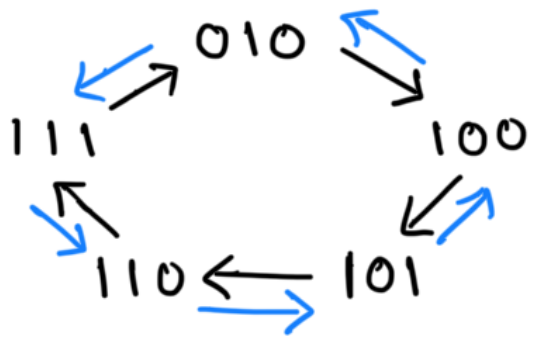
Assignment - 4

- up/down counter (SR-FF)

$$2 \leftrightarrow 4 \leftrightarrow 5 \leftrightarrow 6 \leftrightarrow 7 \leftrightarrow 2$$

Selection bit, M = 0 → up

M = 1 → down

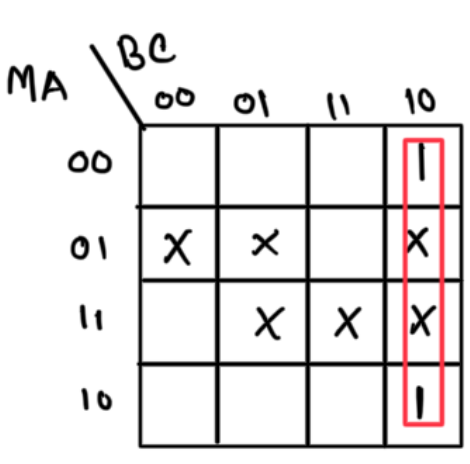


M	A	B	C	A+	B+	C+	SA	RA	SB	RB	SC	RC
0	0	0	0	0	1	0	0	X	1	0	0	X
0	0	0	1	0	1	0	0	X	1	0	0	1
0	0	1	0	1	0	0	1	0	0	1	0	X
0	0	1	1	0	1	0	0	X	X	0	0	1
0	1	0	0	1	0	1	X	0	0	X	1	0
0	1	0	1	1	1	0	X	0	1	0	0	1
0	1	1	0	1	1	1	X	0	X	0	1	0
0	1	1	1	0	1	0	0	1	X	0	0	1
1	0	0	0	0	1	0	0	X	1	0	0	X
1	0	0	1	0	1	0	0	X	1	0	0	1
1	0	1	0	1	1	1	1	0	X	0	1	0
1	0	1	1	0	1	0	0	X	X	0	0	1
1	1	0	0	0	1	0	0	1	1	0	0	X
1	1	0	1	1	0	0	X	0	0	X	0	1
1	1	1	0	1	0	1	X	0	0	1	1	0
1	1	1	1	1	1	0	X	0	X	0	0	1

