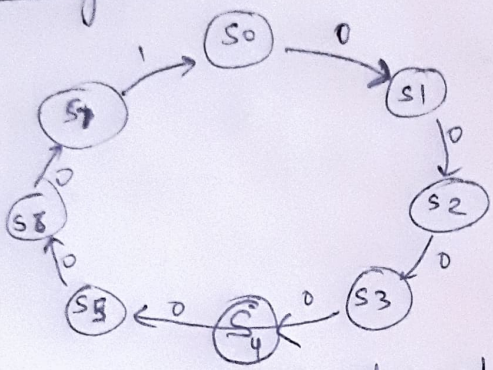
Q1 a) State assignment

S0 → 000
S1 → 001
S2 → 011
S3 → 010
S4 → 110
S5 → 111
S6 → 101
S7 → 100

(b) State Diagram



All transitions happen at clock edge. Outputs are marked over the arrows as 0/1.

(c) State Table

P.S.	N.S, Output
000	(001, 0)
001	(011, 0)
011	(010, 0)
010	(110, 0)
110	(111, 0)
111	(101, 0)
101	(100, 0)
100	(000, 1)

(d) Transition and Output Table

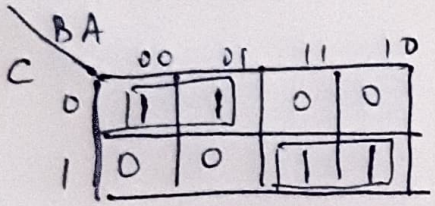
P.S.	N.S.	Output
000	001	0
001	011	0
011	010	0
010	110	0
110	111	0
111	101	0
101	100	0
100	000	1

Excitation Table

Present state			Next state			Flip-flop Inputs			Output
C(t)	**B(t)**	**A(t)**	**C(t+1)**	**B(t+1)**	**A(t+1)**	**D_C**	**D_B**	**D_A**	**Y**
0	0	0	0	0	1	0	0	1	0
0	0	1	0	1	1	0	1	1	0
0	1	1	0	1	0	0	1	0	0
0	1	0	1	1	0	1	1	0	0
1	1	0	1	1	1	1	1	1	0
1	1	1	1	0	1	1	0	1	0
1	0	1	1	0	0	1	0	0	0
1	0	0	0	0	0	0	0	0	1

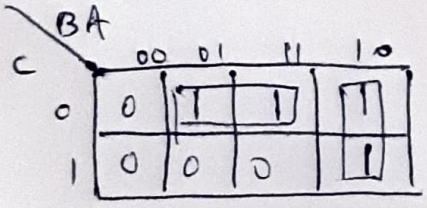
K-Maps

K-Map for D_A



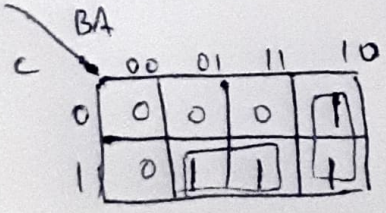
$$D_A = \bar{C}\bar{B} + CB = C \odot B \text{ or } (C \oplus B)'$$

K-Map for D_B



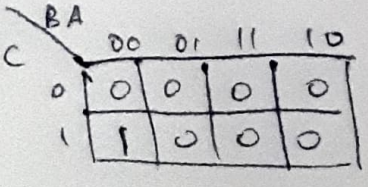
$$D_B = \bar{C}A + B\bar{A}$$

K-Map for D_C



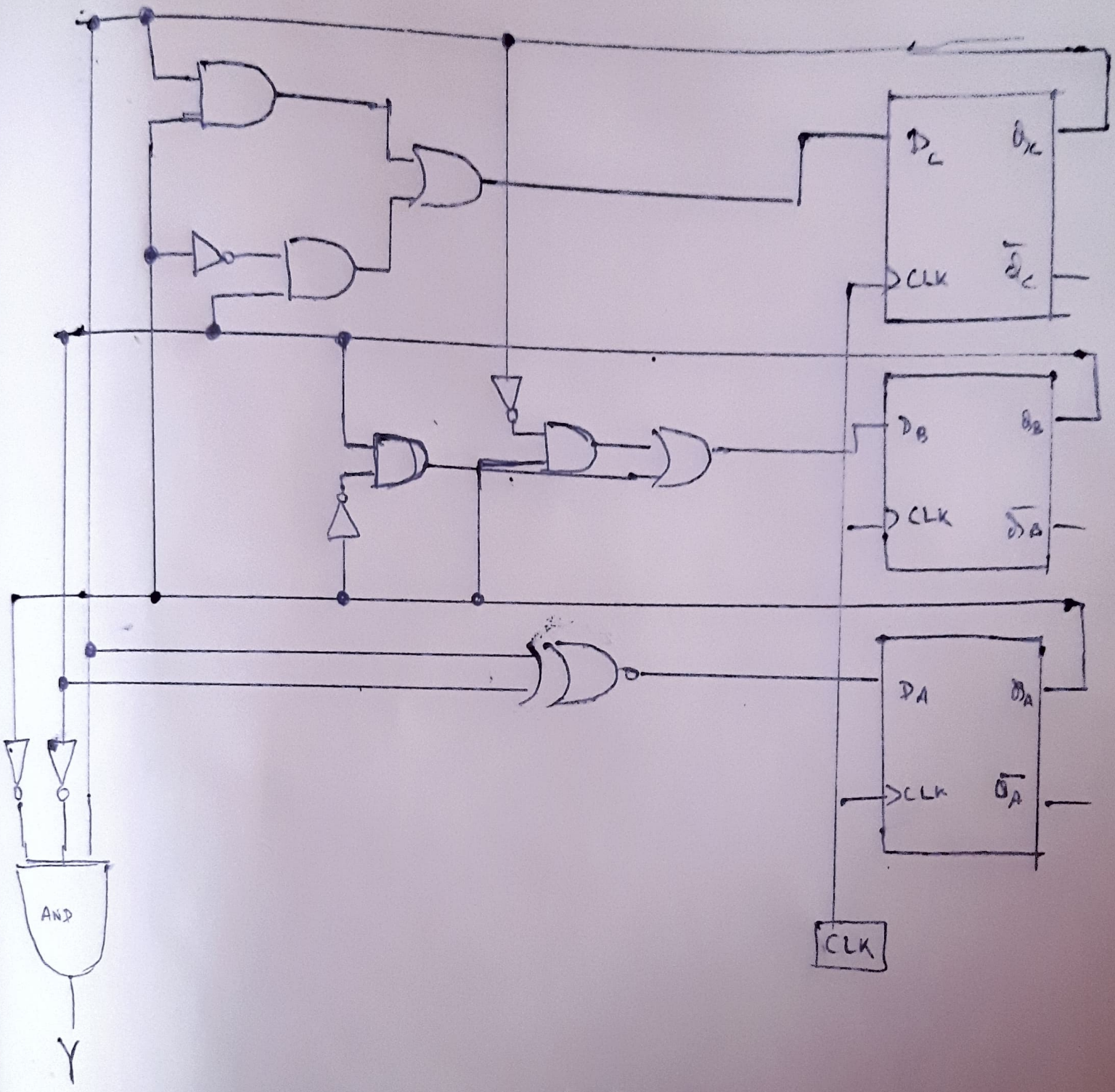
$$D_C = CA + B\bar{A}$$

K-Map for Y



$$Y = C\bar{B}\bar{A}$$

Circuit digram



Note ; $Q_C = C(t+1)$, $Q_B = B(t+1)$, $Q_A = A(t+1)$