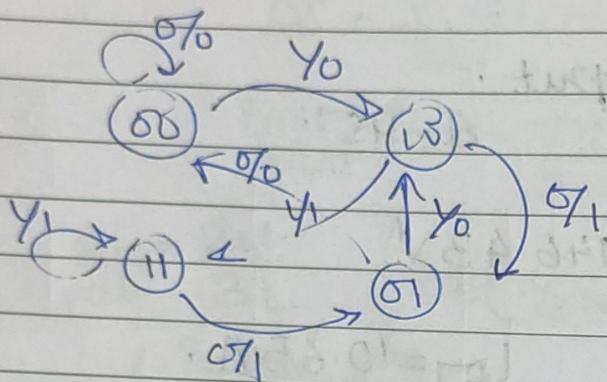


Assignment  
 Mansi Utiyal .

	Present state		$Y_P$	$\bar{Y}_P$	Next state		$D/P$
	$Q_{IN}$	$Q_{ON}$	$X$	$D_1$	$D_0$	$Q_{(N+1)}$	$Q_{(N+1)}$
0	0	0	0	0	0	0	0
1	0	0	1	1	0	1	0
2	0	1	0	0	0	0	0
3	0	1	1	1	0	1	0
4	1	0	0	0	1	0	1
5	1	0	1	1	1	1	1
6	1	1	0	0	0	1	1
7	1	1	1	1	0	1	1
8	1	1	1	1	1	1	1
9	1	1	1	1	1	1	1
10	1	1	1	1	1	1	1



2 Reg loops

Q2 (a) 4 bit counter with RS flip flop. will repeat after 16 clock pulse.

16 clock pulse, state = 2.

18 clock pulse state = 4 ( $2 \rightarrow 3 \rightarrow 4$ ).

	clk	C	B	A
1	-	0	0	0
2	1	0	0	1
3	2	0	1	0
4	3	0	1	1
5	4	1	0	0
6	5	1	0	1
7	6	1	1	0
8	7	1	1	1
9	8	0	0	0

counter goes back to initial after 8 clk pulse

Q3. Moore Model  $\rightarrow$  Seq. & detect = 010

States  $a \rightarrow X$  bit correctly decoded

$b \rightarrow 1$

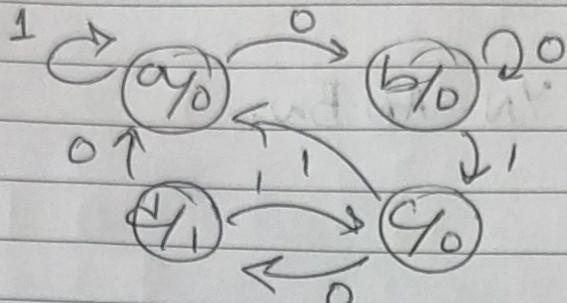
$c \rightarrow 2$

$d \rightarrow 3$

$O/P = 1$  in state

State

transition  
diagram:



State assignment

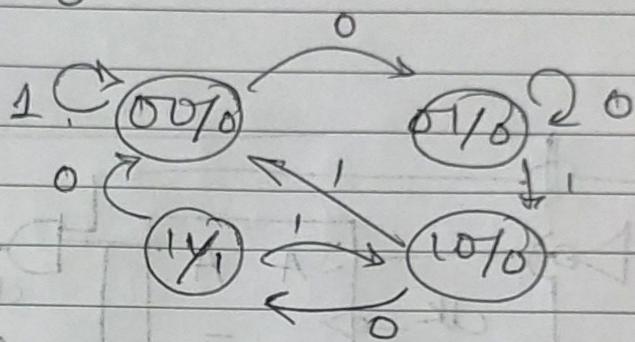
State BA

a 00

b 01

c 10

d 11



Present State i/p Next State O/P

Bn	An	Xn	Bn+1	An+1	Yn	JB	KB	JA	KA
0	0	0	0	1	0	0	x	1	x
0	0	1	0	0	0	0	x	0	x
0	1	0	0	1	0	0	x	x	0
0	1	1	1	0	0	1	x	x	1
1	0	0	1	1	0	x	0	1	x
1	0	1	0	0	0	x	1	0	x
1	1	0	0	0	1	x	1	x	1
1	1	1	1	0	1	x	0	x	1

