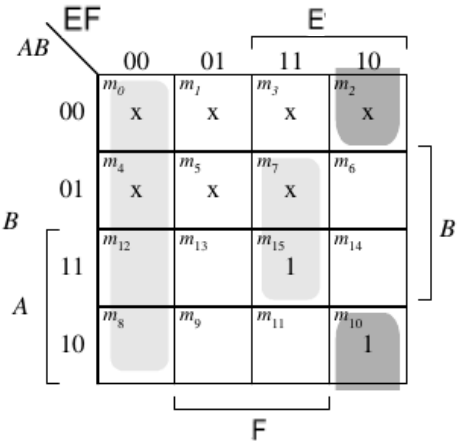
$$D_A = A + x$$
$$y = Ax' + A'x$$

5.18

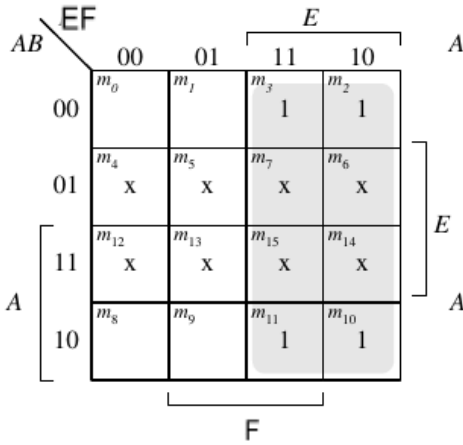
Input		Present state		Next state		Flop-flip inputs			
E	F	A	B	A	B	J_A	K_A	J_B	K_B
0	0	0	0	0	0	0	x	0	x
0	0	0	1	0	1	0	x	x	0
0	0	1	0	1	0	x	0	0	x
0	0	1	1	1	1	x	0	x	0
0	1	0	0	0	0	0	x	0	x
0	1	0	1	0	1	0	x	x	0
0	1	1	0	1	0	x	0	0	x
0	1	1	1	1	1	x	0	x	0
1	0	0	0	1	1	1	x	1	x
1	0	0	1	0	0	0	x	x	1
1	0	1	0	0	1	x	1	1	x
1	0	1	1	1	0	x	0	x	1
1	1	0	0	0	1	0	x	1	x
1	1	0	1	1	0	1	x	x	1
1	1	1	0	1	1	x	0	1	x
1	1	1	1	0	0	x	1	x	1



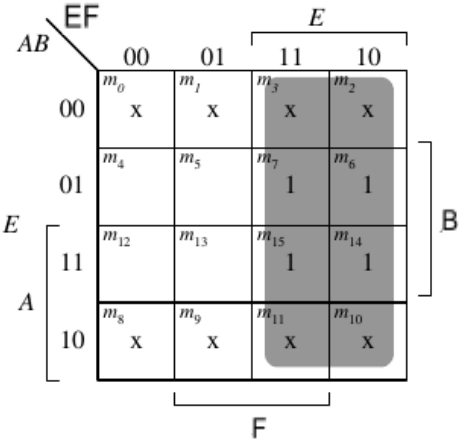
$J_A = (BF+B'F')E$



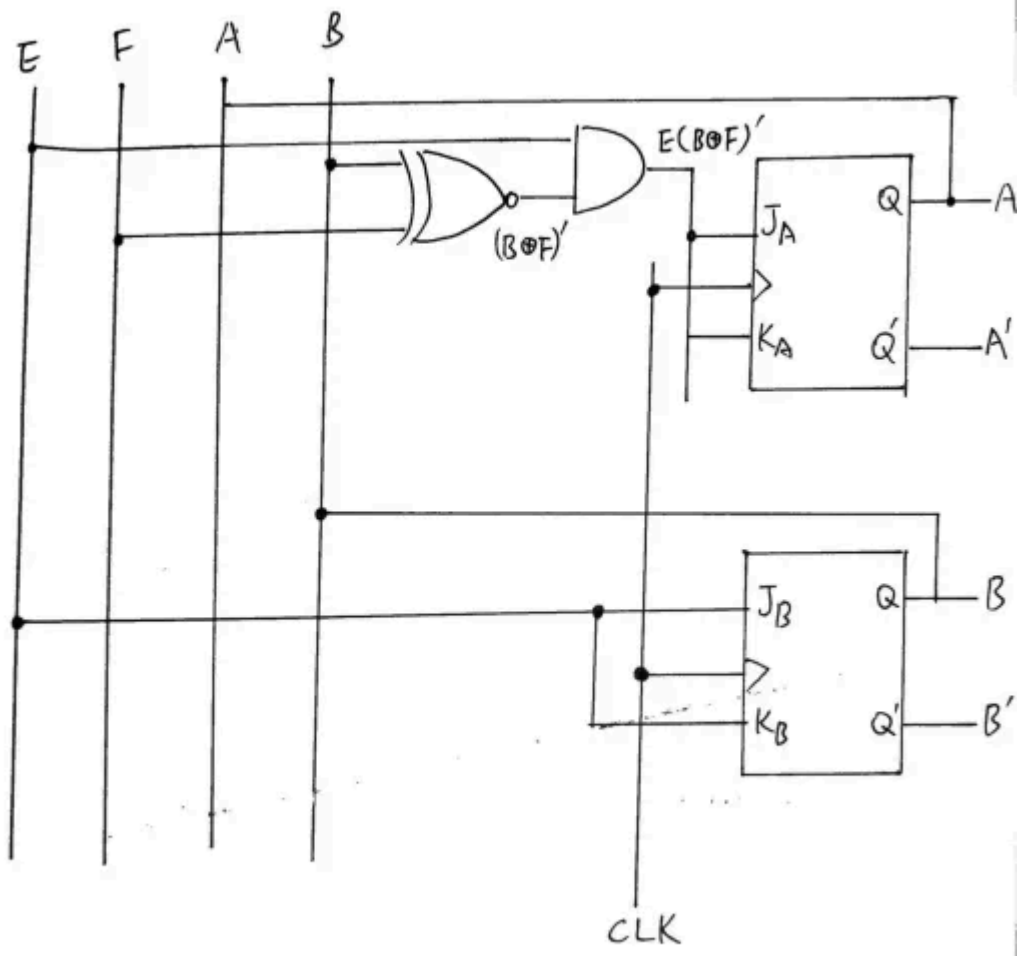
$K_A = (BF+B'F')E$



$J_B = E$



$K_B = E$


E
F
A
B
E(B⊕F)′
(B⊕F)′
J_A
Q
A
K_A
Q′
A′
J_B
Q
B
K_B
Q′
B′
CLK