

STLD Assignment 5:-

10-June:

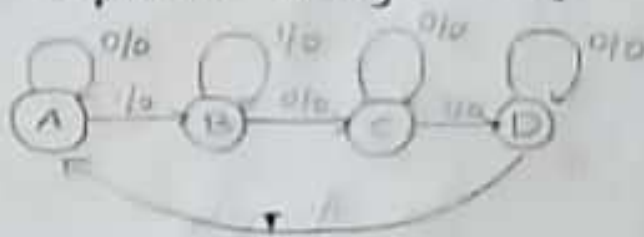
Name: V-manvitha

Rollno: 19131A0506

Branch: CSE-4

- 1) Design a sequence detector to detect the sequence 011 for mealy type using D-flip-flop

Ans: Now we are designing it by using non-overlapping sequences. Given sequence is 011; the state diagram for this sequence using mealy



- b) State table

PS	NS, Z	
	X=0	X=1
A	A, 0	B, 0
B	C, 0	B, 0
C	C, 0	D, 0
D	D, 0	A, 1

Let $A \rightarrow 00$, $B \rightarrow 01$, $C \rightarrow 10$, $D \rightarrow 11$

draw the transition of o/p table

- c) Transition & o/p table

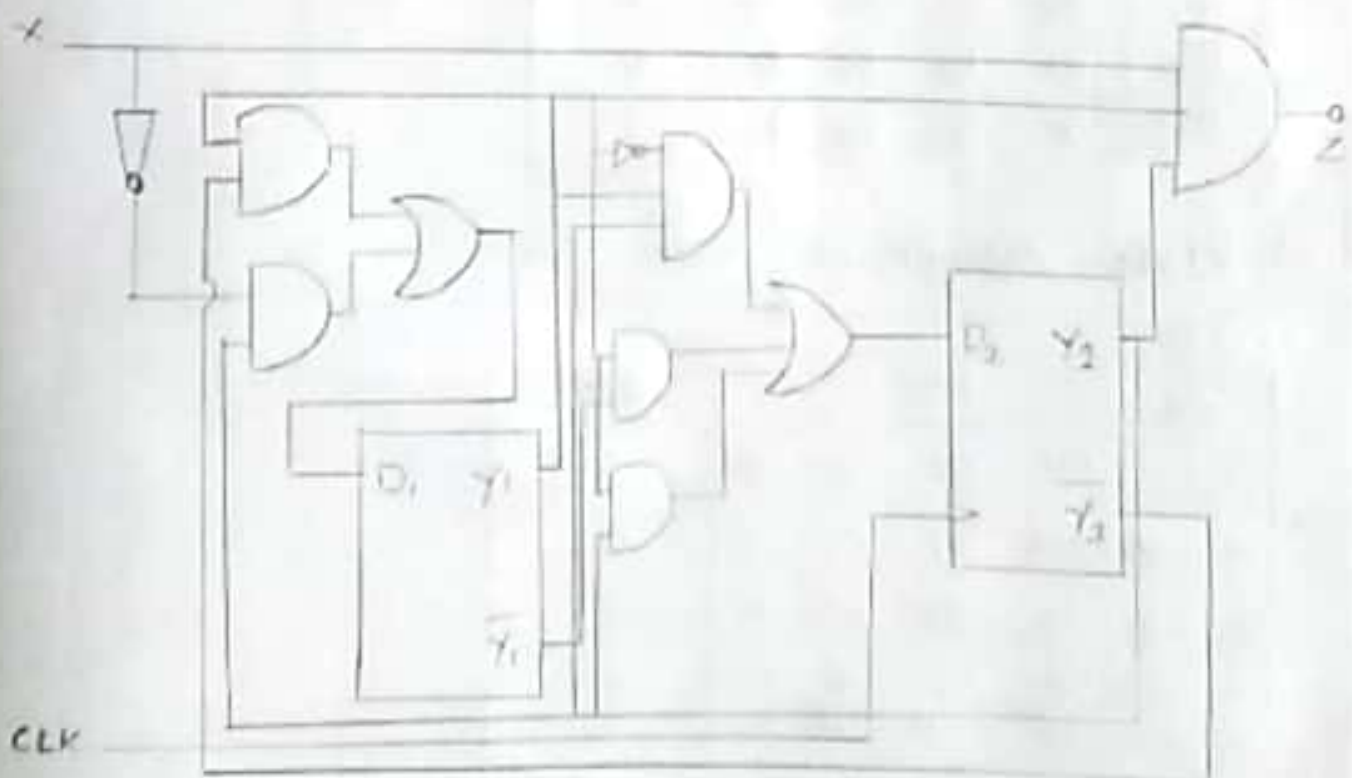
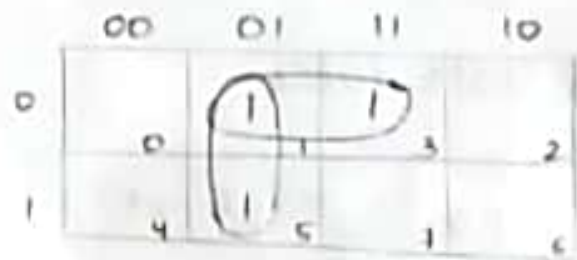
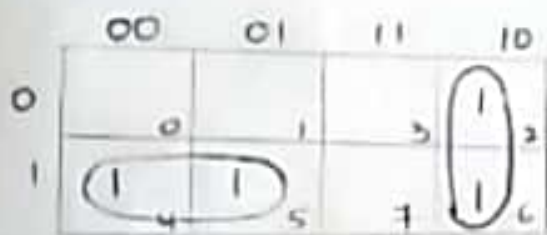
PS	NS		O/P(Z)	
	X=0	X=1	X=0	X=1
$A \rightarrow 00$	00	01	0	0
$B \rightarrow 01$	10	01	0	0
$C \rightarrow 10$	10	11	0	0
$D \rightarrow 11$	11	00	0	1