~~Xn Bn An~~

Xn	00	01	11	w
0	0	0	x	x
1	0	(x)	x	x

~~Xn Bn An~~

Xn	00	01	11	w
0	1	x	x	1
1	0	0	x	0

$J_B = X_n A_n$

$J_A = \bar{X}_n$

BNAW

$X_n$	00	01	11	10
0	x	x	D	0
1	x	x	0	1

BuAn

$X_n$	00	01	11	10
0	x	0	1	x
1	x	1	1	x

$$KB = \bar{X}_n A_{nt} + X_n \bar{A}_{nt}$$

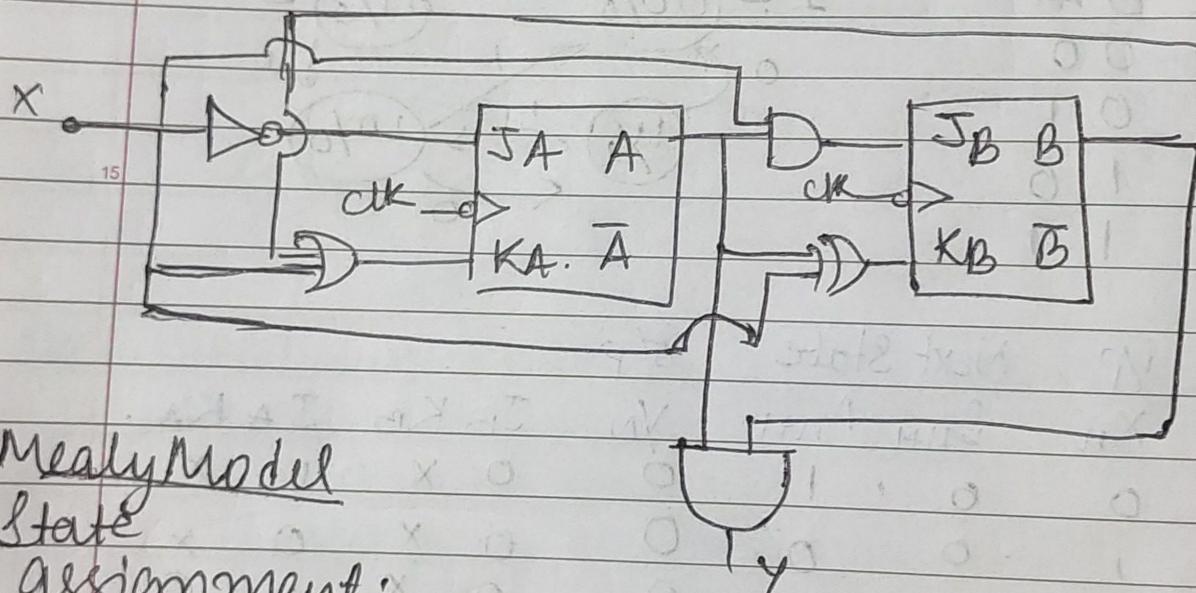
$$KA = X_w + B_w$$

Aw Bw

0	00
1	01

$$YN = A_w \cdot B_w$$

Circuit realization.

Mealy Model

State

assignment:

State B A

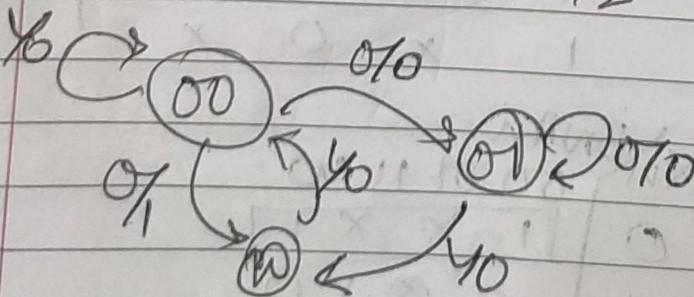
a 1 0 0 x

a  $\rightarrow$  X bit correctly decoded

b 0 1 x

b  $\rightarrow$  1 u

c x 1 0 x

c  $\rightarrow$  2 u

Present State	i/p.	Next State	o/p.		
Bn	An	X	Bn+1 An+1	Y	JB KB JA KA
0	0	0	0 1	0 0	x 1 x
0	0	1	0 0	0 0	x 0 x 0 x
0	1	0	0 0	1 0	x x 0
0	1	1	1 1	0 1	x x 1
1	0	0	1 1	0 0	x 1 0 x
1	0	1	0 0	0 0	x 1 0 x

BnAn		X BnAn			
X	00 01 11 10	X	00 01 10 10	0	1
0	0 0 x x	0	1 x x 0	0	1
1	0 1 x x	1	0 x x 0	1	0

BnAn		X BnAn			
X	00 01 10 10	X	00 01 10 10	0	1
0	1 x x 0	0	1 x x 0	0	1
1	0 x x 0	1	0 x x 0	1	0

$$JB = X An$$

$$JA = \bar{X} Bn$$

BnAn		X BnAn			
X	00 01 11 10	X	00 01 11 10	0	1
0	0 0 x 1	0	0 x x 1	0	1
1	0 0 x 0	1	0 x x 0	1	0

