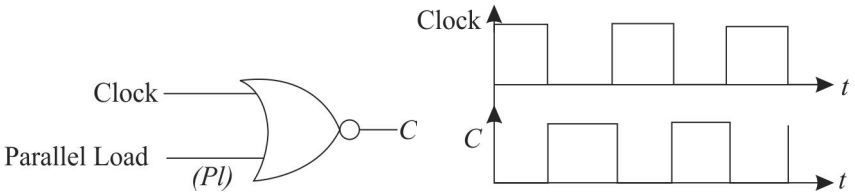
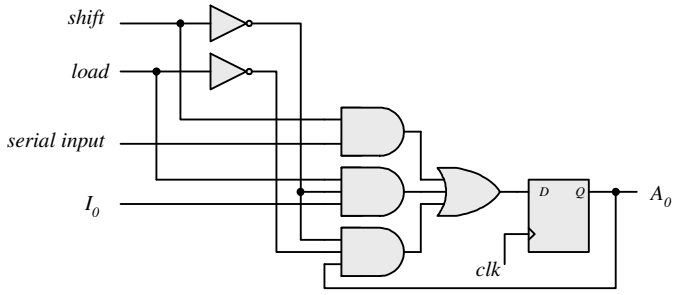
6.1



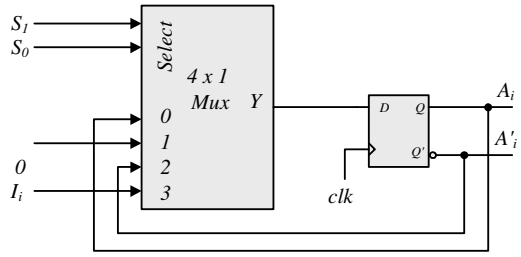
$C = (\text{clock} + PL)'$

When $PL = 0$, $C = (\text{clock})'$. Hence complete circuit diagram act as negative edge triggered, even though the flip-flops are positive edge triggered.
When, $PL = 1$, $C = 0$. Hence no change in output A.

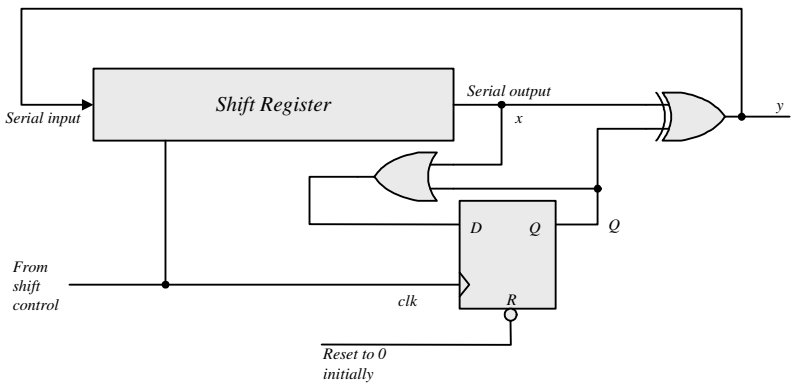
6.6 First stage of register:



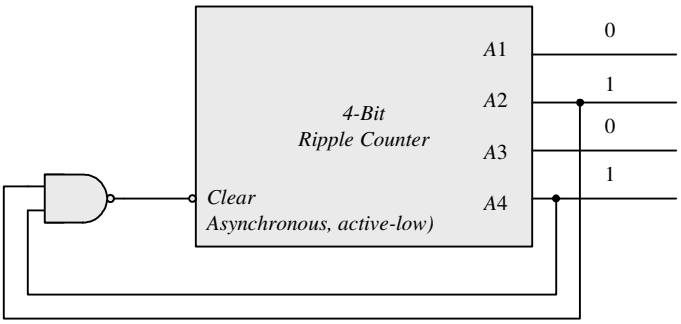
6.7 First stage of register:



6.10 Note that y = x if Q = 0, and y = x' if Q = 1. Q is set on the first 1 from x.
Note that $x \oplus 0 = x$, and $x \oplus 1 = x'$.