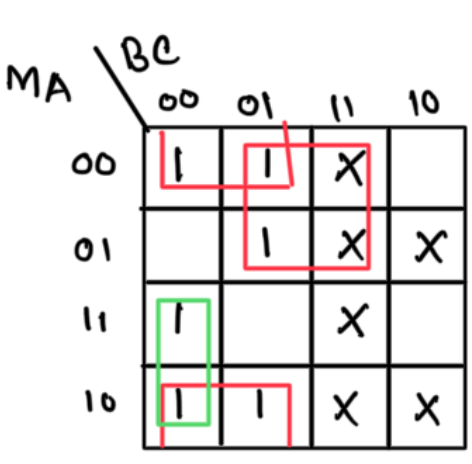
ET of SR

Q(t)	Q(t+1)	S	R
0	0	0	X
0	1	1	0
1	0	0	1
1	1	X	0

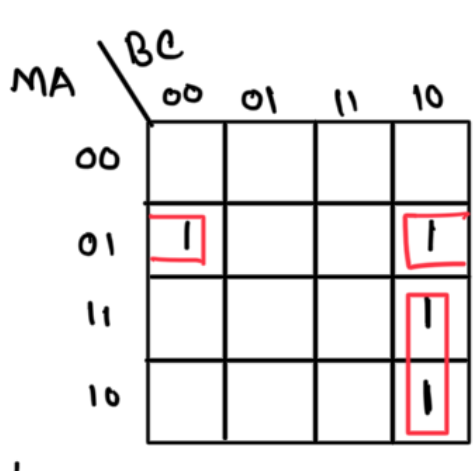
$SA = BC'$



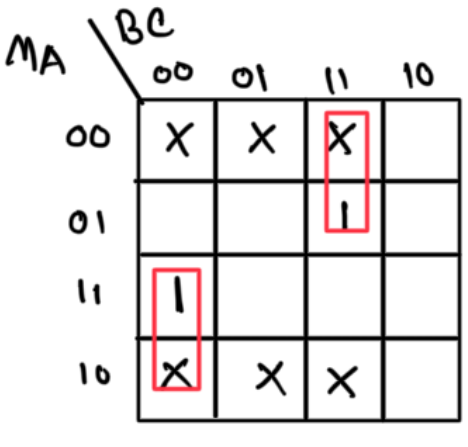
$SB = MB'C' + A'B' + MC$



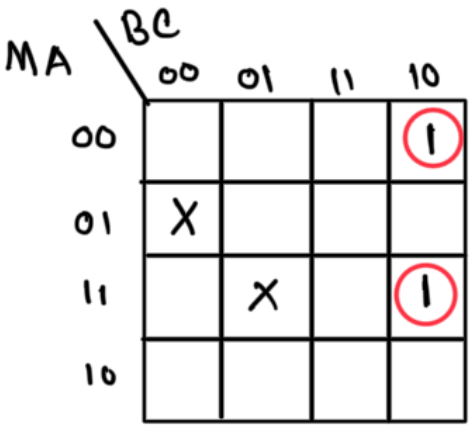
$SC = M'AC' + MBC'$



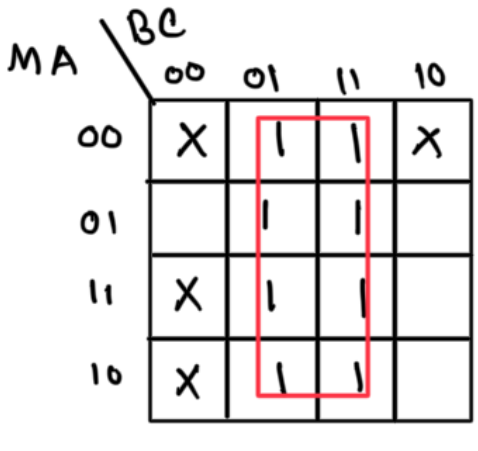
$RA = MB'C' + M'BC$

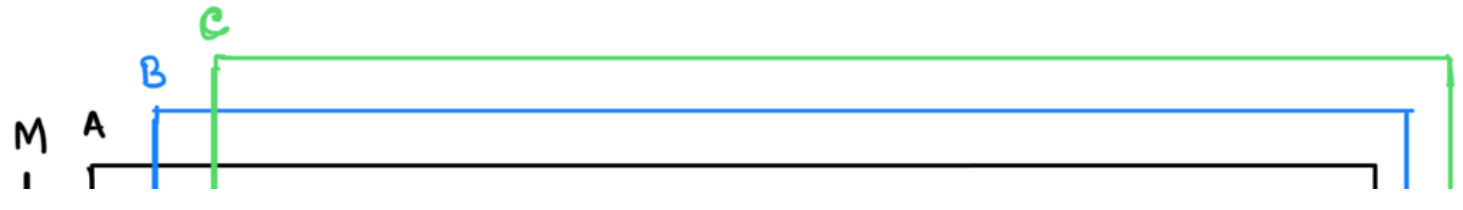


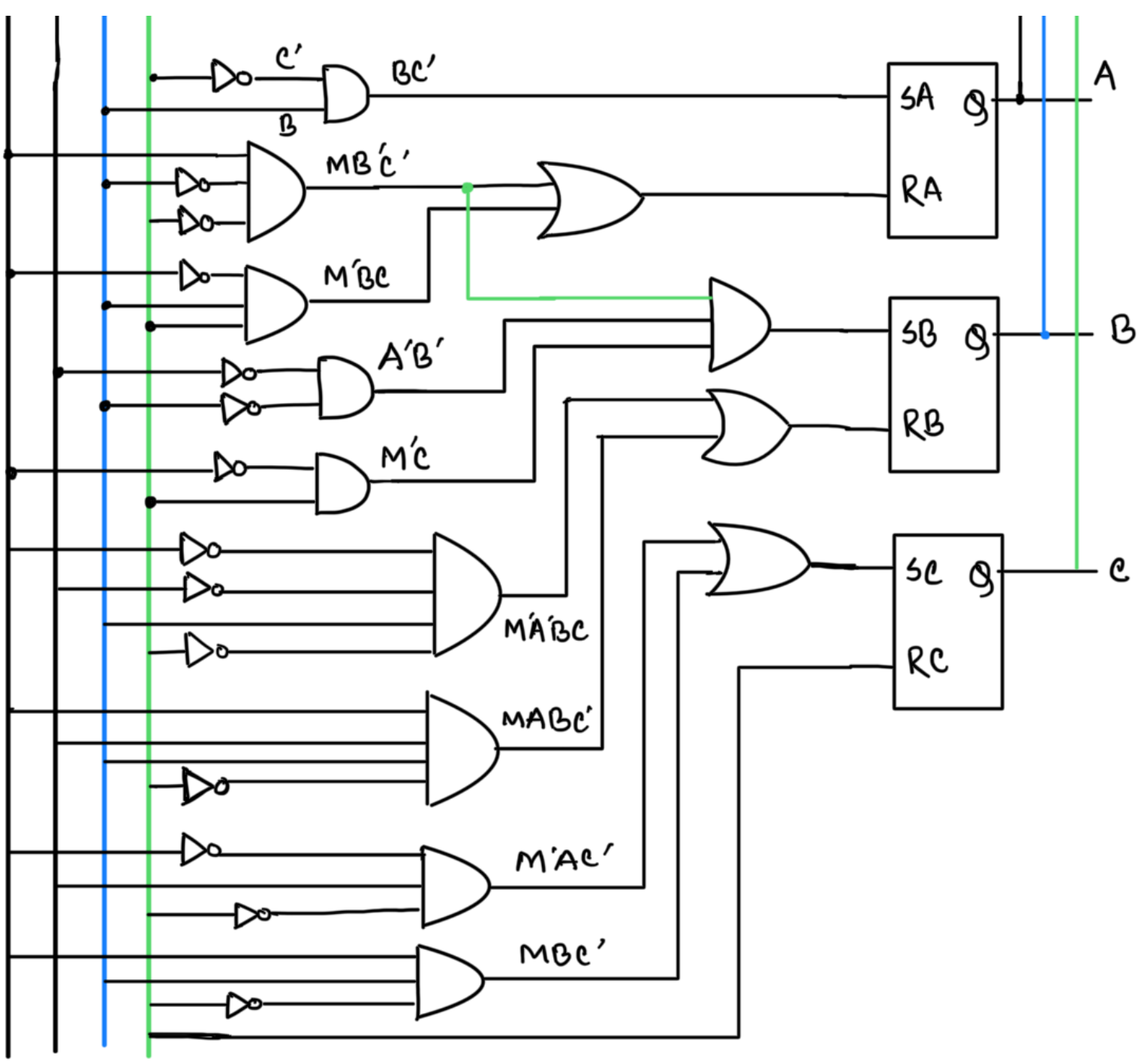
$RB = M'A'BC' + MABC'$