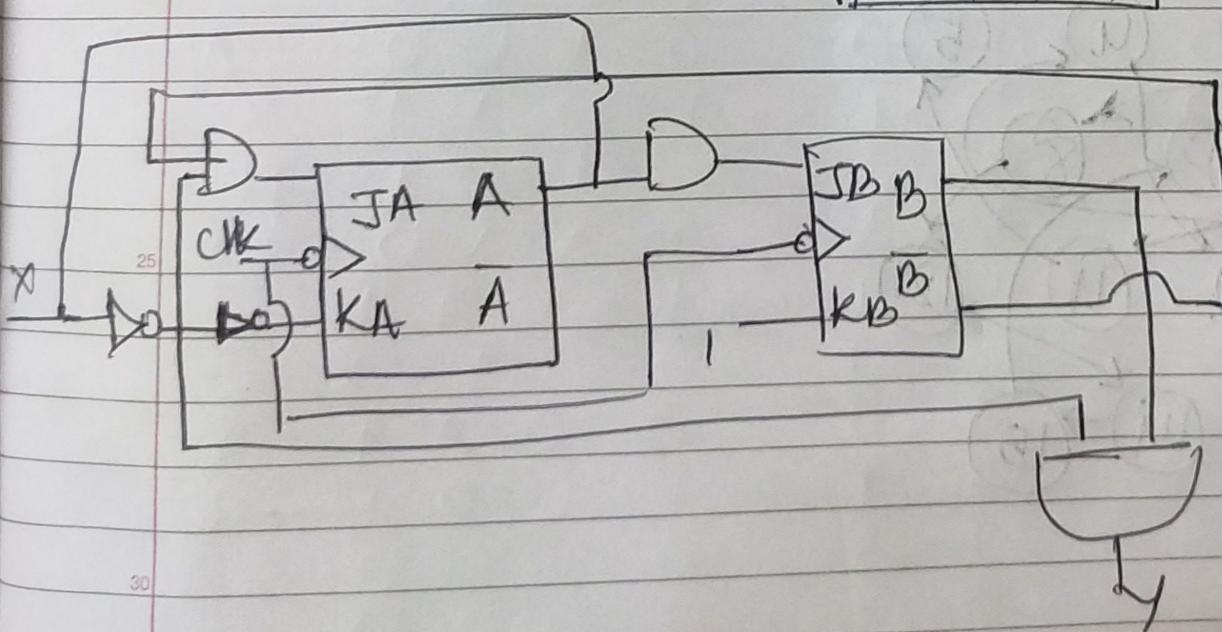
BnAn		X BnAn			
X	00 01 11 10	X	00 01 11 10	0	1
0	x x x 1	0	x x x 1	0	1
1	x x x 1	1	x x x 1	1	0

$$KB = 1$$

Circuit realization.

BnAn		X BnAn			
X	00 01 11 10	X	00 01 11 10	0	1
0	x 0 0 x x	0	x 0 0 x x	0	1
1	x 1 x x x	1	x 1 x x x	1	0

$$KA = X$$



Q4. Present State.

$Q_3\ Q_2\ Q_1\ Q_0$

0 0 0 0

0 0 0 1

0 0 1 0

0 0 1 1

0 1 0 0

0 1 0 1

0 1 1 0

0 1 1 1

1 0 0 0

1 0 0 1

1 0 1 0

1 0 1 1

1 1 0 0

1 1 0 1

1 1 1 0

1 1 1 1

FF I/P.