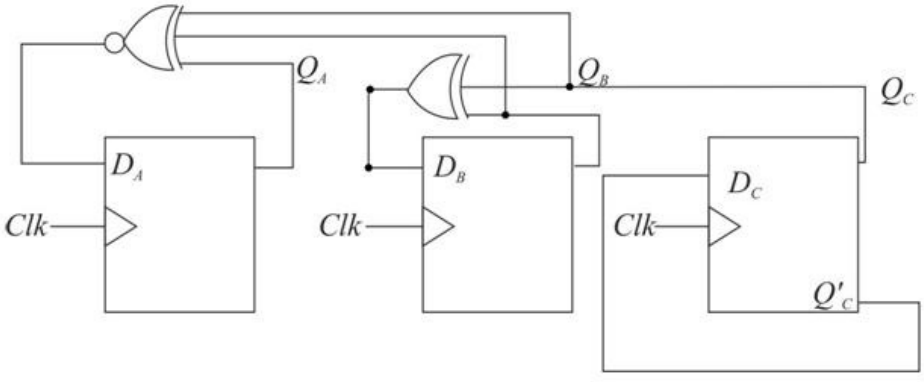


6.13



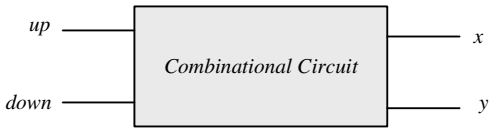
6.17

Present State $Q_A\ Q_B\ Q_C$	Next State $Q_A\ Q_B\ Q_C$	$D_A\ D_B\ D_C$	
0 0 0	0 0 1	0 0 1	$D_A = \Sigma(3, 4, 5, 6)$
0 0 1	0 1 0	0 1 0	$D_B = \Sigma(1, 2, 5, 6)$
0 1 0	0 1 1	0 1 1	$D_c = \Sigma(0, 2, 4, 6)$
0 1 1	1 0 0	1 0 0	$D_A = Q_A \oplus Q_B \oplus Q_C$
1 0 0	1 0 1	1 0 1	$D_B = Q_B \oplus Q_C$
1 0 1	1 1 0	1 1 0	$D_C = Q'_C$
1 1 0	1 1 1	1 1 1	
1 1 1	0 0 0	0 0 0	



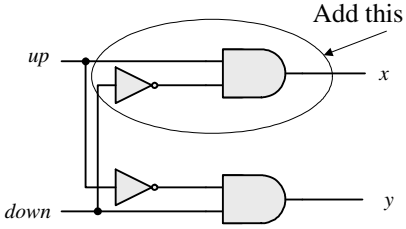
6.18

When *up* = *down* = 1 the circuit counts up.



up	*down*	*x*	*y*	Operation
0	0	0	0	No change
0	1	0	0	Count down
1	0	1	0	Count up
1	1	0	0	No change

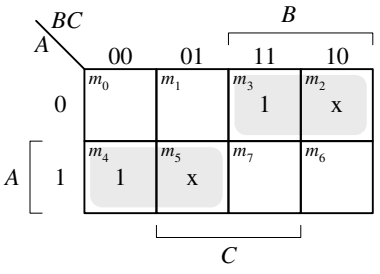
Add this to Fig. 6.13



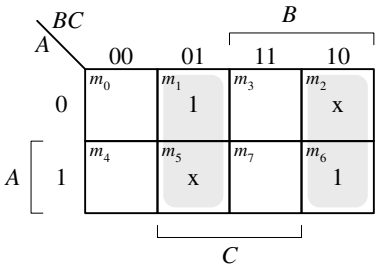
$x = up\ (down)'$
$y = (up)'down$

6.24

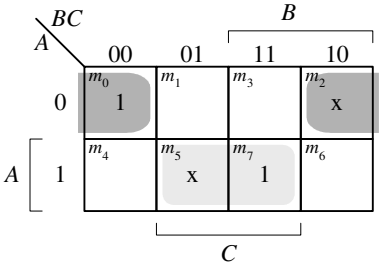
Present state ABC	*Next state ABC*	*Flip-flop inputs* T_A	T_B	T_C
000	001	0	0	1
001	011	0	1	0
010	xxx	x	x	x
011	111	1	1	0
100	000	1	1	0
101	xxx	x	x	x
110	100	0	1	0
111	110	0	0	1



