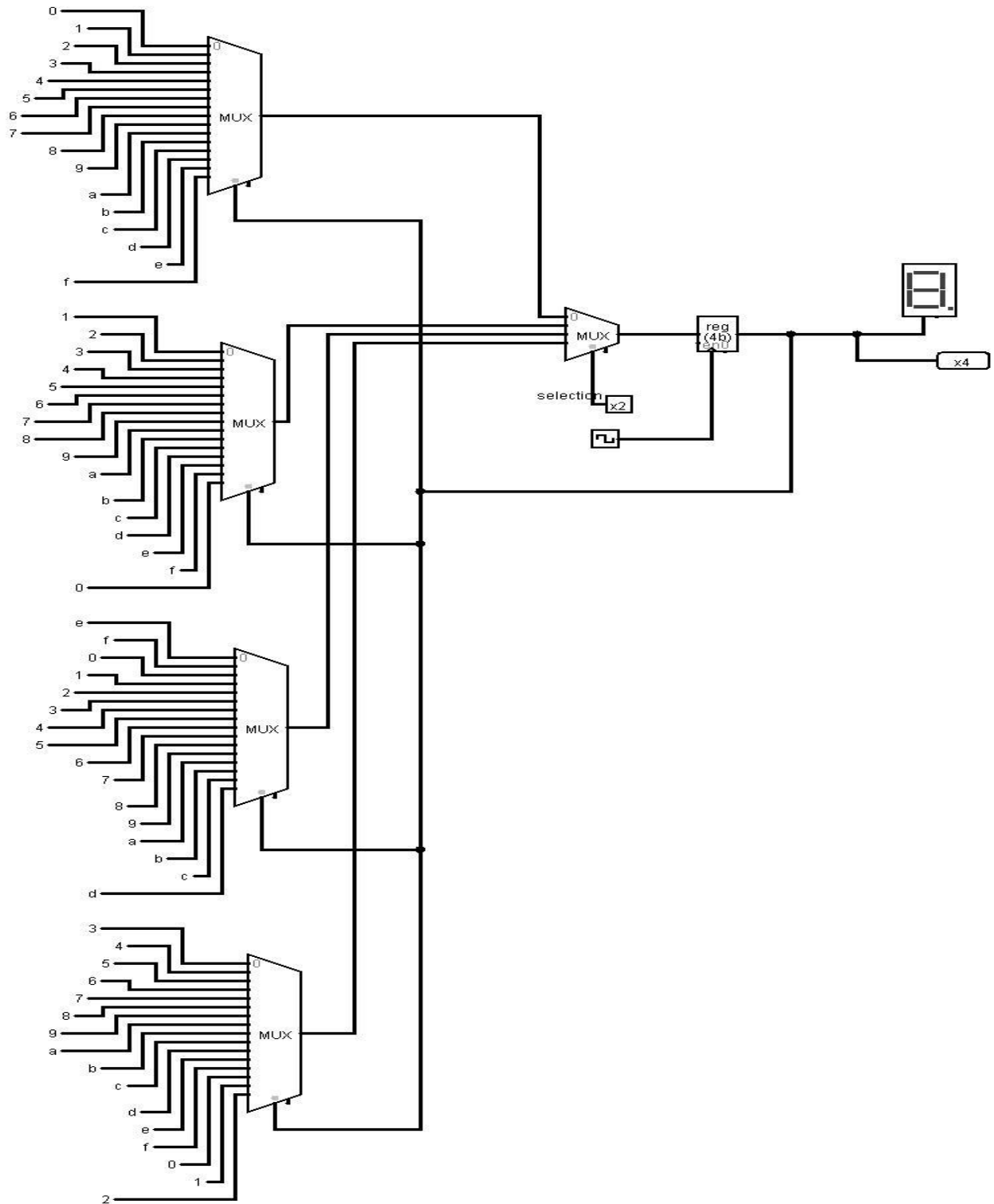


Name – Samrathpreet Singh Randhawa

Roll no. – 1801CS43

CS226 Lab – 11

Q1)