$D_3\ D_2\ D_1\ D_0$

1 0 0 0

0 0 0 0

1 0 0 1

0 0 0 1

1 0 1 0

0 0 1 0

1 0 1 1

0 0 0 1

0 0 1 0

1 0 1 1

0 0 0 0

0 0 1 0

1 1 0 1

0 1 0 0

1 1 1 0

0 1 1 0

1 1 1 1

Next State

$Q_3^+\ Q_2^+\ Q_1^+\ Q_0^+$

1 0 0 0

0 0 0 0

0 0 0 1

0 0 0 1

0 0 0 1

1 1 0 1 0

0 0 1 0 0 1 0

0 0 1 0 1 0 1 1

0 0 1 0 0 1 1 1

0 1 0 0 1 1 0 0

0 1 0 0 0 1 0 0

0 1 0 0 1 1 0 1

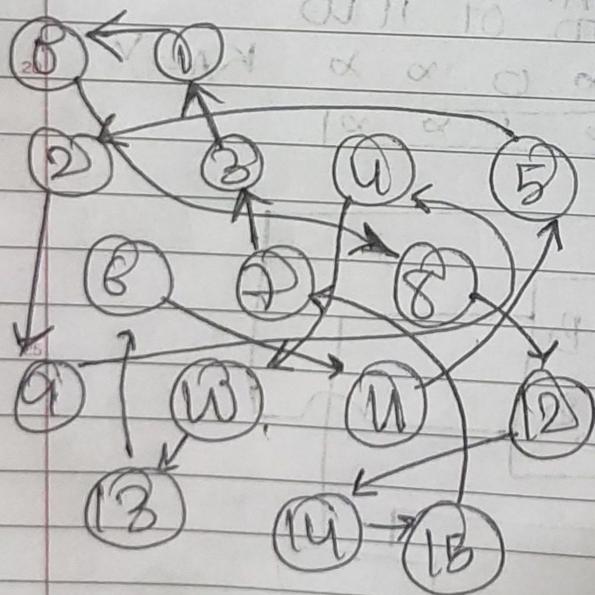
0 1 0 1 0 1 0 1

1 1 1 0 1 1 0 0

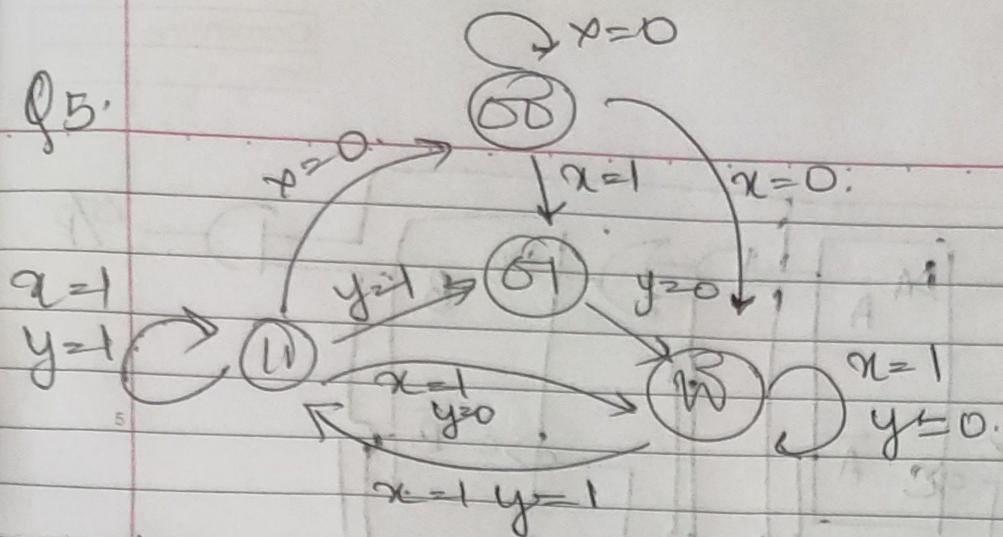
0 1 1 1 0 1 0 0

1 1 1 1 0 1 0 0

0 1 1 1 1 1 0 0



Q5.



Bn A <sub>n</sub>	X	Y	Bn A <sub>n+1</sub>	S/p.	D <sub>b</sub>	D <sub>A</sub>
0 0	0	0	0	0	0	0
0 0	0	1	0	0	0	0
0 0	1	0	0	1	0	0
0 0	1	1	0	1	0	1
0 1	0	0	1	0	0	1
0 1	0	1	1	0	1	0
0 1	1	0	1	0	0	1
0 1	1	1	1	1	0	0
1 0	0	0	0	0	0	0
1 0	0	1	0	0	0	0
1 0	1	0	0	1	0	0
1 0	1	1	1	1	0	0
1 1	0	0	1	0	0	0
1 1	0	1	0	1	0	0
1 1	1	0	1	1	1	0
1 1	1	1	1	1	1	1

