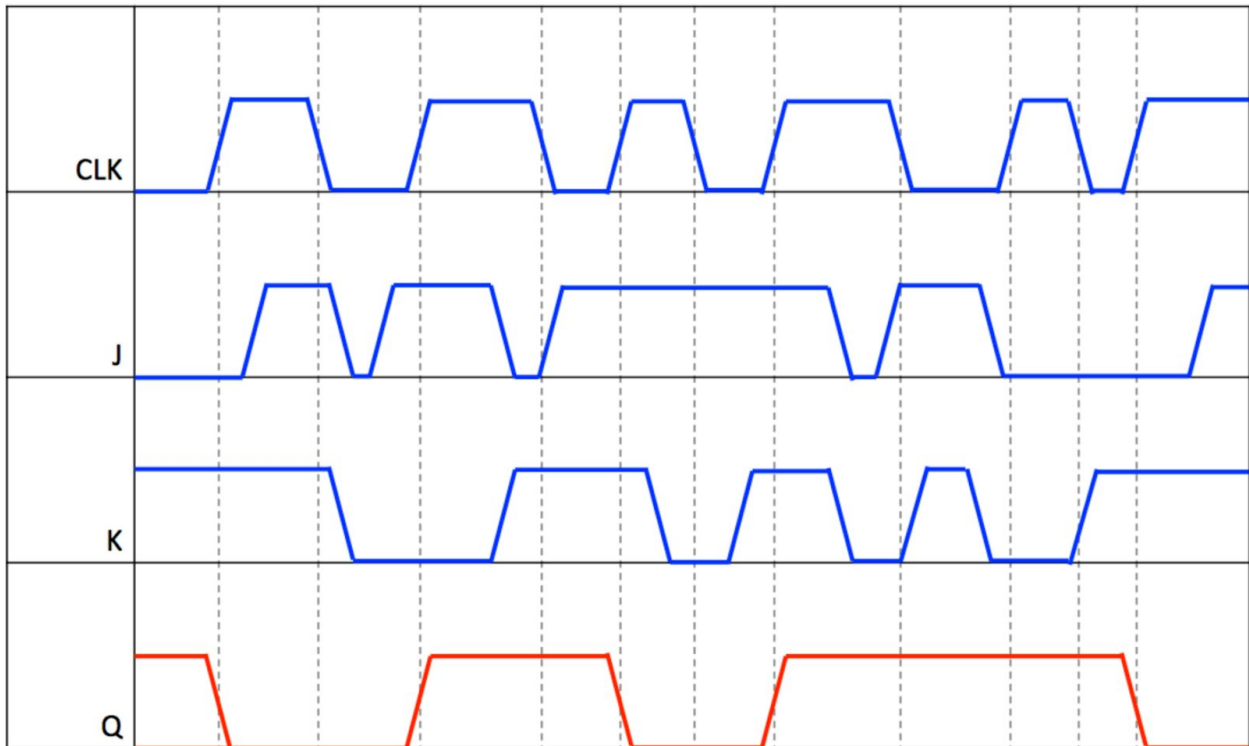
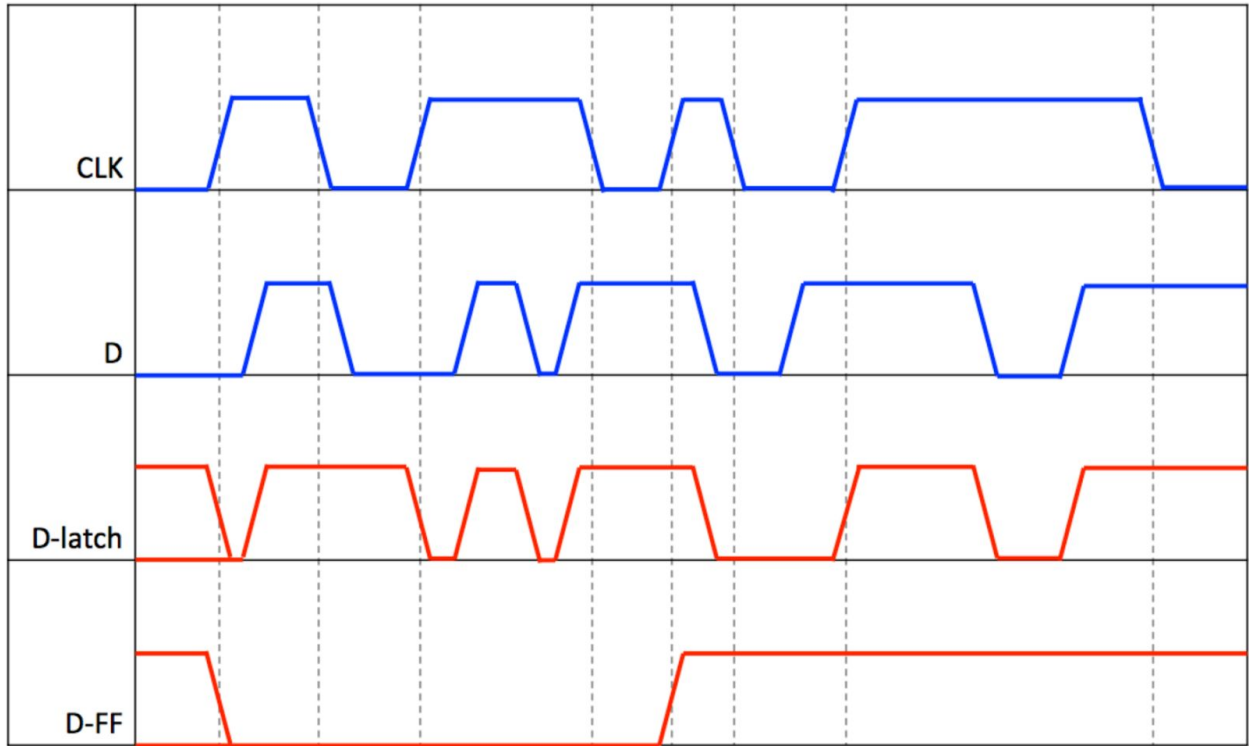