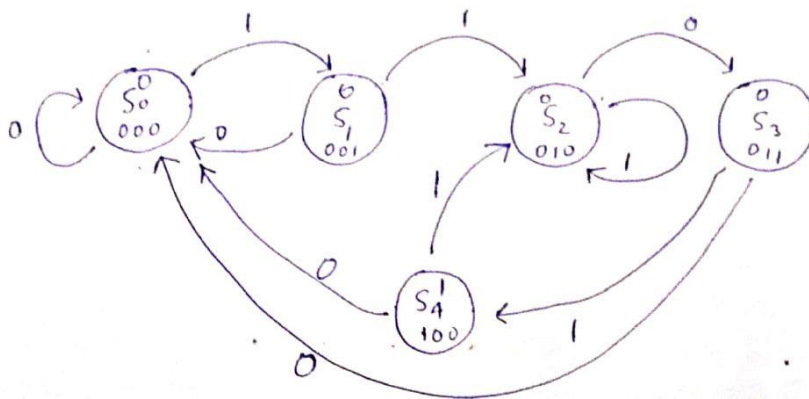


C0 C1

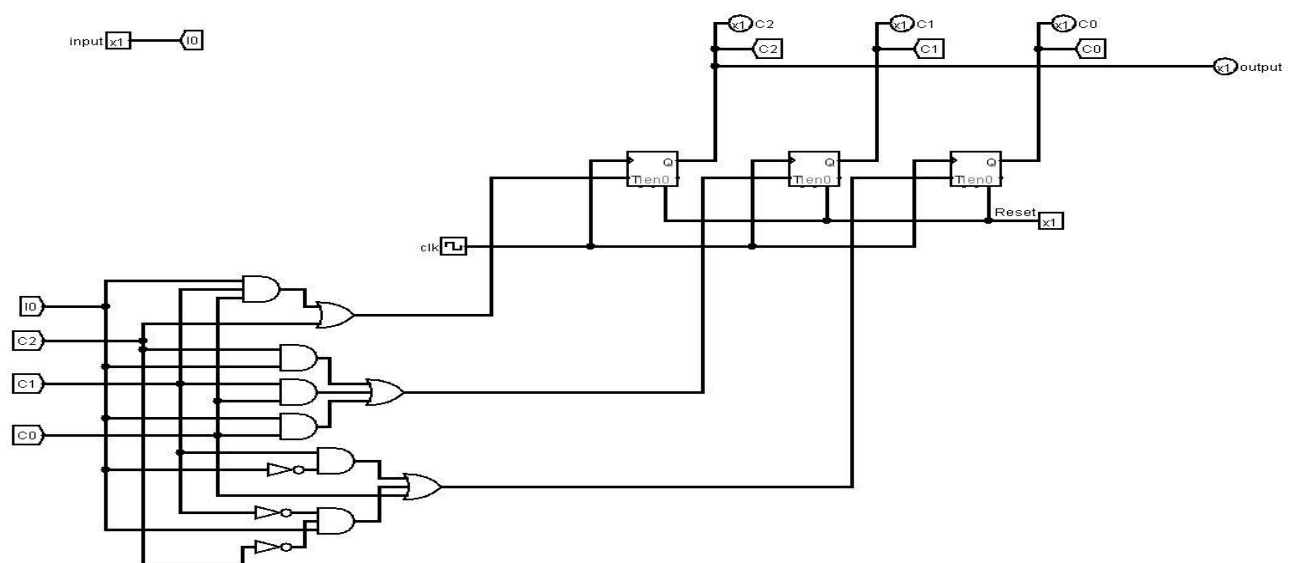
- 0 0 Stop counting
- 0 1 Count up by one
- 1 0 Count down by two
- 1 1 Count up by three

Q2) Design Mealy Moore sequence detector for 1101.

Moore State Transition Diagram



T-Flip flop Moore



Current State			Input	Next State			Flip flop Input			Output
C_2	C_1	C_0	I_0	N_2	N_1	N_0	T_2	T_1	T_0	O
0	0	0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	1	0	0	1	0
0	0	1	0	0	0	0	0	0	1	0
0	0	1	1	0	1	0	0	1	1	0
0	1	0	0	0	1	1	0	0	1	0
0	1	0	1	0	1	0	0	0	0	0
0	1	1	0	0	0	0	0	1	1	0
0	1	1	1	1	0	0	1	1	1	0
1	0	0	0	0	0	0	1	0	0	1
1	0	0	1	0	1	0	1	1	0	1

