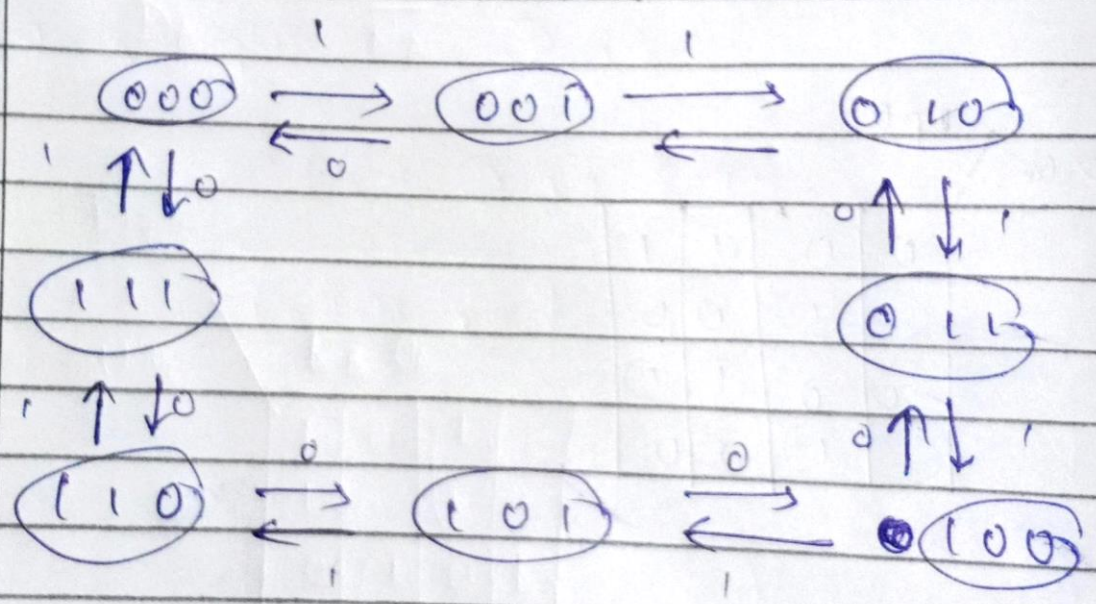


~~Qp~~ ~~Q~~

U ~~Qc~~ ~~Qb~~ ~~Qa~~ ~~Qc⁺~~ ~~Qb⁺~~ ~~Q~~

$U_p = 1$: $0 \rightarrow 1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 5 \rightarrow 6 \rightarrow 7 \rightarrow 0$

$U_p = 0$: $0 \rightarrow 7 \rightarrow 6 \rightarrow 5 \rightarrow 4 \rightarrow 3 \rightarrow 2 \rightarrow 1 \rightarrow 0$



Q_i	Q_{i+1}	D
0	0	0
0	1	1
1	0	0
1	1	1

V	Q_c^+	Q_B^+	Q_A	Q_c^+	Q_B^+	Q_A^+	D_c	D_B	D_A
0	0	0	0	1	1	1	1	1	1
0	0	0	1	0	0	0	0	0	0
0	0	1	0	0	0	1	0	0	1
0	0	1	1	0	1	0	0	1	0
0	1	0	0	0	1	1	0	1	1
0	1	0	1	1	0	0	1	0	0
0	1	1	0	1	0	1	1	0	1
0	1	1	1	1	1	0	1	1	0
1	0	0	0	0	0	1	0	0	1
1	0	0	1	0	1	0	0	1	0
1	0	1	0	0	1	1	0	1	1
1	0	1	1	1	0	0	1	0	0
1	1	0	0	1	0	1	1	0	1
1	1	0	1	1	1	0	1	1	0
1	1	1	0	1	1	1	1	1	1
1	1	1	1	0	0	0	0	0	0

$D_A:$

1)

$U Q_c$

$Q_B Q_A$

1	0	0	1
1	0	0	1
1	0	0	1
1	0	0	1

$$D_A = \overline{Q_A}$$

11)

$D_B:$

$U Q_c$

$Q_B Q_A$

1	0	1	0
1	0	1	0
0	1	0	1
0	1	0	1

$$D_B = \overline{U}(\overline{Q_A} \overline{Q_B} + Q_A Q_B) + U(\overline{Q_A} Q_B + Q_A \overline{Q_B})$$

$$= \overline{U}(\overline{Q_A \oplus Q_B}) + U(Q_A \oplus Q_B)$$

111)

		$Q_B Q_A$			
		00	01	11	10
Q_C	00	1	0	0	0
	01	0	1	1	1
	11	1	1	0	1
	10	0	0	1	0

$$D_c = \bar{U} \bar{Q}_c \bar{Q}_B \bar{Q}_A + \bar{U} Q_c Q_A + \cancel{Q_c Q_B \bar{Q}_A} + Q_c Q_B \bar{Q}_A + U Q_c \bar{Q}_B + \cancel{U \bar{Q}_c Q_A Q_B}$$

$$= \bar{U} \bar{Q}_A \bar{Q}_B \bar{Q}_c + \bar{U} Q_A Q_c$$

$$+ U Q_c \bar{Q}_B + U Q_A Q_B \bar{Q}_c$$

$$+ Q_c Q_B \bar{Q}_A$$