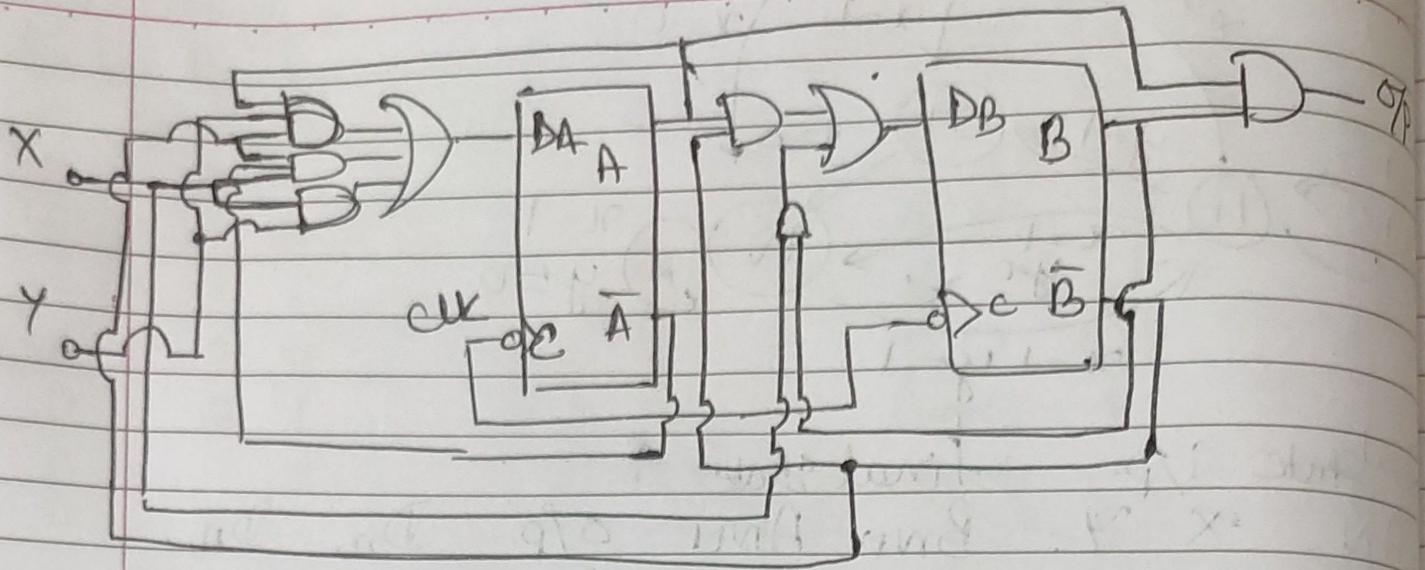
Bn A <sub>n</sub>	X	Y	Bn A <sub>n+1</sub>
0 0	0	0	0 0
0 1	0	1	0 1
1 0	1	1	1 1
1 1	1	1	1 1

$$S/p = A_n B_{n+1}$$

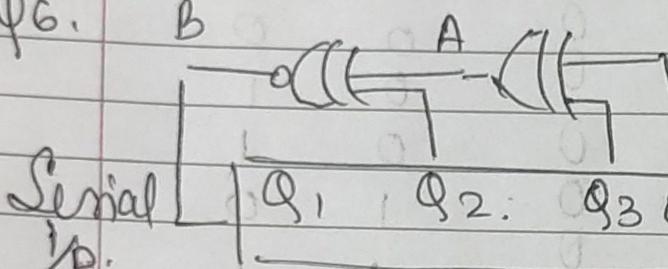
Bn A <sub>n</sub>	X	Y	Bn A <sub>n+1</sub>
0 0	0	0	0 0
0 1	0	1	0 1
1 0	1	0	1 0
1 1	1	1	1 1

$$D_B = \overline{B_n} A_n + B_n X$$

$$D_A = XY + \overline{B_n} A_n Y + \overline{B_n} A_n X$$



Q6. B



Serial  
ip.

initial state = 0000

Present state

$Q_1\ Q_2\ Q_3\ Q_4$

0 0 0 0

1 0 0 0

1 1 0 0

0 1 0 0

1 0 1 1

1 0 1 1

1 1 1 0

1 1 1 1

0 1 1 1

0 0 1 1

1 0 0 1

0 1 0 0

0 0 1 0

0 0 0 1

0 0 0 0

A B

0 0

0 0

0 0

1 0

1 0

1 0

1 0

1 0

0 0

0 1

1 0

0 0

1 0

0 0

1 0

Next state

$Q_1^+$   $Q_2^+$   $Q_3^+$   $Q_4^+$

1 0 0 0

1 1 0 0

1 1 1 0

1 0 1 0

1 1 1 1

1 1 1 0

1 1 1 1

0 1 1 1

0 0 1 1

1 0 0 1

0 1 0 0

0 0 1 0

0 0 0 1

0 0 0 0

After

15 ck

plus,

some

state

will

repeat

again

$$B = (Q_2 \oplus A)^t$$

$$A = Q_3 \oplus Q_4$$

$$Q_1^+ = B = (Q_2 \oplus A)^t$$

$$Q_3^+ = Q_2, Q_2^+ = Q_1$$

$$Q_4^+ = Q_3$$