$RC = C$







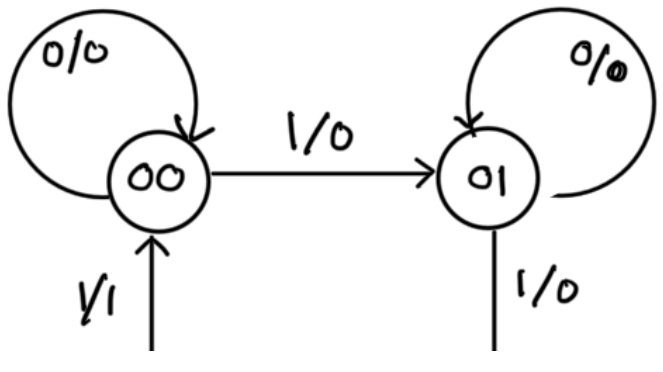
- Circuit to state diagram :

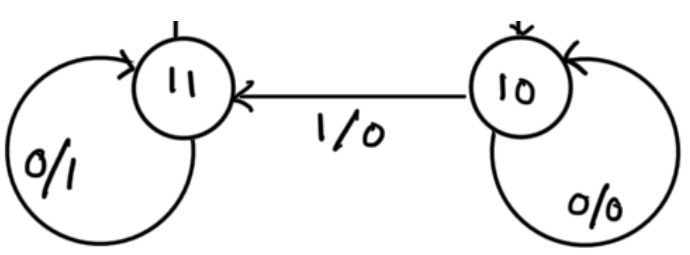
inputs	present state	next state	output
x	A . B	A+ B+	y

functions : $TA = Bx$ $\quad TB = x$ $\quad y = AB$

A	B	x	TA	TB	y	A+	B+
0	0	0	0	0	0	0	0
0	0	1	0	1	0	0	1
0	1	0	0	0	0	0	1
0	1	1	1	1	0	1	0
1	0	0	0	0	0	1	0
1	0	1	0	1	0	1	1
1	1	0	0	0	1	1	1
1	1	1	1	1	1	0	0

Q(t)	T	Q(t+1)
0	0	0
0	1	1
1	0	1
1	1	0




11
10
1/0
0/1
0/0