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CSC 376
Chapter 11

Part I

	Present state				Next State			
	a	b	c	d	a	b	c	d
9	1	0	0	1	1	0	0	0
8	1	0	0	0	0	1	1	1
7	0	1	1	1	0	1	1	0
6	0	1	1	0	0	1	0	1
5	0	1	0	1	0	1	0	0
4	0	1	0	0	0	0	1	1
3	0	0	1	1	0	0	1	0
2	0	0	1	0	0	0	0	1
1	0	0	0	1	0	0	0	0
0	0	0	0	0	1	0	1	0
10	1	0	1	0	1	0	1	1
11	1	0	1	1	1	1	0	0
12	1	1	0	0	1	0	0	1

← sorry for the misalignment, it was easier to write up

D_A

AB \ CD	00	01	11	10
00	1	0	0	0
01	0	0	0	0
11	1	X	X	X
10	0	1	1	1

$D_A = \bar{A}\bar{B}\bar{C}\bar{D} + AB\bar{C} + AD +$
AC

D_B

AB \ CD	00	01	11	10
00	0	0	0	0
01	0	1	1	1
11	0	X	X	X
10	1	0	1	0

$D_B = BD + BC + ACD +$
$A\bar{B}\bar{C}\bar{D}$

D_C

AB \ CD	00	01	11	10
00	1	0	1	0
01	1	0	1	0
11	0	X	X	X
10	1	0	0	1

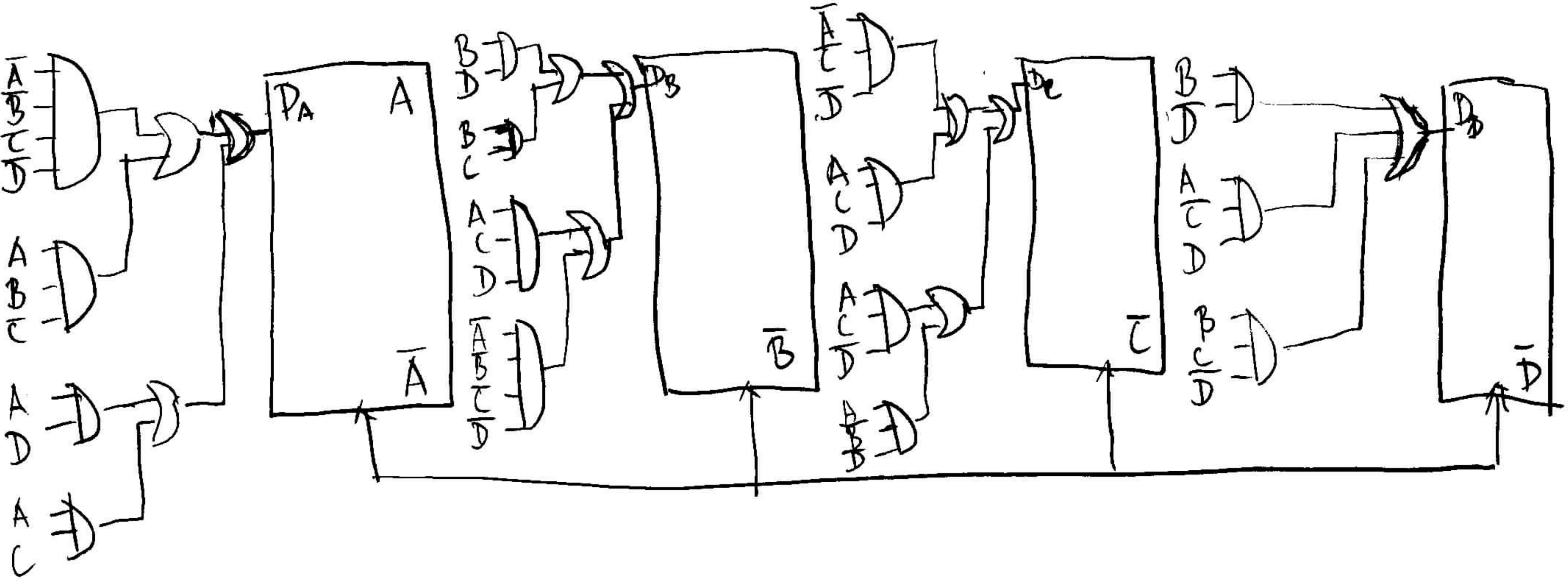
$D_C = \bar{A}\bar{C}\bar{D} + ACD +$
$AC\bar{D} + A\bar{B}\bar{D}$