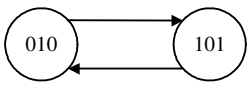
$T_A = A \oplus B$



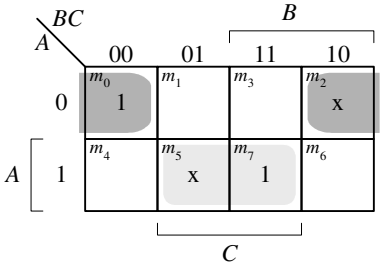
$T_B = B \oplus C$



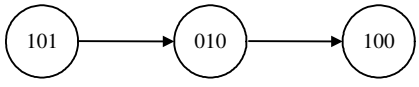
$T_C = A \oplus C$



No self-correcting



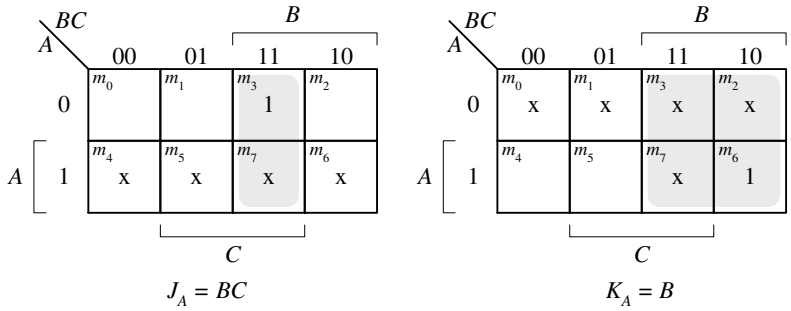
$T_C = AC + A'B'C'$

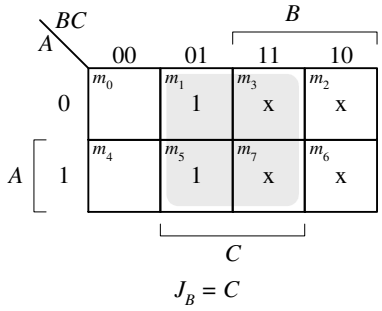


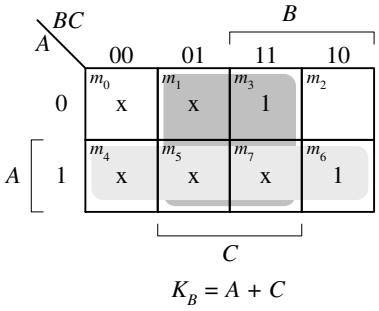
Self-correcting

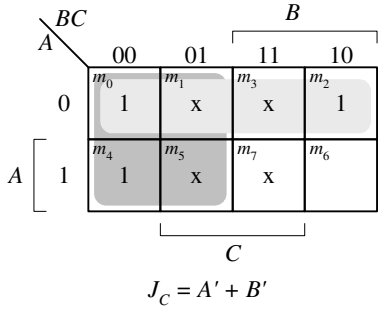
6.27

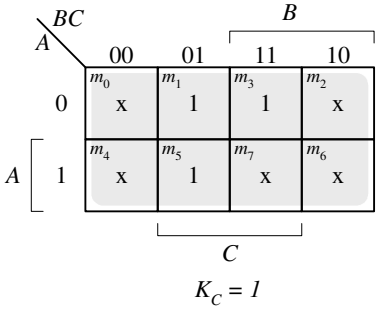
Present state ABC	*Next state ABC*	*Flip-flop inputs*					
		J_A	K_A	J_B	K_B	J_C	K_C
000	001	0	x	0	x	1	x
001	010	0	x	1	x	x	1
010	011	0	x	x	0	1	x
011	100	1	x	x	1	x	1
100	100	x	x	0	0	1	x
101	110	x	x	1	x	x	1
110	000	x	x	x	1	0	x
111	xxx	x	x	x	x	x	x

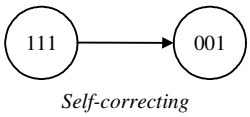












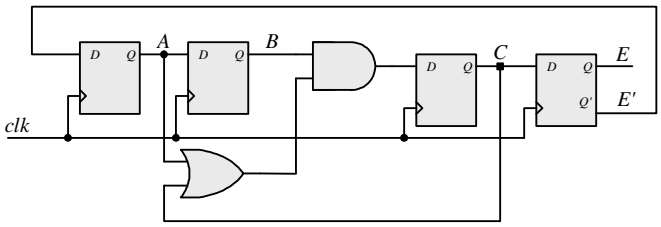
Self-correcting

6.29 **(a)** The 8 valid states are in Fig. 6.18(b), with the sequence: 0, 8, 12, 14, 15, 7, 3, 1, 0, ...

The 8 unused states and their next states are shown below:

State	*Next state*	*All invalid states*
ABCE	*ABCE*	
0000	1001	9
0100	1010	10
0101	0010	2
0110	1011	11
1001	0100	4
1010	1101	13
1011	0101	5
1101	0110	6

(b) Modification: $D_C = (A + C)B$.



The valid states are the same as in (a). The unused states have the following sequences: 2→ 9→ 4→ 8 and 10→ 13→ 6→11→ 5→ 0. The final states, 0 and 8, are valid.