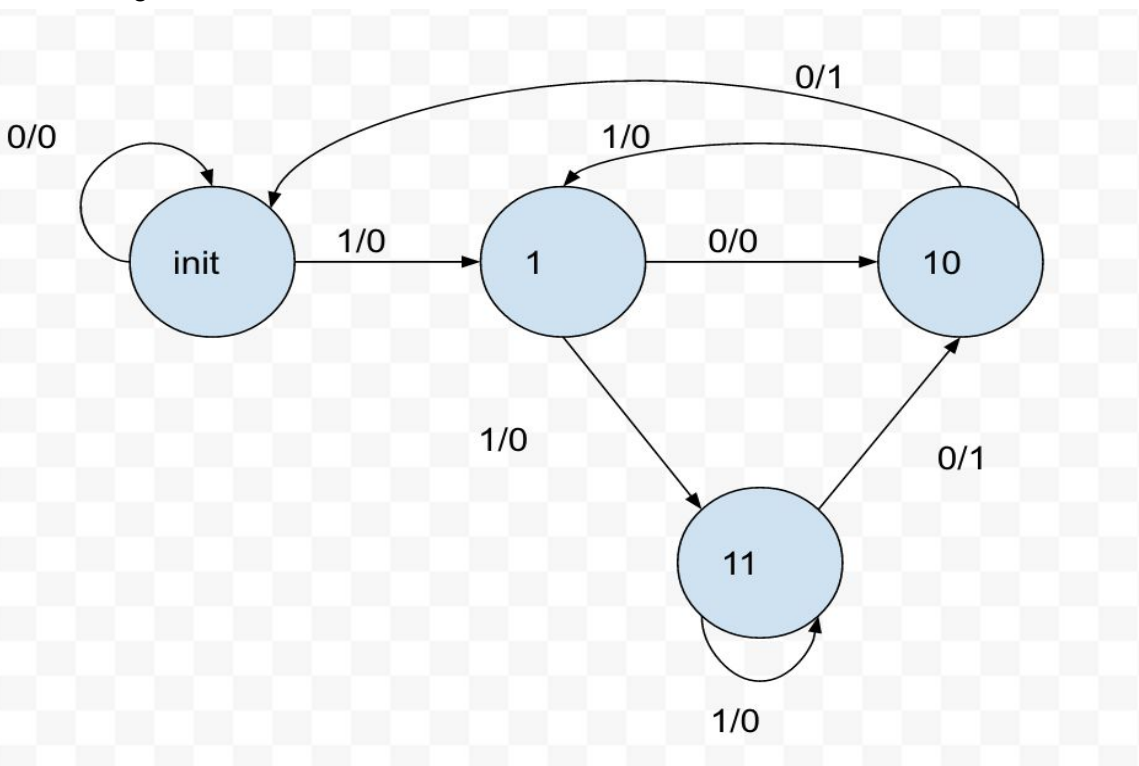


