

## Assignment #8.

Q1

Design sequential circuit of the following.

i) - D- Flip Flop

$Q_1$	$Q_2$	$Q_3$	$Q_1^+$	$Q_2^+$	$Q_3^+$	$D_1$	$D_2$	$D_3$
0	0	0	0	0	1	0	0	1
0	0	1	0	1	0	0	1	0
0	1	0	0	1	1	0	1	1
0	1	1	1	0	0	1	0	0
1	0	0	1	0	1	1	0	1
1	0	1	1	1	0	1	1	0
1	1	0	1	1	1	1	1	1
1	1	1	0	0	0	0	0	0

K-maps

$D_1 \Rightarrow$

$Q_1 \backslash Q_2 Q_3$	00	01	11	10
0	0	0	1	0
1	1	1	0	1

$$D_1 = \bar{Q}_1 Q_2 Q_3 + Q_1 \bar{Q}_2 \bar{Q}_3$$

$$D_2 = \bar{Q}_2 Q_3 + Q_2 \bar{Q}_3 + Q_1 \bar{Q}_2$$

$$D_3 = \bar{Q}_2 \bar{Q}_3 + Q_2 \bar{Q}_3$$

$D_2 \Rightarrow$

$Q_1 \backslash Q_2 Q_3$	00	01	11	10
0	0	1	0	1
1	0	1	0	1

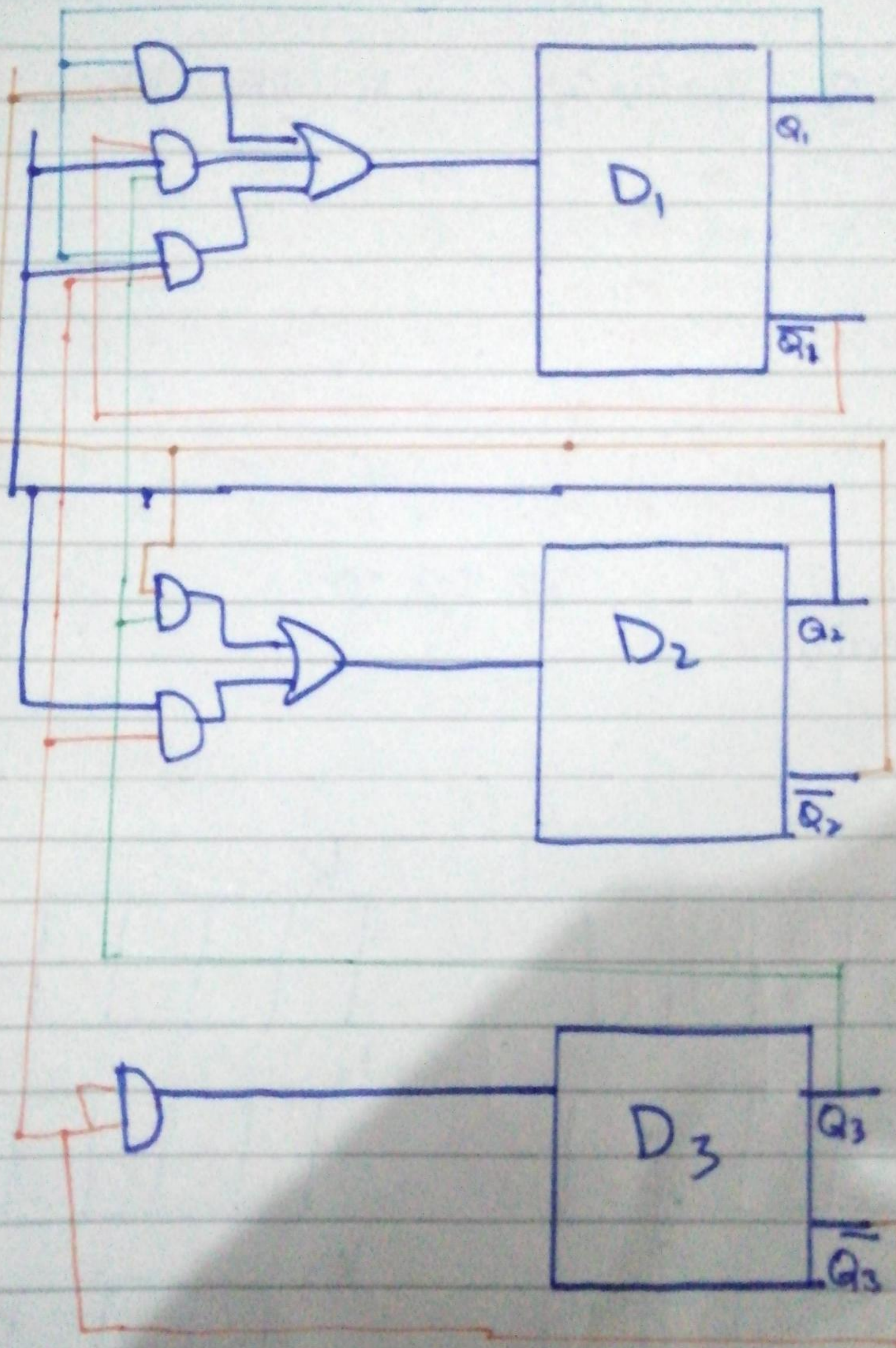


$Q_1$   $Q_2 Q_3$   $D_3$

	00	01	11	10
0	1	0	0	1
1	1	0	0	1



Circuit:





Equations:

$$J_1 = Q_2 Q_3$$

$$K_1 = Q_2 Q_3$$

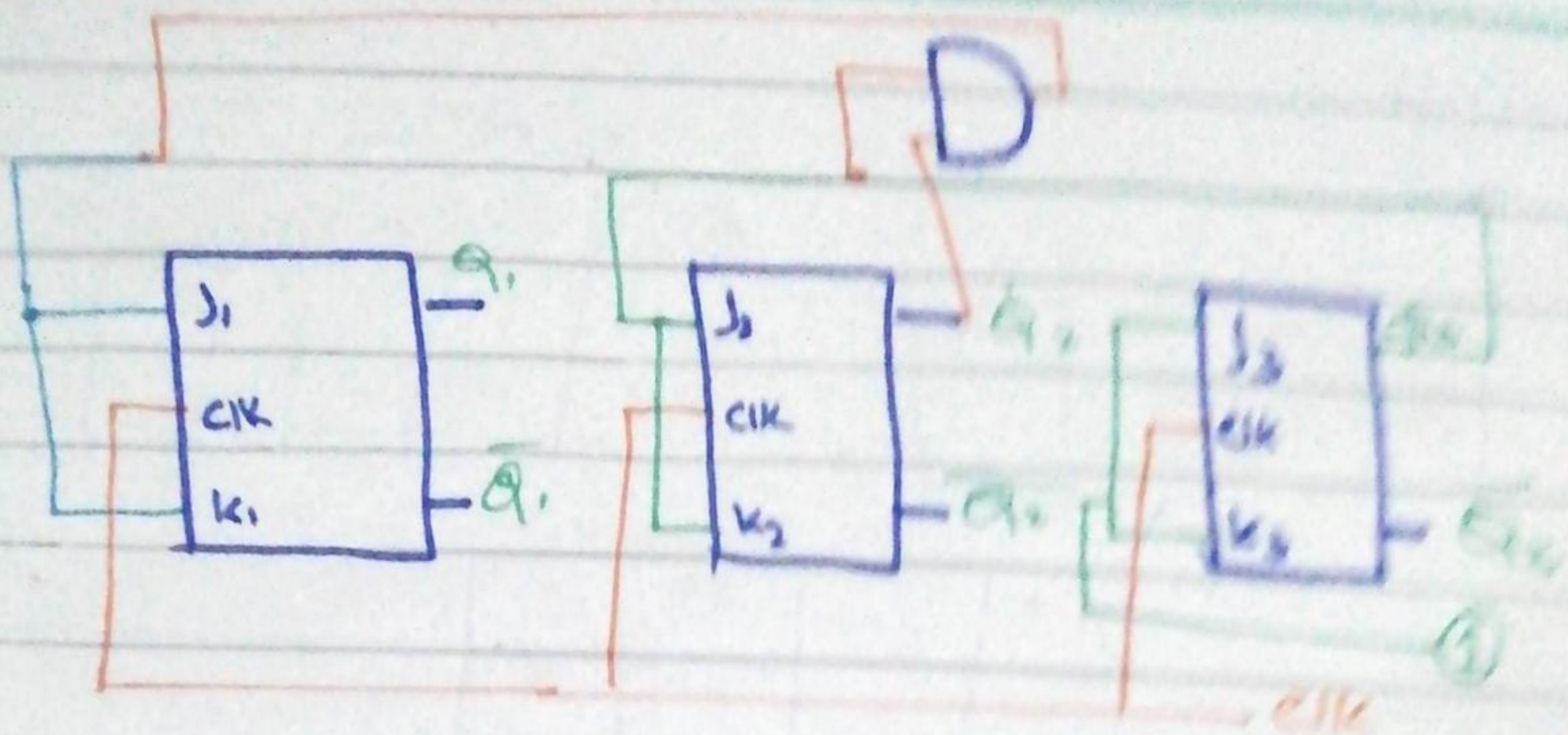
$$J_2 = Q_3$$

$$K_2 = Q_3$$

$$J_3 = 1$$

$$K_3 = 1$$

Circuit:



c) T Flip Flop

$Q_1$	$Q_2$	$Q_3$	$Q_1^+$	$Q_2^+$	$Q_3^+$	$T_1$	$T_2$	$T_3$
0	0	0	0	0	1	0	0	1
0	0	1	0	1	0	0	1	1
0	1	0	0	1	1	0	0	1
0	1	1	1	0	0	1	1	1
1	0	0	1	0	1	0	0	1
1	0	1	1	1	0	0	1	1
1	1	0	1	1	1	0	0	1
1	1	1	0	0	0	1	1	1



