

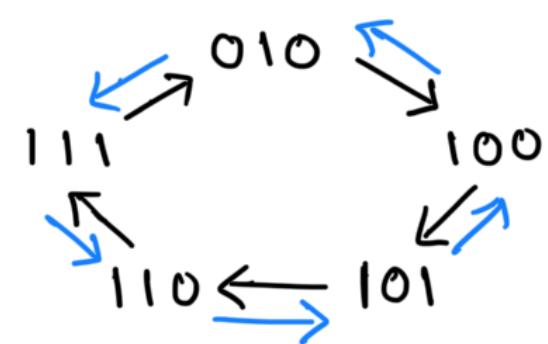
Assignment - 4

- up/down counter (SR-FF)

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

Selection bit, $M = 0 \rightarrow \text{up}$

$M = 1 \rightarrow \text{down}$



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	X
1	1	0	0	0	1	0	0	1	1	0	0	X
1	1	0	1	1	0	0	X	0	0	1	0	1
1	1	1	0	1	1	0	X	0	X	0	0	1
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	0	0	X
0	0	1	1	0	0
1	0	1	0	1	0
0	1	0	1	0	1
1	0	1	1	1	0
1	1	0	0	1	1
1	1	1	1	1	0

$$SA = BC'$$

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

$$SC = M'AC' + MBC'$$

MA	BC			
	00	01	11	10
00				1
01	X	X		X
11		X	X	X
10				1

MA	BC			
	00	01	11	10
00	1	1	X	
01		1	X	X
11	1			X
10	1	1	X	X

MA	BC			
	00	01	11	10
00				
01	1			
11			1	
10				1