1.



## 2.1 Mealy machine

### i) State Diagram



### ii) State Table

State Assignment:

init : 00

"1" : 01

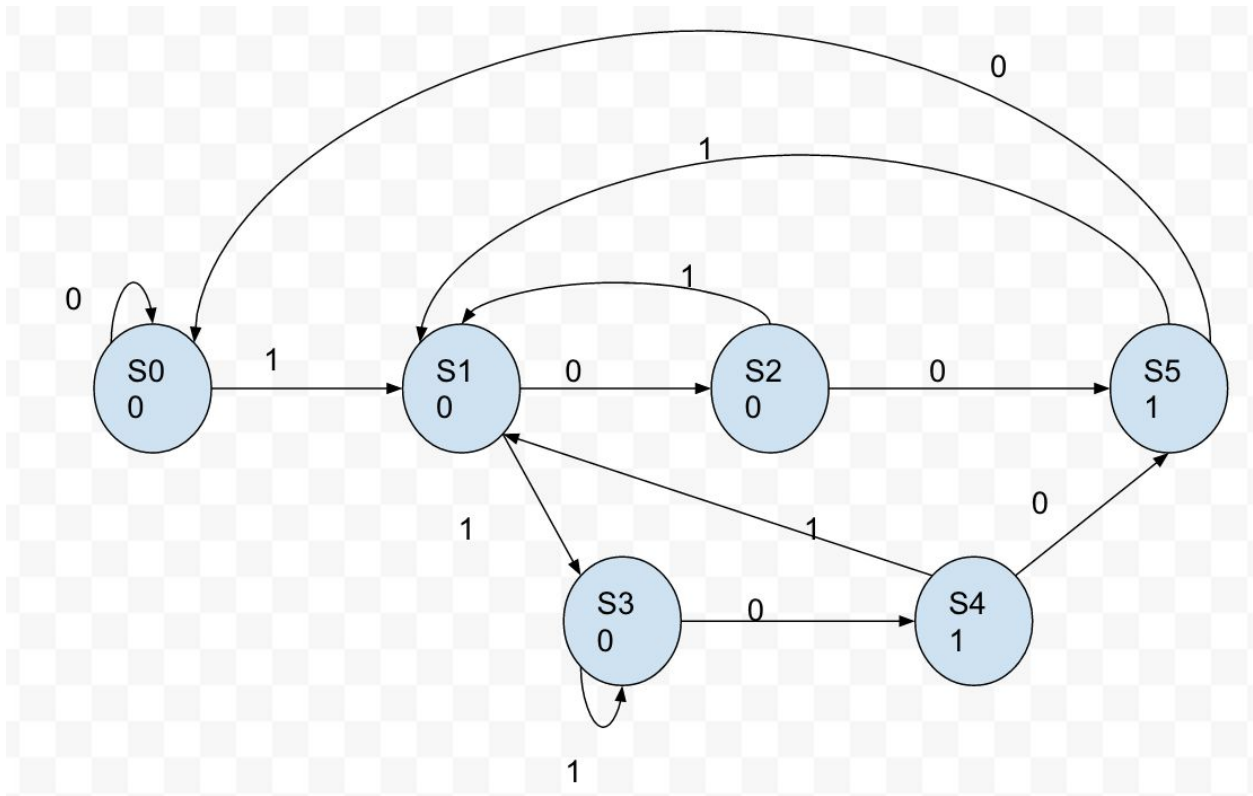
"10": 10

"11": 11

PS \ X	X = 0	X = 1
00	00,0	01, 0
01	10, 0	11, 0
10	00, 1	01, 0
11	10,1	11,0

## 2.2 Moore machine

### i) State Diagram



ii) State Table

PS \ X	X = 0	X = 1
S0	S0, 0	S1, 0
S1	S2, 0	S3, 0
S2	S5, 0	S1, 0
S3	S4, 0	S3, 0
S4	S5, 1	S1, 1
S5	S0, 1	S1, 1

3. i)

$$n_0(t) = b(t) \cdot p_0'(t) + p_1(t) \cdot p_1'(t)$$

$$n_1(t) = p_1'(t) \cdot p_0(t) \cdot b(t) + p_1(t) \cdot p_0'(t)$$

$$z(t) = p_1(t)$$

$n_0$  and  $n_1$  are T inputs of the T-flip flops.

Therefore:

$$p0(t+1) = n0(t) \oplus p0(t)$$

$$p1(t+1) = n1(t) \oplus p1(t)$$

Excitation Table

id	p1(t)	p0(t)	b	n1(t)	n0(t)	p1(t+1)	p0(t+1)	z
0	0	0	0	0	0	0	0	0
1	0	0	1	0	1	0	1	0
2	0	1	0	0	0	0	1	0
3	0	1	1	1	0	1	1	0
4	1	0	0	1	1	0	1	1
5	1	0	1	1	1	0	1	1
6	1	1	0	0	0	1	1	1
7	1	1	1	0	0	1	1	1