D_D

AB \ CD	00	01	11	10
00	0	0	0	1
01	1	0	0	1
11	1	X	X	X
10	1	0	0	0

$D_D = B\bar{D} + A\bar{C}D +$
$BC\bar{D}$

Circuit Diagram



$\overline{A}$ $\overline{B}$ $\overline{C}$ $\overline{D}$
A B $\overline{C}$
A D
A C
D_A
A
$\overline{A}$
B $\overline{D}$
B C
A C D
$\overline{A}$ $\overline{B}$ $\overline{C}$ $\overline{D}$
D_B
$\overline{B}$
$\overline{A}$ $\overline{C}$ $\overline{D}$
A C D
A $\overline{C}$ $\overline{D}$
A $\overline{B}$ $\overline{D}$
D_C
$\overline{C}$
B $\overline{D}$
A $\overline{C}$ D
B $\overline{C}$ $\overline{D}$
D_D
$\overline{D}$

Part II

A_1	A_0	B_1	B_0	Q_1	Q_0	R_1	R_0	E
0	0	0	0	X	X	X	X	1
0	0	0	1	0	0	0	0	0
0	0	1	0	0	0	0	0	0
0	0	1	1	0	0	0	0	0
0	1	0	0	X	X	X	X	1
0	1	0	1	0	1	0	0	0
0	1	1	0	0	0	0	1	0
0	1	1	1	0	0	0	1	0
1	0	0	0	X	X	X	X	1
1	0	0	1	1	0	0	0	0
1	0	1	0	0	1	0	0	0
1	0	1	1	0	0	1	0	0
1	1	0	0	X	X	X	X	1
1	1	0	1	1	1	0	0	0
1	1	1	0	0	1	0	1	0
1	1	1	1	0	1	0	0	0

E

$A_1A_0 \backslash B_1B_0$	00	01	11	10
00	1	0	0	0
01	1	0	0	0
11	1	0	0	0
10	1	0	0	0

$E = B_1B_0$

Q_1

$A_1A_0 \backslash B_1B_0$	00	01	11	10
00	X	0	0	0
01	X	0	0	0
11	X	1	0	0
10	X	1	0	0

$Q = A_1 + \overline{B}_1$

Q_0

$A_1A_0 \backslash B_1B_0$	00	01	11	10
00	X	0	0	0
01	X	1	0	0
11	X	1	1	1
10	X	0	0	1

$$Q_0 = A_1A_0 + A_0\overline{B}_1 + A_1B_1\overline{B}_0$$

R_1

$A_1A_0 \backslash B_1B_0$	00	01	11	10
00	X	0	0	0
01	X	0	0	0
11	X	0	0	0
10	X	0	1	

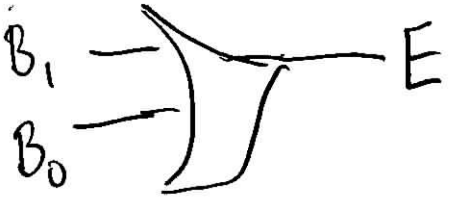
$R_1 = A_1\overline{A}_0B_1B_0$

R_0

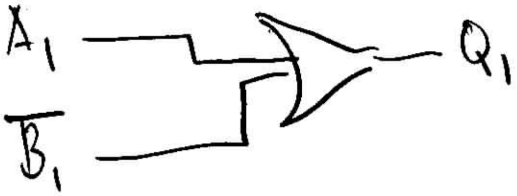
A_1A_0 \ B_1B_0	00	01	11	10
00	X	0	X	0
01	X	0	1	1
11	X	0	0	1
10	X	0	0	0

$$R_2 = \overline{A}_1 A_0 B_1 + A_0 B_1 B_0$$

E.)

