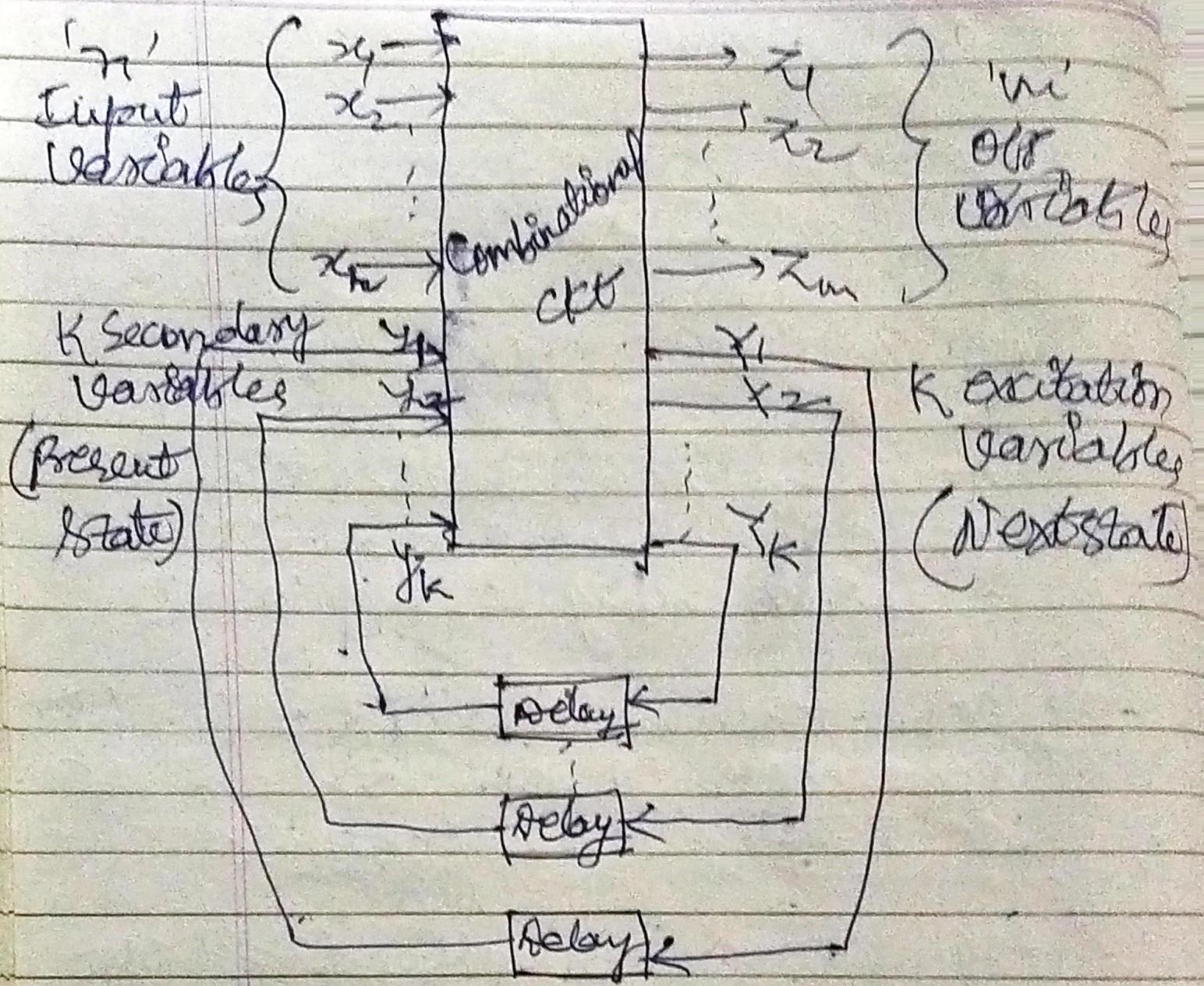


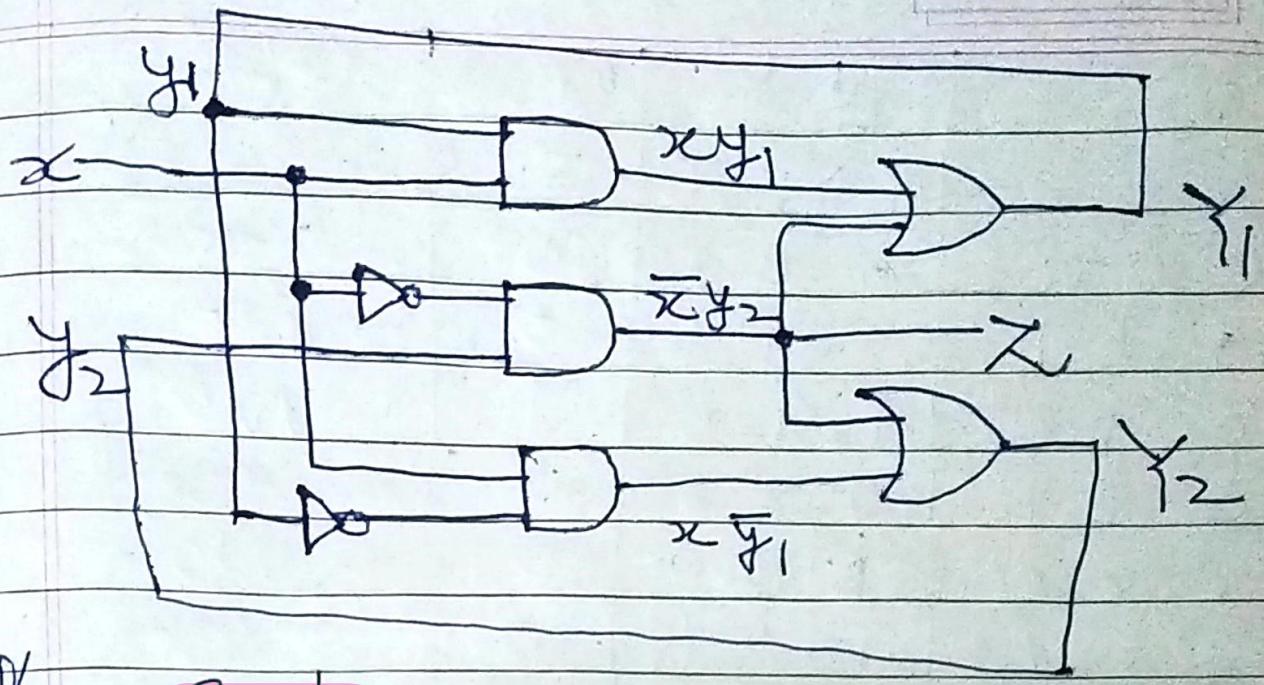
Asynchronous Sequential ckt

- It does not use clock pulse.
- The change of internal state occurs when there is change in the input variables.
- The memory element in Asynchronous sequential ckt are either unclocked flip-flops or time delay elements.
- Asynchronous sequential ckt are used when speed of operations is important.
- Asynchronous sequential ckt is useful in applications where input signal to the system may change at any time, independently of internal clock.
- Present state & next state variables in asynchronous sequential ckt are called secondary variable & excitation variables respectively.



Block diagram of Asynchronous
 Sequential Ckt

Q Derive the flow table, state