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

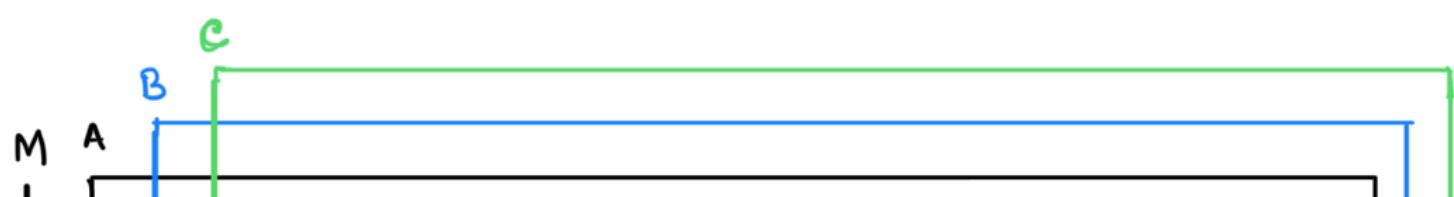
$$RB = M'A'BC' + MABC'$$

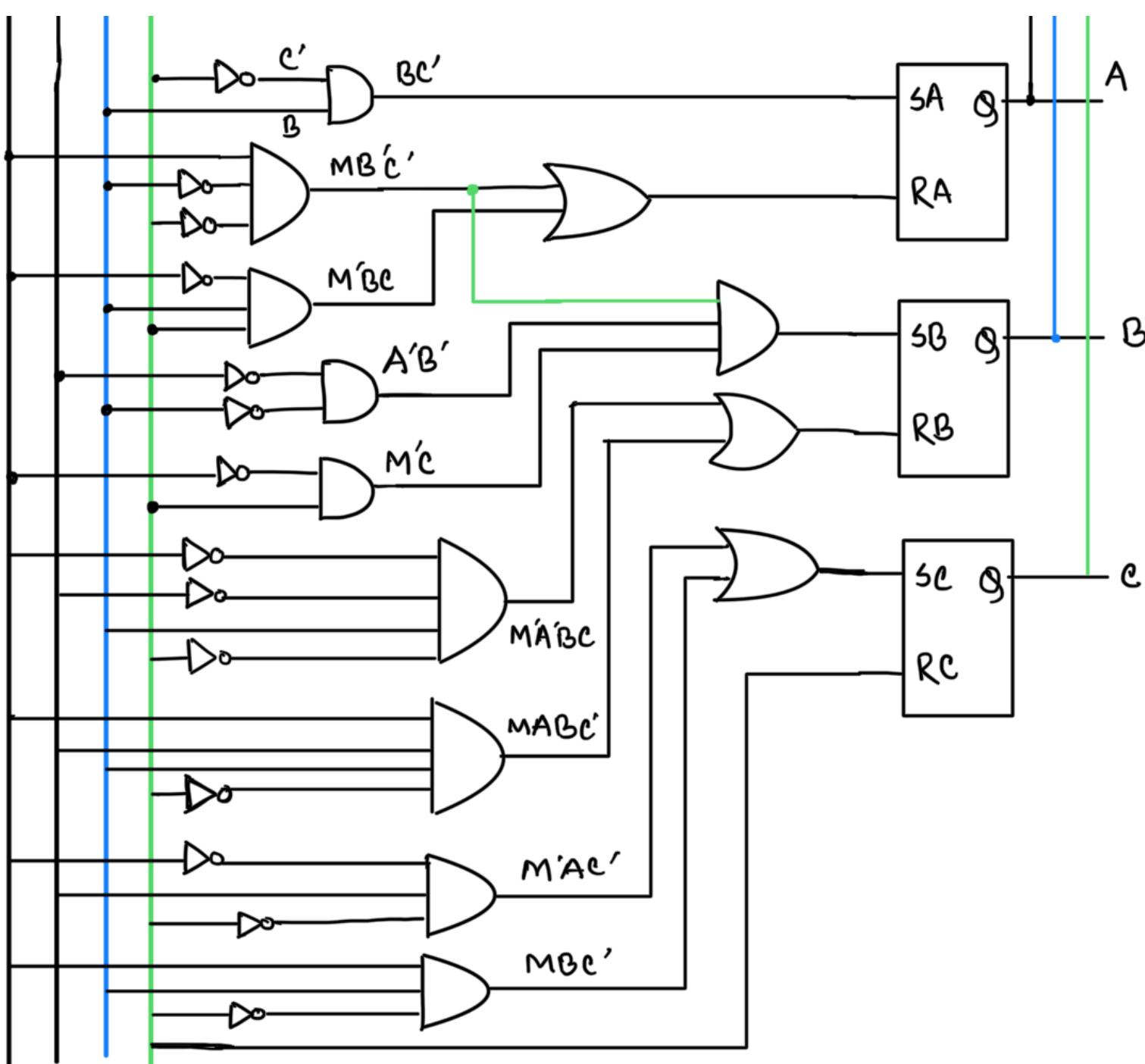
$$RC = C$$

MA	BC			
	00	01	11	10
00	X	X	X	
01			1	
11	1			
10	X	X	X	

MA	BC			
	00	01	11	10
00				1
01	X			
11		X		1
10			1	

MA	BC			
	00	01	11	10
00	X	1	1	X
01		1	1	
11	X	1	1	
10	X	1	1	





- Circuit to state diagram :

<u>inputs</u>	<u>present state</u>	<u>next state</u>	<u>output</u>
x	A, B	$A+ B+$	y

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

$q(t)$	T	$q(t+)$
0	0	0
0	1	1
1	0	1
1	1	0

<u>A</u>	<u>B</u>	<u>x</u>	<u>TA</u>	<u>TB</u>	<u>y</u>	<u>$A+ B+$</u>
0	0	0	0	0	0	0
0	0	1	0	1	0	0
0	1	0	0	0	0	0
0	1	1	1	1	0	1
1	0	0	0	0	0	1
1	0	1	0	1	0	1
1	1	0	0	0	1	1
1	1	1	1	1	1	0