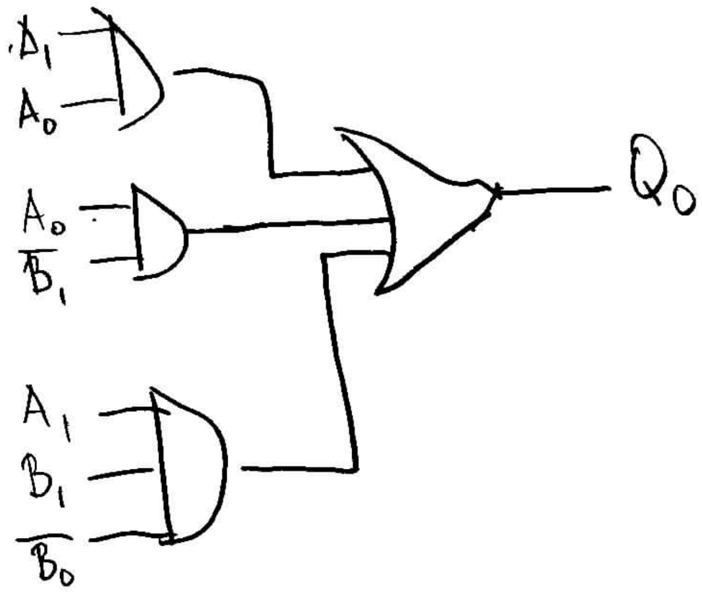


Q_1)



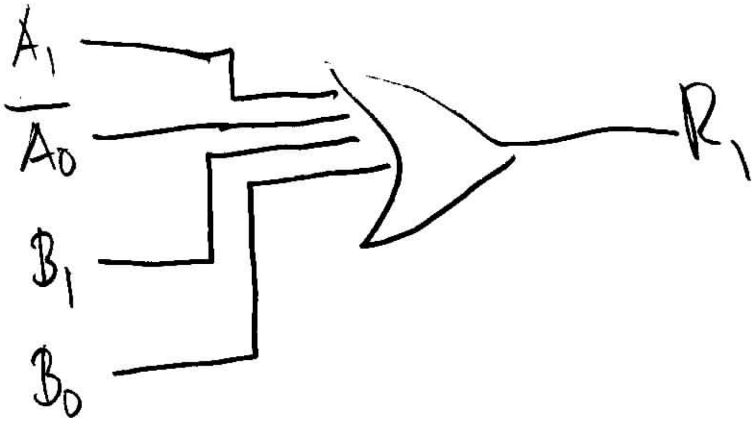
A_1
$\overline{B}_1$
Q_1

Q_0)

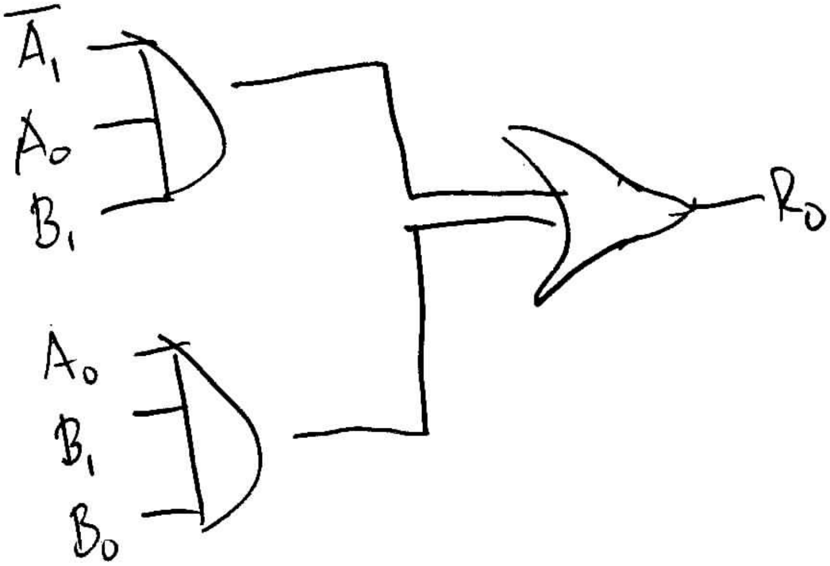


A_1
A_0
A_0
$\overline{B}_1$
A_1
B_1
$\overline{B}_0$
Q_0

R_1)


A_1
$\overline{A_0}$
B_1
B_0
R_1

R_0)


$\overline{A_1}$
A_0
B_1
A_0
B_1
B_0
R_0