 table, transition table from
 Given Asynchronous
 Sequential Ckt —



Sofk

Boolean expression -

$$Y_1 = xy_1 + \bar{x}y_2 \quad \& \quad Z = \bar{xy}_2$$

$$Y_2 = x\bar{y}_1 + \bar{x}y_2$$

y₁y₂x	0	1
00	0	0
01	1	0
11	1	1
10	0	1

y₁y₂x	0	1
00	0	1
01	1	1
11	1	0
10	0	0

y₁y₂x	0	1
00	00	01
01	11	11
11	11	10
10	00	10

(a) Map for

$$Y_1 = xy_1 + \bar{x}y_2$$

(b) Map for

$$Y_2 = x\bar{y}_1 + \bar{x}y_2$$

(c) Transition table

$y_1y_2 = Y \rightarrow$ Then State is
stable otherwise not

→ Transition/stability table

P.S.	N.S.	O/P	stability
$Y_1 Y_2 X$	$Y_1 Y_2 X$	Z	
0 0 0	0 0 0	0	yes
0 0 1	0 1 1	0	NO
0 1 0	1 1 0	1	NO
0 1 1	0 1 1	0	yes
1 0 0	0 0 0	0	NO
1 0 1	1 0 1	0	yes
1 1 0	1 1 0	1	yes
1 1 1	1 0 1	0	NO

→ If - present state = Next state
 then state is stable
 otherwise not.