$C_2 C_1$		$C_0 I_0$			
		00	01	11	10
00	01	0	0	0	0
01	11	0	0	1	0
11	10	X	X	X	X
10		1	1	X	X

$$T_2 = C_2 + C_0 C_1 I_0$$

$C_2 C_1$		$C_0 I_0$			
		00	01	11	10
00	01	0	0	1	0
01	11	0	0	1	1
11	10	X	X	X	X
10		0	1	X	X

$$T_1 = C_1 C_0 + C_0 I_0 + C_2 I_0$$

$C_2 C_1$		$C_0 I_0$			
		00	01	11	10
00	01	0	1	1	1
01	11	1	0	1	1
11	10	X	X	X	X
10		0	0	X	X

$$T_0 = C_0 + \overline{C_2} \overline{C_1} I_0 + C_1 \overline{I_0}$$

$C_2 C_1$		$C_0 I_0$			
		00	01	11	10
00	01	0	0	0	0
01	11	0	0	0	0
11	10	X	X	X	X
10		1	1	X	X

$$O = C_2$$

J-K flip flop Moore

JK Moore

C_2	C_1	C_0	I_0	N_2	N_1	N_0	J_2	K_2	J_1	K_1	J_0	K_0	O
0	0	0	0	0	0	0	0	X	0	X	0	X	0
0	0	0	1	0	0	1	0	X	0	X	1	X	0
0	0	1	0	0	0	0	0	X	0	X	X	1	0
0	0	1	1	0	1	0	0	X	1	X	X	1	0
0	1	0	0	0	1	1	0	X	X	0	1	X	0
0	1	0	1	0	1	0	0	X	X	0	0	X	0
0	1	1	0	0	0	0	0	X	X	1	X	1	0
0	1	1	1	1	0	0	1	X	X	1	X	1	0
1	0	0	0	0	0	0	0	X	0	X	0	X	1
1	0	0	1	0	1	0	0	X	1	X	0	X	1

$C_2 I_0$	00	01	11	10
00	0	0	0	0
01	0	0	1	0
11	X	X	X	X
10	X	X	X	X

$$J_2 = C_1 C_0 I_0$$

	00	01	11	10
00	X	X	X	X
01	X	X	X	X
11	X	X	X	X
10	X	1	X	X

$$K_2 = 1$$

$C_0 I_0$	00	01	11	10
00	0	0	1	0
01	X	X	X	X
11	X	X	X	X
10	0	1	X	X

$$J_1 = C_2 I_0 + C_0 I_0$$

$C_0 I_0$	00	01	11	10
00	X	X	X	X
01	0	0	1	1
11	X	X	X	X
10	X	X	X	X

$$K_1 = C_0$$

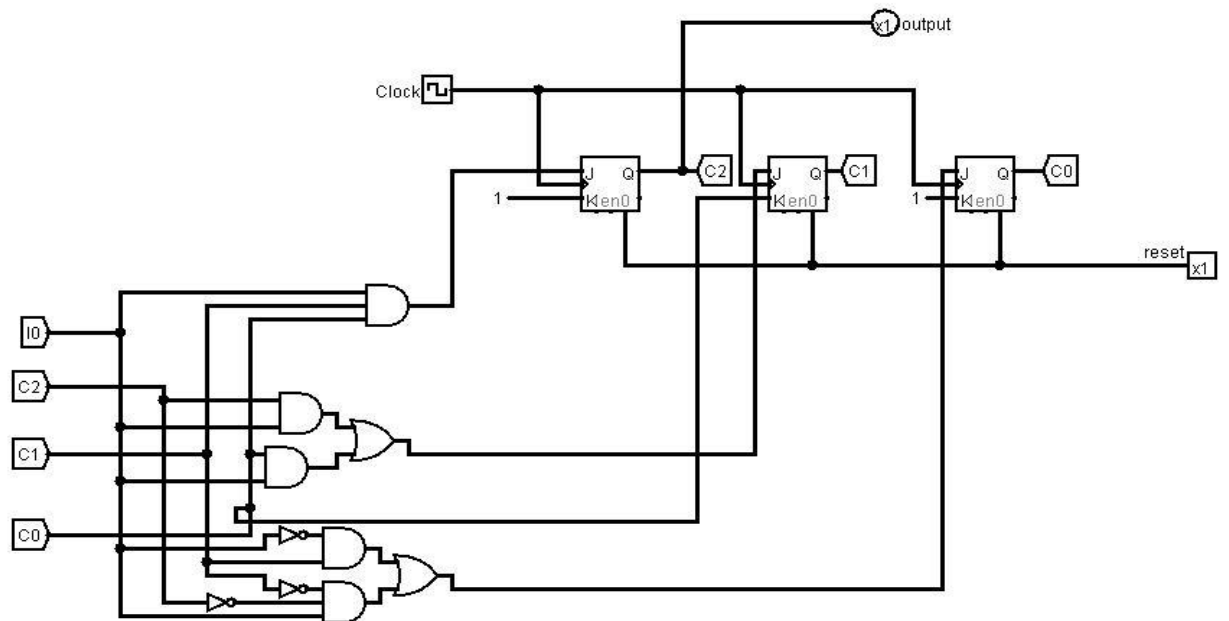
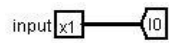
$C_1 I_0$	00	01	11	10
00	0	1	X	X
01	1	0	X	X
11	X	X	X	X
10	0	0	X	X