State Table

p1p0 \ b	b = 0	b = 1
00	00, 0	01, 0
01	01, 0	11, 0
10	01, 1	01, 1
11	11, 1	11, 1

State Assignment

$$p1p0 = 00 \rightarrow S0$$

$$p1p0 = 01 \rightarrow S1$$

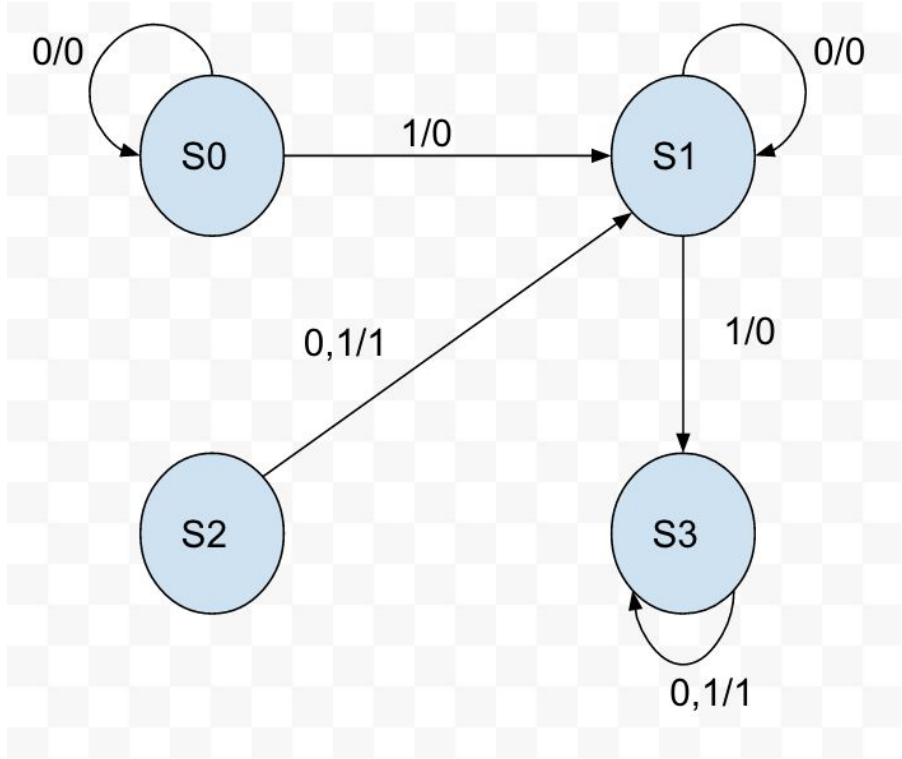
$$p1p0 = 10 \rightarrow S2$$

$$p1p0 = 11 \rightarrow S3$$

PS \ b	b = 0	b = 1
--------	-------	-------

S0	S0, 0	S1, 0
S1	S1, 0	S3, 0
S2	S1, 1	S1, 1
S3	S3, 1	S3, 1

ii) State Diagram

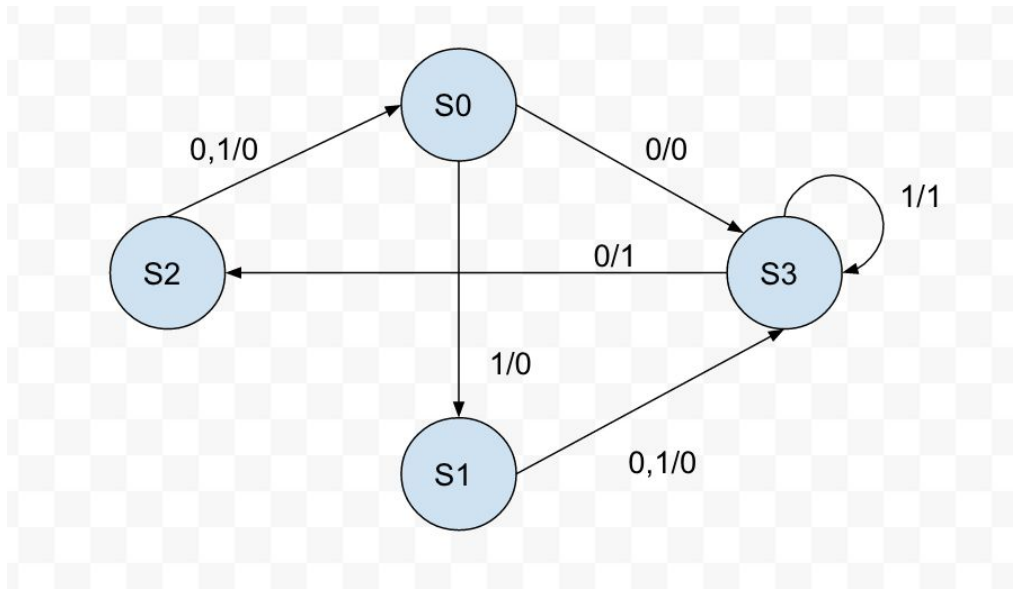


i) Excitation table

Q1(t)	Q0(t)	x(t)	Q1(t+1)	Q0(t+1)	y	JQ1	KQ1	JQ0	KQ0
0	0	0	1	1	0	1	X	1	X
0	0	1	0	1	0	0	X	1	X
0	1	0	1	1	0	1	X	X	0
0	1	1	1	1	0	1	X	X	0
1	0	0	0	0	0	X	1	0	X
1	0	1	0	0	0	X	1	0	X
1	1	0	1	0	1	X	0	X	1
1	1	1	1	1	1	X	0	X	0

State Assignment

Q1Q0	S
00	S0
01	S1
01	S2
10	S3



ii)  
K-maps

JQ1

<b>Q1\Q0x</b>	<b>00</b>	<b>01</b>	<b>11</b>	<b>10</b>
<b>0</b>	1	0	1	1
<b>1</b>	X	X	X	X

$$JQ1 = Q0 + x'$$

KQ1

<b>Q1\Q0x</b>	<b>00</b>	<b>01</b>	<b>11</b>	<b>10</b>
<b>0</b>	X	X	X	X
<b>1</b>	1	1	0	0

$$KQ1 = Q0'$$

JQ0

<b>Q1\Q0x</b>	<b>00</b>	<b>01</b>	<b>11</b>	<b>10</b>
<b>0</b>	1	1	X	X
<b>1</b>	0	0	X	X