→ State-table :-

Present State	Next State		
Y_1	Y_2	$x = Y_1 Y_2$	$x = Y_1 Y_2$
0	0	0 0	0 1
0	1	1 1	0 1
1	0	0 0	1 0
1	1	1 1	1 0

→ Flow-table put $00=a$
 $01=b$
 $11=c$
 $10=d$

y/s

	0	1	
a	(a)	b	
b	c	(b)	→ flowtable made from transition table.
c	(c)	d	
d	a	(d)	

- A table in which internal states are symbolized with letters rather than binary numbers called flow table.
- Flow tables also includes the output values of the CFT for each state.

Primitive Flow table

- A table in which only one stable state in each row, called primitive flow table.

Q make logic diagram of Asynchronous Sequential Ctl whose flow table is given below -

	00	01	11	10
a	0,0	0,0	0,0	b,0
b	a,0	a,0	0,1	b,0
(flow table)				

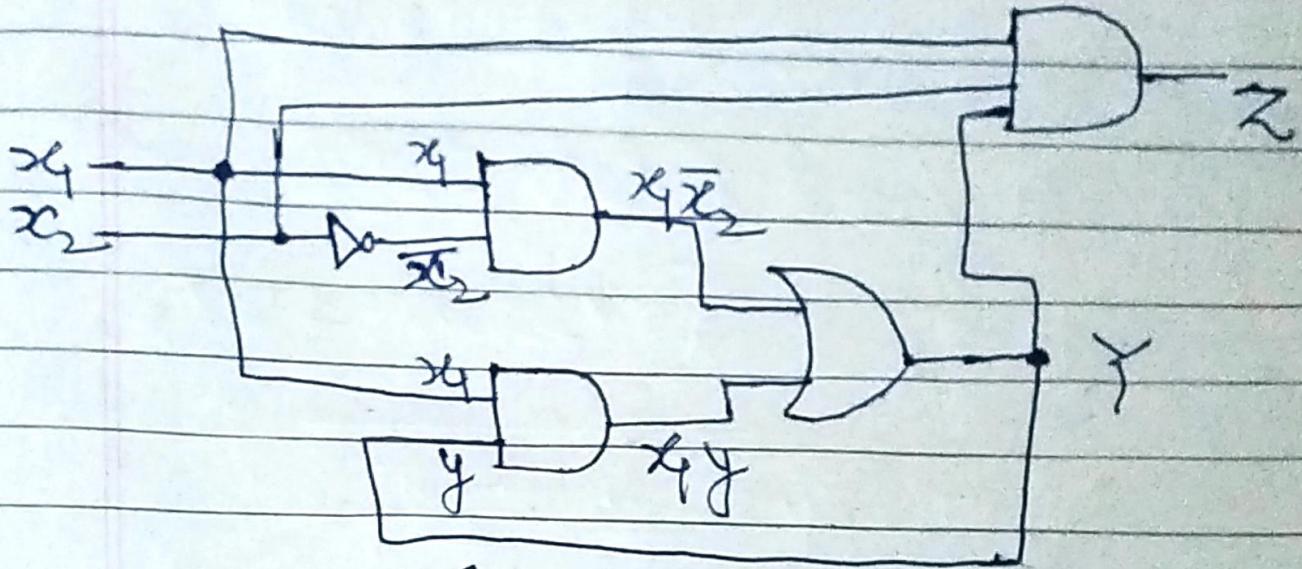
~~SOL~~ Transition table

	00	01	11	10
0	0	0	0	1
1	0	0	1	0
(transition table)				