$$J_0 = C_1 \bar{I}_0 + \bar{C}_1 \bar{C}_2 I_0$$

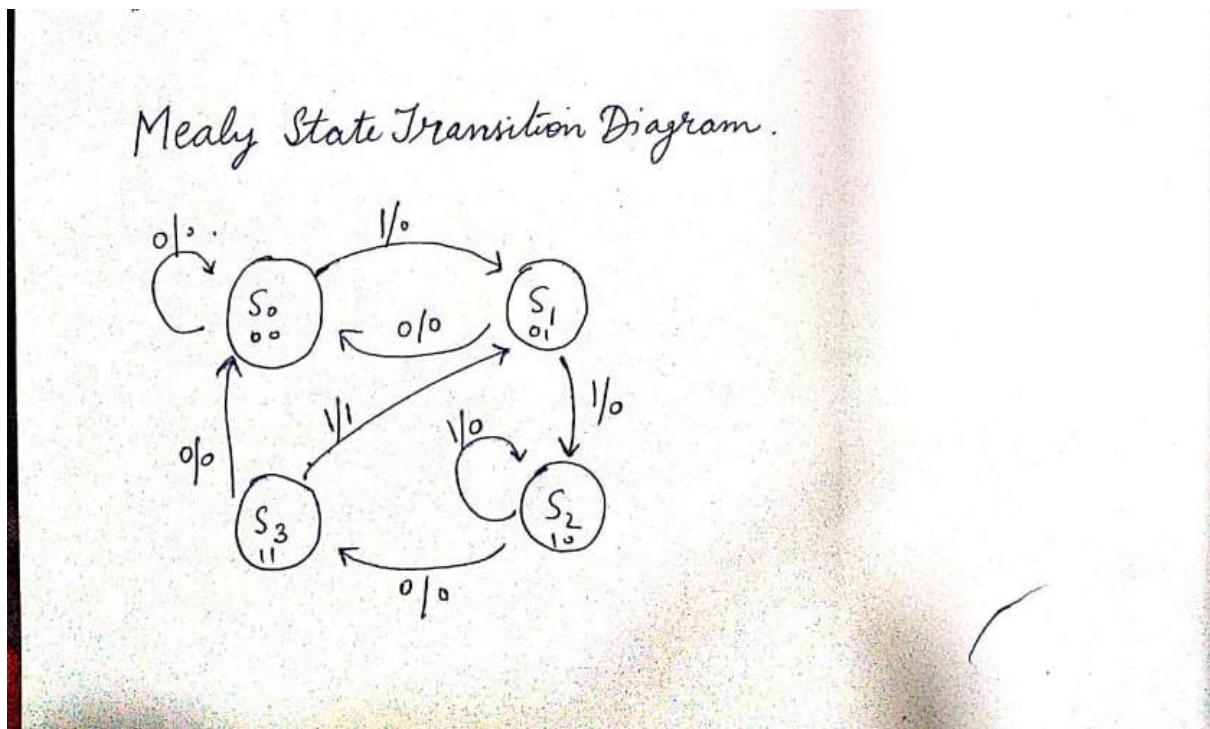
$C_1 I_0$	00	01	11	10
00	X	X	1	1
01	X	X	1	1
11	X	X	X	X
10	X	X	X	X

$$K_0 = 1$$

$$O = C_2$$



Mealy –



T flip flop mealy -

T flip flop.