d) Excitation table

PS		I/P	NS		I/P to FF's		O/P
Y_1	Y_2	X	Y_1	Y_2	D_1	D_2	Y
0	0	0	0	0	0	0	0
0	0	1	0	1	0	1	0
0	1	0	1	0	1	0	0
0	1	1	0	1	0	1	0
1	0	0	1	0	1	0	0
1	0	1	1	1	1	1	0
1	1	0	1	1	1	1	0
1	1	1	0	0	0	0	1

From excitation table $D_1 = \sum m(2, 4, 5, 6)$ & $D_2 = \sum m(1, 3, 5, 6)$

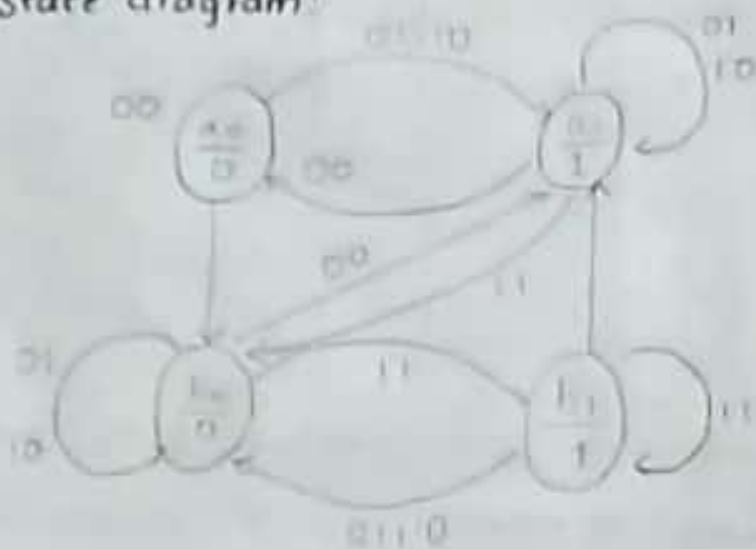
By using 3 variable k map



2) Design a Binary Serial adder for Moore type

Ans In a Moore type machine the o/p depends only on the present state of the machine it requires more than 2 states

a) State diagram:



b) State table

FS	NS (Input)				O/p (sum)
	00	01	10	11	
a ₀	a ₀	a ₁	a ₁	b ₀	0
a ₁	a ₀	a ₁	a ₁	b ₀	1
b ₀	a ₁	b ₀	b ₀	b ₁	0
b ₁	a ₁	b ₀	b ₀	b ₁	1

c) State - Assignment table

PS	NS				O/p
	00	01	10	11	
a ₀ → 00	00	01	01	10	0
a ₁ → 01	00	01	01	10	1
b ₀ → 10	01	10	10	11	0
b ₁ → 11	01	10	10	11	1

