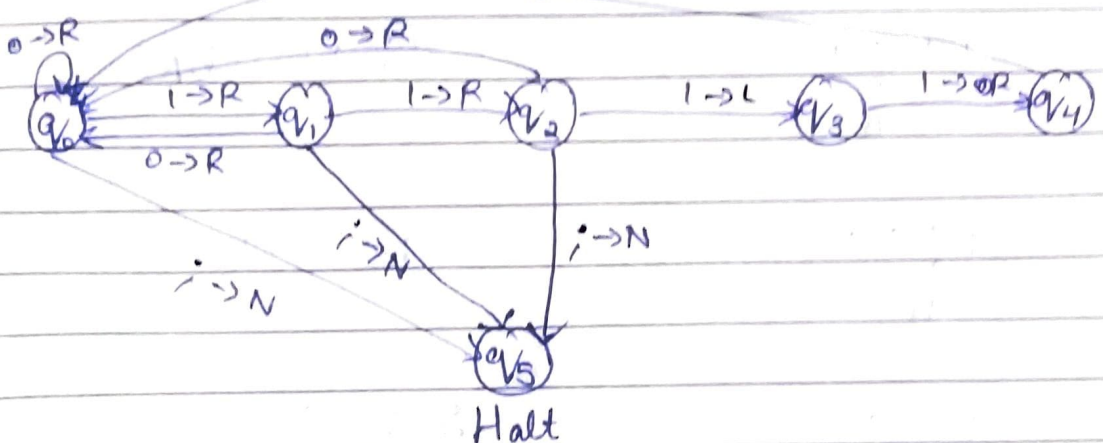


3-E FLAT Assignment - III

Q1. Let, Initial Configuration be ~~11111~~ 11110111

For T.M the input be 111 0101
1 → R



Here, $\Sigma = \{0, 1, \cdot\}$

$S = \{q_0, q_1, q_2, q_3, q_4, \text{Halt} = q_5\}$

$D = \{L, R, N\}$

SFM

$S \backslash \Sigma$	0	1	⋅
q_0	R	$q_1 R$	$q_5 N$
q_1	$q_0 R$	$q_2 R$	$q_5 N$
q_2	$q_0 R$	$q_3 L$	$q_5 N$
q_3	-	$q_4 R$	-
q_4	-	$q_0 R$	-
q_5	-	-	-

Simulation

Taking \uparrow 1 1 1 0 1 1 1; Initial Config

1 1 1 1 0 1 1 1;
 \uparrow
 q_1

$$\delta(q_0, 1) = (q_1, R)$$

1 1 1 1 0 1 1 1;
 \uparrow
 q_0

$$\delta(q_1, 1) = (q_2, R)$$

1 1 1 1 0 1 1 1;
 \uparrow
 q_3

$$\delta(q_2, 1) = (q_3, L)$$

1 0 1 1 0 1 1 1;
 \uparrow
 q_4

$$\delta(q_3, 1) = (q_4, R)$$

1 0 1 1 0 1 1 1;
 \uparrow
 q_0

$$\delta(q_4, 1) = (q_0, R)$$

1 0 1 1 0 1 1 1;
 \uparrow
 q_1

$$\delta(q_0, 0) = (q_1, R)$$

1 0 1 1 0 1 1 1;
 \uparrow
 q_0

$$\delta(q_1, 0) = (q_0, R)$$

1 0 1 1 0 1 1 1;
 \uparrow
 q_1

$$\delta(q_0, 1) = (q_1, R)$$

1 0 1 1 0 1 1 1;
 \uparrow
 q_2

$$\delta(q_1, 1) = (q_2, R)$$

1 0 1 1 0 1 1 1;
 \uparrow
 q_3

$$\delta(q_2, 1) = (q_3, L)$$

1 0 1 1 0 1 0 1 ;
↑
 q_4

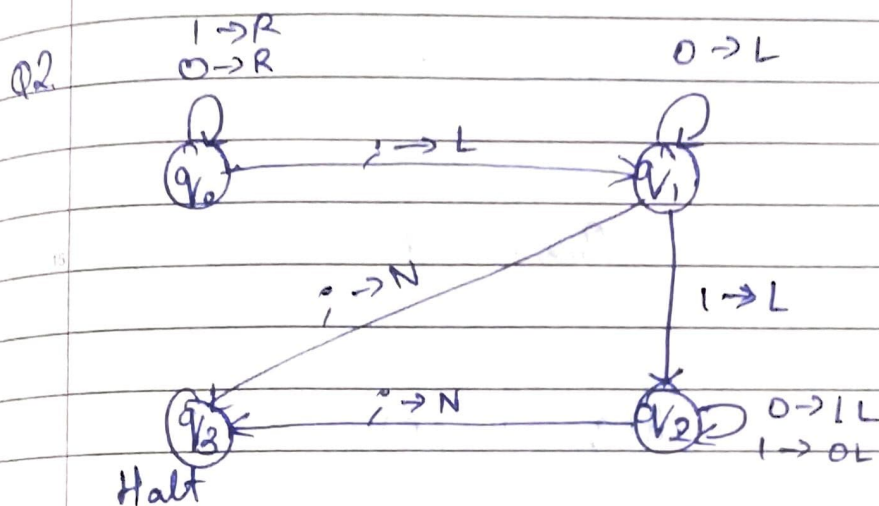
$$\delta(q_3, 1) = (q_4, R)$$

1 0 1 1 0 1 0 1 ;
↑
 q_0

$$\delta(q_4, 1) = (q_0, R)$$

1 0 1 1 0 1 0 1 ;
↑
 q_5

$$\delta(q_0, ;) = (q_5, N)$$



$$\Sigma = \{0, 1, ;\}$$

$$S = \{q_0, q_1, q_2, \text{Halt} = q_3\}$$

$$D = \{L, R, N\}$$

SFM

$S \backslash I$	0	1	;
q_0	R	R	q_1, L
q_1	L	q_2, L	q_3, N
q_2	1L	0L	q_3, N
q_3	-	-	-

$\cdot 0 \text{ } \textcircled{0} \text{ } 1 \text{ } 0;$
 \uparrow
 q_2

$$\delta(q_2, 1) = (0L)$$

$\cdot 1 \text{ } 0 \text{ } 1 \text{ } 0;$
 \uparrow
 q_2

$$\delta(q_2, 0) = (1L)$$

$\cdot 1 \text{ } 0 \text{ } 1 \text{ } 0;$
 \uparrow
 q_3

$$\delta(q_2, i) = (q_3N)$$

Thus, the TM generates the 2's complement for input string 01010 to 10110 .