$JQ0 = Q1'$

KQ0

<b>Q1\Q0x</b>	<b>00</b>	<b>01</b>	<b>11</b>	<b>10</b>
<b>0</b>	X	X	0	0
<b>1</b>	X	X	0	1

$KQ0 = Q1.x'$

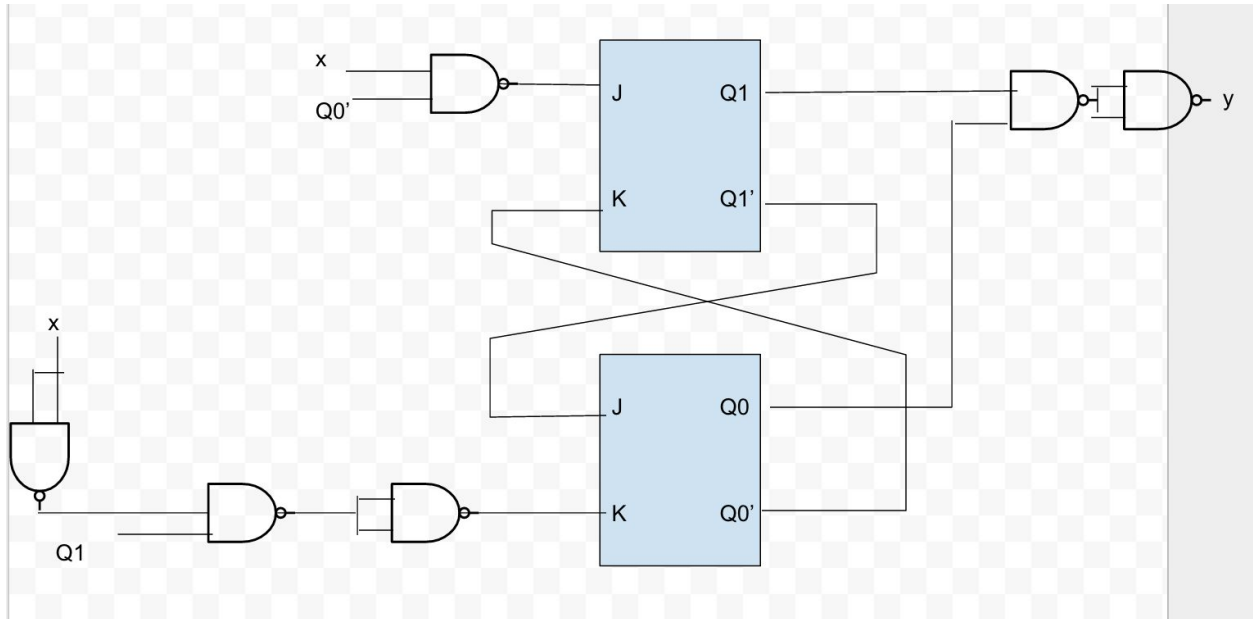
y

<b>Q1\Q0x</b>	<b>00</b>	<b>01</b>	<b>11</b>	<b>10</b>
<b>0</b>	0	0	0	0
<b>1</b>	0	0	1	1

$y = Q1.Q0$



## Logic Diagram



### Rubric:

Problems to be graded : **Total 50**

1. A ) D-FF

:2.5 per clock cycle

**total 10**

2.1 i) Mealy state machine

5 pts: no of states, no deduction for extra state

5 pts \*3: for 3 patterns

test patterns : 100, 110, 1100

**total 20**

4. i) Excitation table

3 pts per row : if more than 6 rows are incorrect -20

**total 20**

ATTEMPT

5 points for attempting following problems: **Total 50**

1. A D-latch

1. B JK-FF

2.1.ii)

2.2.i)

2.2.ii)

3.i)

3.ii)

4.i) state diagram

4.ii) K-map

4.ii) logic diagram