Input		P.S		N.S		output
X	Y	A	B	$(D_A D_B)A^+ B^+$		(sum)
0	0	0	0	0	0	0
0	0	0	1	0	0	1
0	0	1	0	0	1	0
0	0	1	1	0	1	1
0	1	0	0	0	1	0
0	1	0	1	0	1	1
0	1	1	0	1	0	0
0	1	1	1	1	0	1
1	0	0	0	0	1	0
1	0	0	1	0	1	1
1	0	1	0	1	0	0
1	0	1	1	1	0	1
1	1	0	0	0	1	0
1	1	0	1	0	1	1
1	1	1	0	1	0	0
1	1	1	1	1	0	1

Draw the k-maps

XY	AB			
	00	01	11	10
00	0	1	1	0
01	1	1	1	1
11	3	1	1	1
10	2	1	1	0

$$D_A = xy + yA + xA$$

XY	AB			
	00	01	11	10
00			1	1
01	1	1		
11			1	1
10	1	1		

$$D_B = \bar{x}\bar{y}\bar{A} + \bar{x}\bar{y}A + x\bar{y}A + x\bar{y}\bar{A}$$

XY	AB			
	00	01	11	10
00		1	1	
01		1	1	
11		1	1	
10		1	1	

$$\text{Sum} = B$$

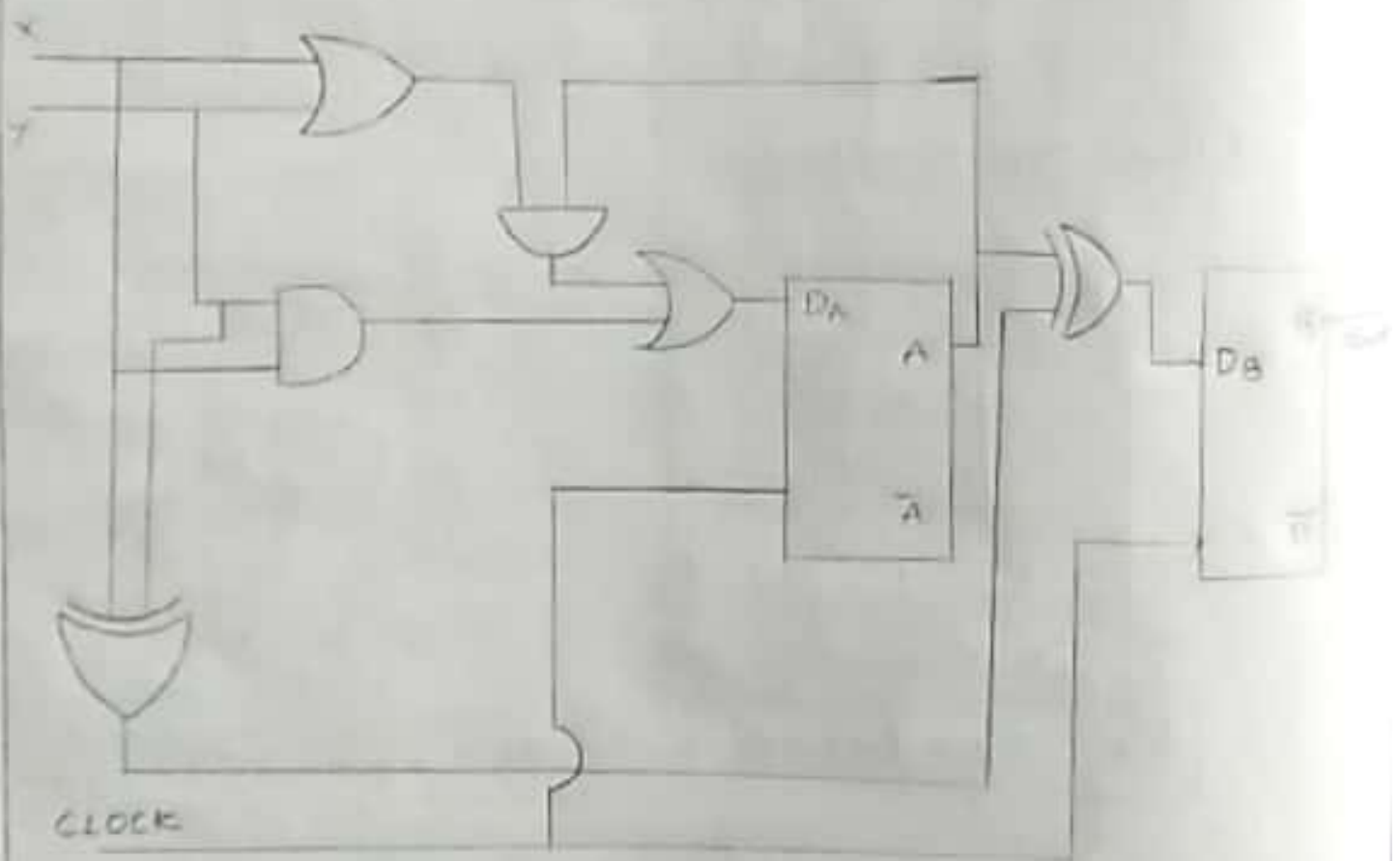
Now $\text{sum} = B$

$$D_A = xy + yA + xA$$

$$\begin{aligned} D_B &= \bar{x}\bar{y}A + \bar{x}y\bar{A} + x\bar{y}A + x\bar{y}\bar{A} \\ &\quad + (\bar{x}y + x\bar{y})\bar{A} + (\bar{x}\bar{y} + xy)A \\ &= (\bar{x}y + x\bar{y})\bar{A} + (\bar{x}\bar{y} + xy)A \\ &= x \oplus y \oplus A \end{aligned}$$

Here, D_B is sum output of full adder & D_A is carry out full adder

logic Diagram



3) Reduce the following state table using partition technique

Ans Given state table,

PS	NS, Z	
	X=0	X=1
A	F, 0	B, 0
B	D, 0	C, 0
