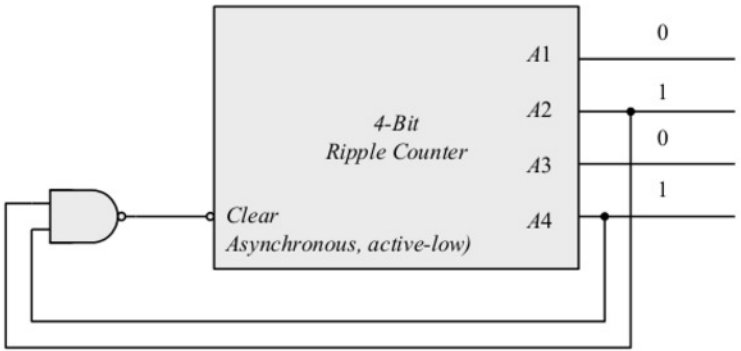
6.11 **(a)** A count down counter.

(b) A count up counter.

6.13



6.19 (a)

PRESENT STATE				NEXT STATE				OUTPUT	FLIP FLOP INPUTS							
Q8	Q4	Q2	Q1	Q8	Q4	Q2	Q1	y	JQ8	KQ8	JQ4	KQ4	JQ2	KQ2	JQ1	KQ1
0	0	0	0	0	0	0	1	0	0	X	0	X	0	X	1	X
0	0	0	1	0	0	1	0	0	0	X	0	X	1	X	X	1
0	0	1	0	0	0	1	1	0	0	X	0	X	X	0	1	X
0	0	1	1	0	1	0	0	0	0	X	1	X	X	1	X	1
0	1	0	0	0	1	0	1	0	0	X	X	0	0	X	1	X
0	1	0	1	0	1	1	0	0	0	X	X	0	1	X	X	1
0	1	1	0	0	1	1	1	0	0	X	X	0	X	0	1	X
0	1	1	1	1	0	0	0	0	1	X	X	1	X	1	X	1
1	0	0	0	1	0	0	1	0	X	0	0	X	0	X	1	X
1	0	0	1	0	0	0	0	1	X	1	0	X	0	X	X	1

TABLE 1

don't cares= Σ(10,11,12,13,14,15).

Simplifying Flip Flop inputs from TABLE 1, we get:

KQ1=1
JQ1=1
KQ2=Q1
JQ2=Q8'Q1
KQ4=Q2Q1
JQ4=Q2Q1
KQ8=Q1
JQ8=Q4Q2Q1

PRESENT STATE				NEXT STATE				OUTPUT	FLIP FLOP INPUTS			
Q8	Q4	Q2	Q1	Q8	Q4	Q2	Q1	y	DQ8	DQ4	DQ2	DQ1
0	0	0	0	0	0	0	1	0	0	0	0	1
0	0	0	1	0	0	1	0	0	0	0	1	0
0	0	1	0	0	0	1	1	0	0	0	1	1
0	0	1	1	0	1	0	0	0	0	1	0	0
0	1	0	0	0	1	0	1	0	0	1	0	1
0	1	0	1	0	1	1	0	0	0	1	1	0
0	1	1	0	0	1	1	1	0	0	1	1	1
0	1	1	1	1	0	0	0	0	1	0	0	0
1	0	0	0	1	0	0	1	0	1	0	0	1
1	0	0	1	0	0	0	0	1	0	0	0	0

TABLE 2

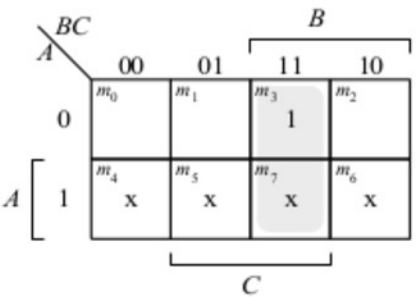
6.19 **(b)** From TABLE 2

$D_{Q1} = Q'_1$
$D_{Q2} = \sum (1, 2, 5, 6)$
$D_{Q4} = \sum (3, 4, 5, 6)$
$D_{Q8} = \sum (7, 8)$
Don't care: $d = \sum (10, 11, 12, 13, 14, 15)$

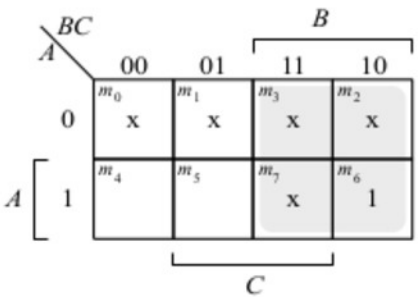
Simplifying with maps:
$D_{Q2} = Q_2Q'_1 + Q'_8Q'_2Q_1$
$D_{Q4} = Q_4Q'_1 + Q_4 Q'_2 + Q'_4Q_2Q_1$
$D_{Q8} = Q_8Q'_1 + Q_4Q_2Q_1$

6.27

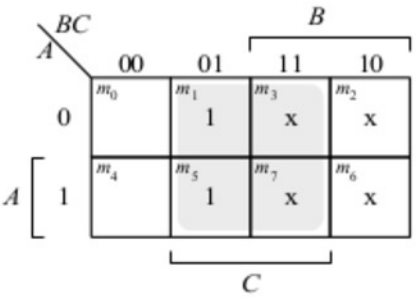
Present state ABC	Next state ABC	Flip-flop inputs J_A	K_A	J_B	K_B	J_C	K_C
000	001	0	x	0	x	1	x
001	010	0	x	1	x	x	1
010	011	0	x	x	0	1	x
011	100	1	x	x	1	x	1
100	100	x	x	0	0	1	x
101	110	x	x	1	x	x	1
110	000	x	x	x	1	0	x
111	xxx	x	x	x	x	x	x



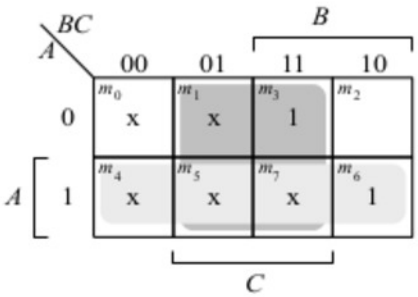
$J_A = BC$



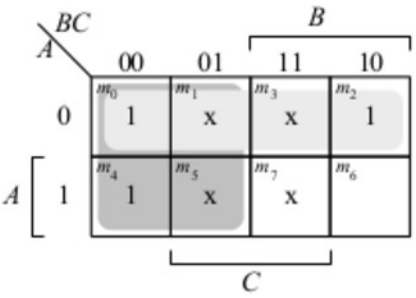
$K_A = B$



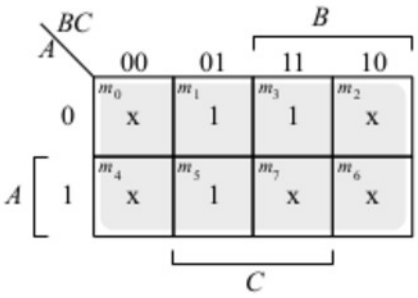
$J_B = C$



$K_B = A + C$



$J_C = A' + B'$



$K_C = 1$