
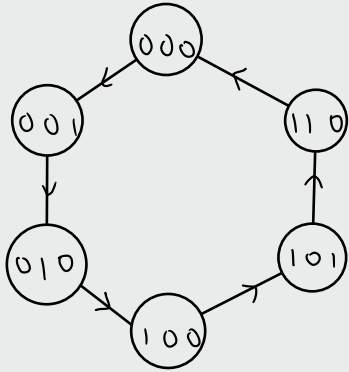


- Implement the sequential circuit needed for the counter of the following sequence (using D flip flops)

0 → 1 → 2 → 4 → 5 → 6




Excitation table:

$Q(t)$	$Q(t+1)$	D
0	0	0
0	1	1
1	0	0
1	1	1

	$Q(t)$			$Q(t+1)$					
	A	B	C	A	B	C	D_A	D_B	D_C
0	0	0	0	0	0	1	0	0	1
1	0	0	1	0	1	0	0	1	0
2	0	1	0	1	0	0	1	0	0
4	1	0	0	1	0	1	1	0	1
5	1	0	1	1	1	0	1	1	0
6	1	1	0	0	0	0	0	0	0

D_A	A	BC					
		00	01	11	10		
0				X	1		
1		1	1	X			

$$D_A = AB' + A'B$$

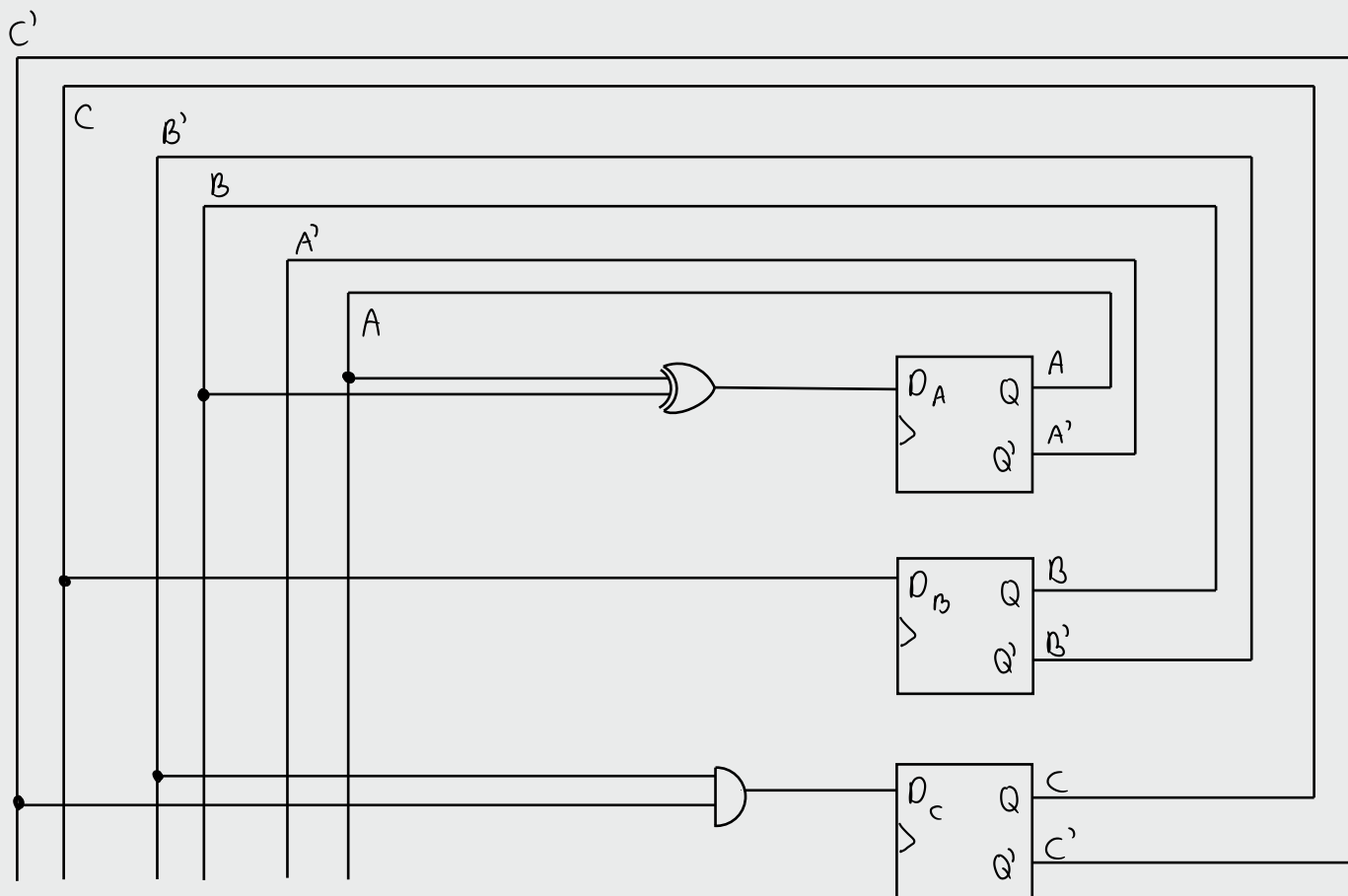
$$= A \oplus B$$

D_B	A	BC					
		00	01	11	10		
0			1	X			
1			1	X			

$$D_B = C$$

D_C	A	BC					
		00	01	11	10		
0		1		X			
1		1		X			

$$D_C = B'C'$$



$$D_A = A \oplus B \quad D_B = C \quad D_C = B' C'$$

Unused state 011

A	B	C
0	1	1
↓	↓	↓
1	1	0

$$D_A = A \oplus B$$

$$= 0 \oplus 1 = 1$$

$$Q(t+1) = Q(t)'$$

$$D_B = C = 1$$

$$Q(t+1) = Q(t)$$

$$D_C = B' C' = 1' 1' = 0$$

$$Q(t+1) = Q(t)'$$

Unused State 111

A	B	C
1	1	1
↓	↓	↓
0	1	0

$$D_A = A \oplus B$$

$$= 1 \oplus 1 = 0$$

$$Q(t+1) = Q(t)'$$

$$D_B = C = 1$$

$$Q(t+1) = Q(t)$$

$$D_C = B' C'$$

$$= 1' 1' = 0$$

$$Q(t+1) = Q(t)'$$

Since the invalid states transition into valid states, then this circuit is self-correcting