K-map

$T_1:-$

$Q_1$	$Q_2Q_3$	0	0	1	0
		0	0	1	0

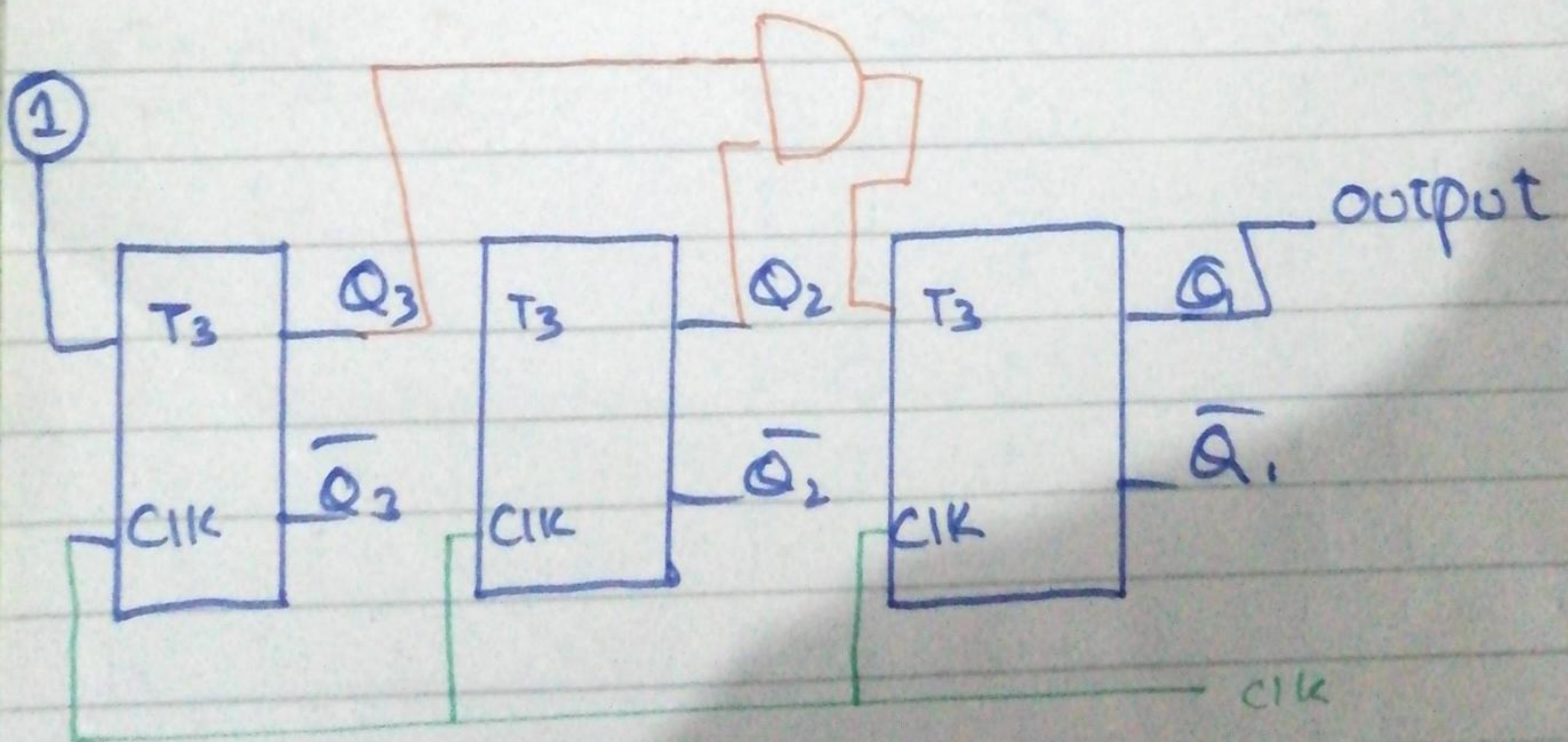
$T_3:-$

$Q_1$	$Q_2Q_3$	1	1	1	1
		1	1	1	1

$T_2:-$

$Q_1$	$Q_2Q_3$	0	1	1	0
		0	1	1	0

Circuit :-





Q2:

4-bit universal Shift Register