$$Y = x_1 \bar{x}_2 + x_4 y$$

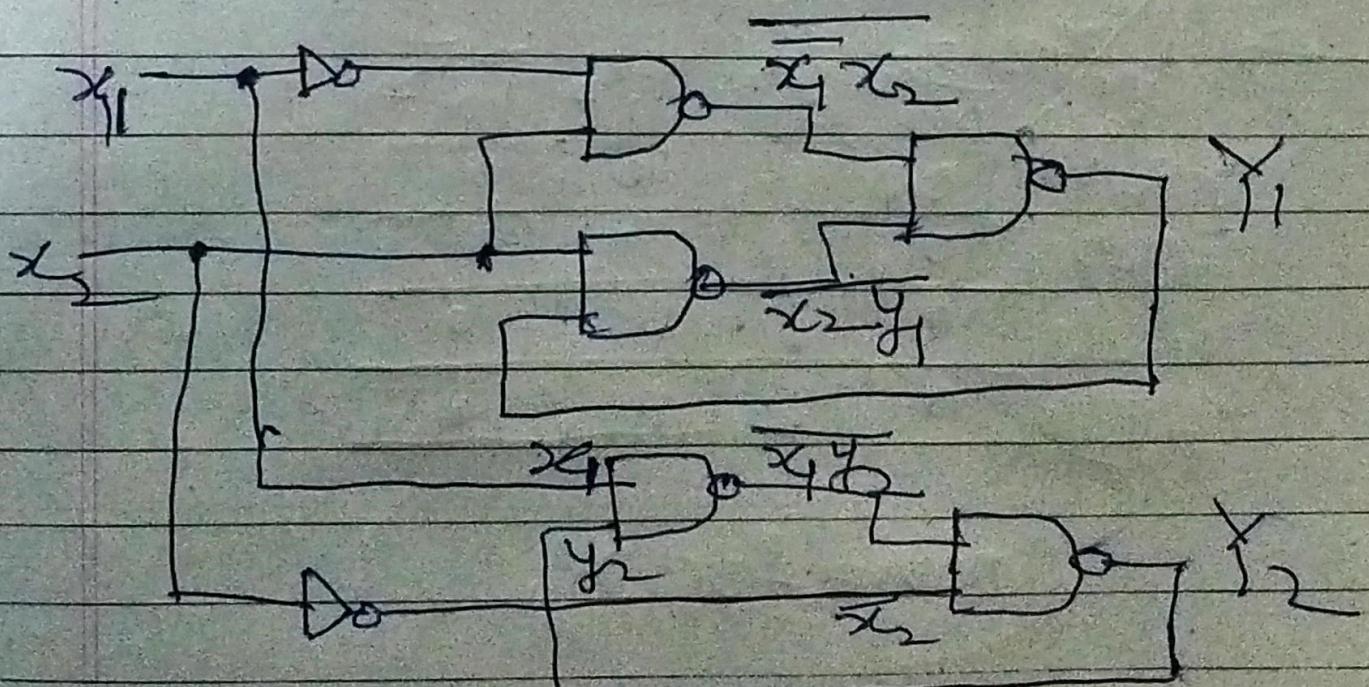
	00	01	11	10
0	0	0	0	0
1	0	0	1	0
k-map for Z' (OP)				

$$Z = x_1 x_2 y$$



(logic diagram)

Q Derive the transition table for asynchronous sequential ckt shown in figure. Determine the sequence of internal states y_1, y_2 for following input sequence $x_1, x_2 \rightarrow 00, 10, 11, 01, 11, 10, 00,$



~~SofS~~ x_1 & x_2 = Input variable

$y_1 y_2$ = Next state

$y_1 y_2$ = Present state

$$y_1 = \overline{\overline{x_1} \cdot x_2} \cdot \overline{x_2 y_1}$$

$$= \overline{\overline{x_1} \cdot x_2} + \overline{x_2 y_1}$$

$$\boxed{y_1 = \overline{x_1} x_2 + x_2 y_1}$$

$$y_2 = \overline{x_1 \cdot y_2 \cdot \overline{x_2}}$$

$$= \overline{x_1 y_2} + \overline{x_2}$$

$$\boxed{y_2 = x_1 y_2 + x_2}$$

$$\rightarrow \cancel{y_1 y_2} \overline{x_1} \overline{x_2} \overline{x_1} \overline{x_2} \overline{x_1} x_2 \overline{x_1} \overline{x_2}$$

$\overline{x_1} \overline{x_2} 00$	0	1	0	0
$\overline{x_1} x_2 01$	0	1	0	0
$x_1 \overline{x_2} 11$	0	1	1	0
$x_1 x_2 10$	0	1	1	0

(map for y_1)

~~$y_1 y_2$~~ ~~$y_1 z_2$~~ (Map for 'Y')

	00	01	11	10
00	0	1	1	0
01	0	1	1	1
11	0	1	1	1
10	0	1	1	0

~~$y_1 y_2$~~ ~~$y_1 z_2$~~

	00	01	11	10
00	00	11	01	00
01	00	11	01	01
11	00	11	11	01
10	00	11	11	00

(Transition Table)

$\rightarrow y_1 z_2; 00 \quad 10 \quad 11 \quad 01 \quad 11 \quad 10 \quad 00$
 $y_1 y_2; 00 \quad 00 \quad 01 \quad 11 \quad 11 \quad 01 \quad 00$

A.W.