C_1	C_0	I_0	N_1	N_0	T_1	T_0	O
0	0	0	0	0	0	0	0
0	0	1	0	1	0	1	0
0	1	0	0	0	0	1	0
0	1	1	1	0	1	1	0
1	0	0	1	1	0	1	0
1	0	1	1	0	0	0	0
1	1	0	0	0	1	1	0
1	1	1	0	1	1	0	1

$C_1 C_0$	I_0	
00	0	0
01	0	1
11	1	1
10	0	0

$$T_1 = C_1 C_0 + C_0 I_0$$

$C_1 C_0$	I_0	
00	0	0
01	1	1
11	1	0
10	1	0

$$T_0 = C_1 \bar{I}_0 + \bar{C}_1 C_0 + \bar{C}_1 I_0$$

$C_1 C_0$	I_0	
00	0	0
01	0	0
11	0	1
10	0	0

$$O = C_1 C_0 I_0$$

JK flip flop.

C_1	C_0	I_0	N_1	N_0	J_1	K_1	J_0	K_0	
0	0	0	0	0	0	X	0	X	0
0	0	1	0	1	0	X	1	X	0
0	1	0	0	0	0	X	X	1	0
0	1	1	1	0	1	X	X	1	0
1	0	0	1	1	X	0	1	X	0
1	0	1	1	0	X	0	0	X	0
1	1	0	0	0	X	1	X	1	0
1	1	1	0	1	X	1	X	0	1

C_1	C_0	I_0
0	0	0
0	1	0
1	0	1
1	1	0

$$J_1 = C_0 I_0$$

C_1	C_0	I_0
0	0	X
0	1	X
1	0	1
1	1	0

$$K_1 = C_0$$

C_1	C_0	I_0
0	0	0
0	1	X
1	0	X
1	1	0

$$J_0 = \bar{C}_1 I_0 + \bar{I}_0 C_1$$

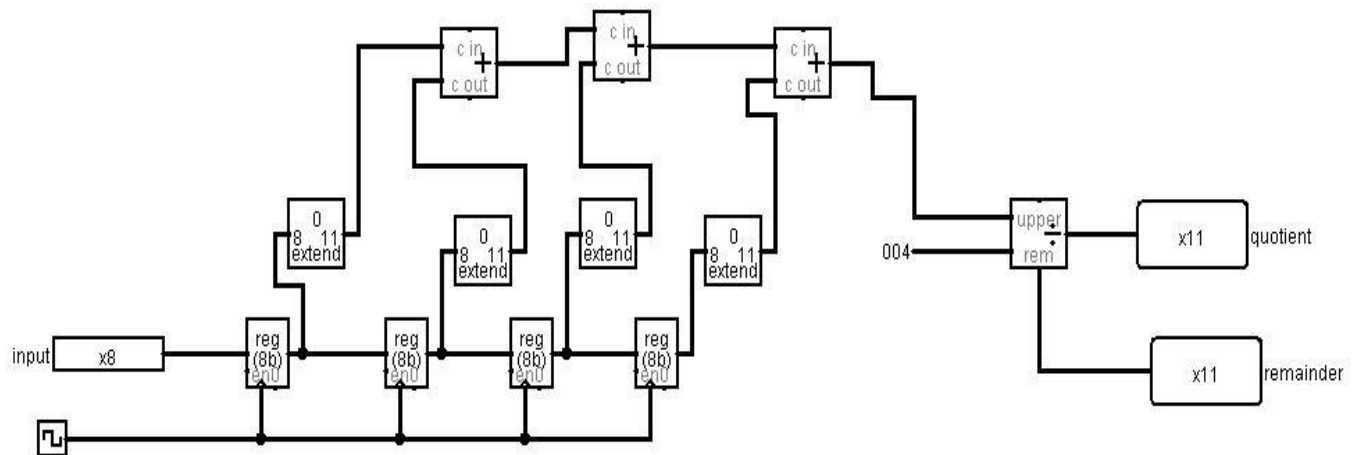
$$= C_1 \oplus I_0$$

C_1	C_0	I_0
0	0	X
0	1	X
1	0	1
1	1	X

$$K_0 = \bar{C}_1 + \bar{I}_0$$

$$0 = C_1 C_0 I_0$$

Q3) Design Average temperature calculator using history of 4 temperatures.



Enter temperature values in this one by one
the last 4 states will remain stored in
registers from where output will go into adders
and after that net sum of four temperatures will
be divided by 4 to get required output.