C	F, 0	F, 0
D	G, 1	A, 0
E	D, 0	C, 0
F	F, 1	B, 1
G	G, 0	H, 0
H	G, 1	A, 0

Now rearranging the table having same off's into groups

PS	NS, Z	
	X=0	X=1
A	F, 0	B, 0
B	D, 0	C, 0
C	F, 0	F, 0
E	D, 0	C, 0
G	G, 0	H, 0
D	G, 1	A, 0
H	G, 1	A, 0
F	F, 1	B, 1

Now $P_1 = (A, B, C, E, G)(D, H)(F)$

2) The 1's Successor of $(A, B, C, E, G) \rightarrow (B, C, E, G, H)$

They are in different blocks so split (A, B, C, G, E) into (A, B, C, E) & (G)

The 0's Successor of $(A, B, C, E, G) \rightarrow (F, D, F, D, G)$ are in different blocks so partition of (A, B, C, E, G) into (A, C) , (B, E) & (G)

Now $P_2 = (A, C)(B, E)(G)(D, H)(F)$

3) The D-Successor of $(A, C) \rightarrow (F, F)$ & 1-successor

of $(A, C) \rightarrow (B, E)$ since they are in same block of P_2

4) The 0-Successor of $(B, E) \rightarrow (D, D)$ & 1-Successor of $(D, H) \rightarrow (A, A)$ are also in same block of P_2

c) So, no further partitioning is possible

Now, $P_3 = (A, C) (B, E) (G) (D, H) (F)$

So, $A=C$, $B=E$, & $D=H$

So, C, E, H can be replaced by A, B, D . Then the minimized state table is

PS	NS, Z	
	X=0	X=1
A	F, 0	B, 0
B	D, 0	A, 0
D	G, 0	A, 0
F	F, 0	B, 1
G	G, 0	D, 0

Reduced state table