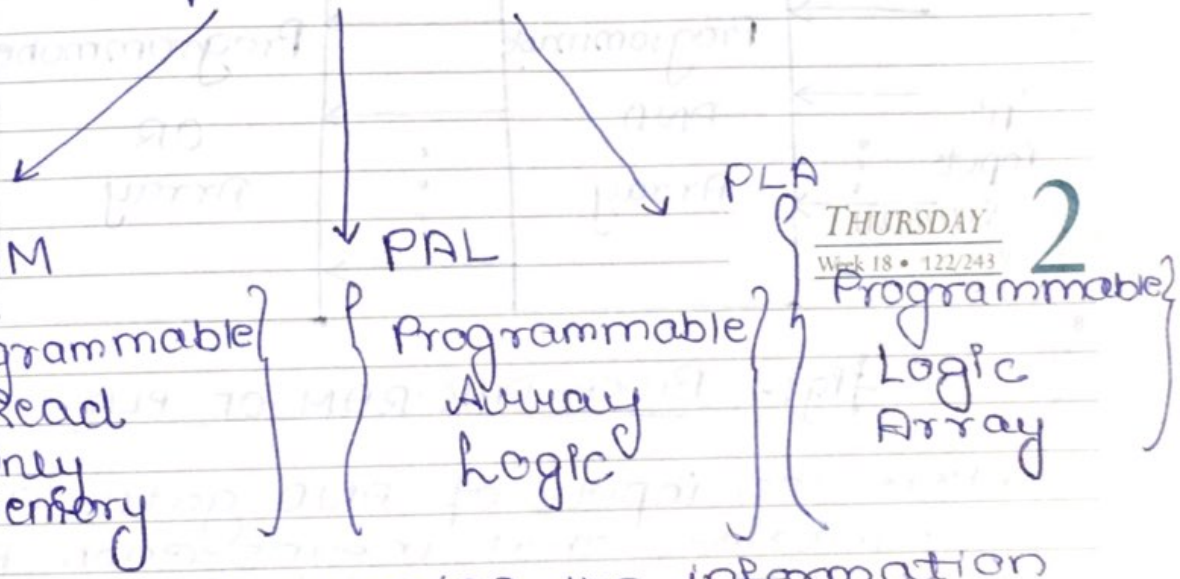
Programmable Logic Devices

PLD's

→ • PLD's are the integrated circuits.
• They contain an array of AND gates and another array of OR gates.

• There are 3 types of PLDs based on type of arrays, which has program -mable feature



• The process of entering the information into these devices is known as progra -mming.
• Basically, users can program these devices or IC's electrically in order to implement the Boolean functions based on the requirement.
• Here, the term programming refers to hardware programming but not software programming.

I. Programmable Logic Array (PLA)

- It is a type of fixed architecture logic devic with programmable AND gates followed by programmable OR gates.
- It is the most flexible PLD.

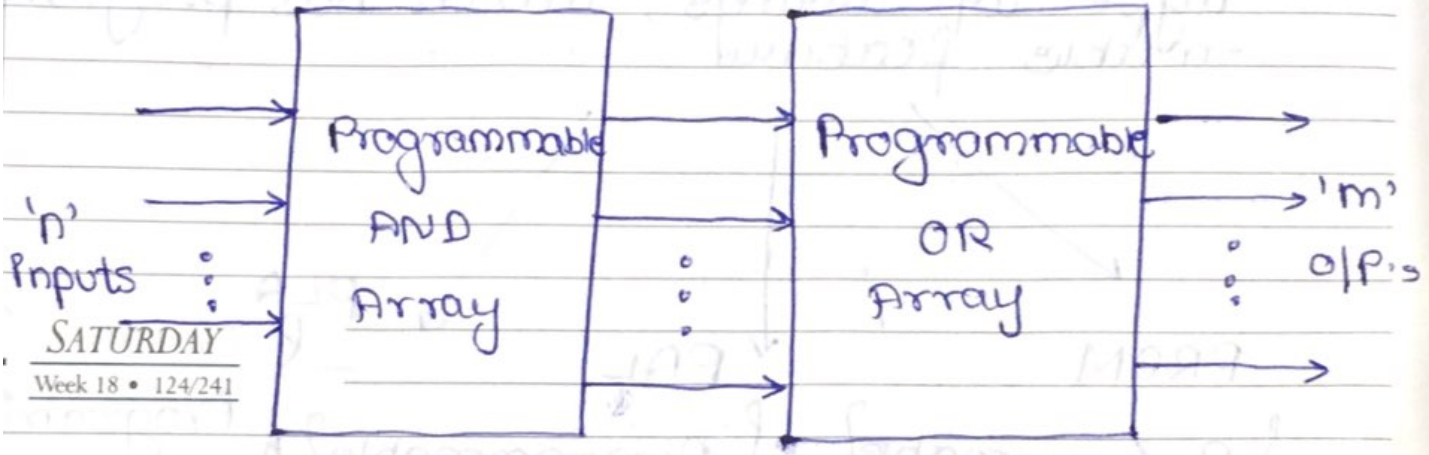


Fig:- BLOCK DIAGRAM OF PLA

- Here the inputs of AND gates are prog-rammable. That means each AND gate has both normal and complemented I/P of variables.
- So, based on requirements, we can program any of those I/P's. So we can generate only required product terms by using these AND gates.
- Here the I/P OR gates are also programmable So we can program any number of required product terms. Since all O/P's of AND gates are applied as I/P's to each OR gate. Therefore, the O/P of PLA will be in form Sum of products form

Example :-

Step 1) Truth Table

A	B	C	Y_1	Y_2
0	0	0	0	0
0	0	1	0	0
0	1	0	0	0
0	1	1	0	1
1	0	0	1	0
1	0	1	1	1
1	1	0	0	0
1	1	1	1	1

Step 2) To find Min. SOP form for both O/P Y_1 and Y_2

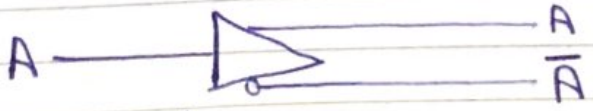
$Y_1 = A\bar{B}\bar{C} + A\bar{B}C + ABC$ { Reduce by K-Map or boolean algebra }

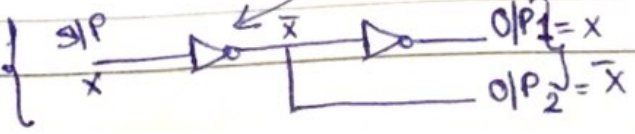
$$\boxed{Y_1 = A\bar{B} + AC} \longrightarrow (1)$$

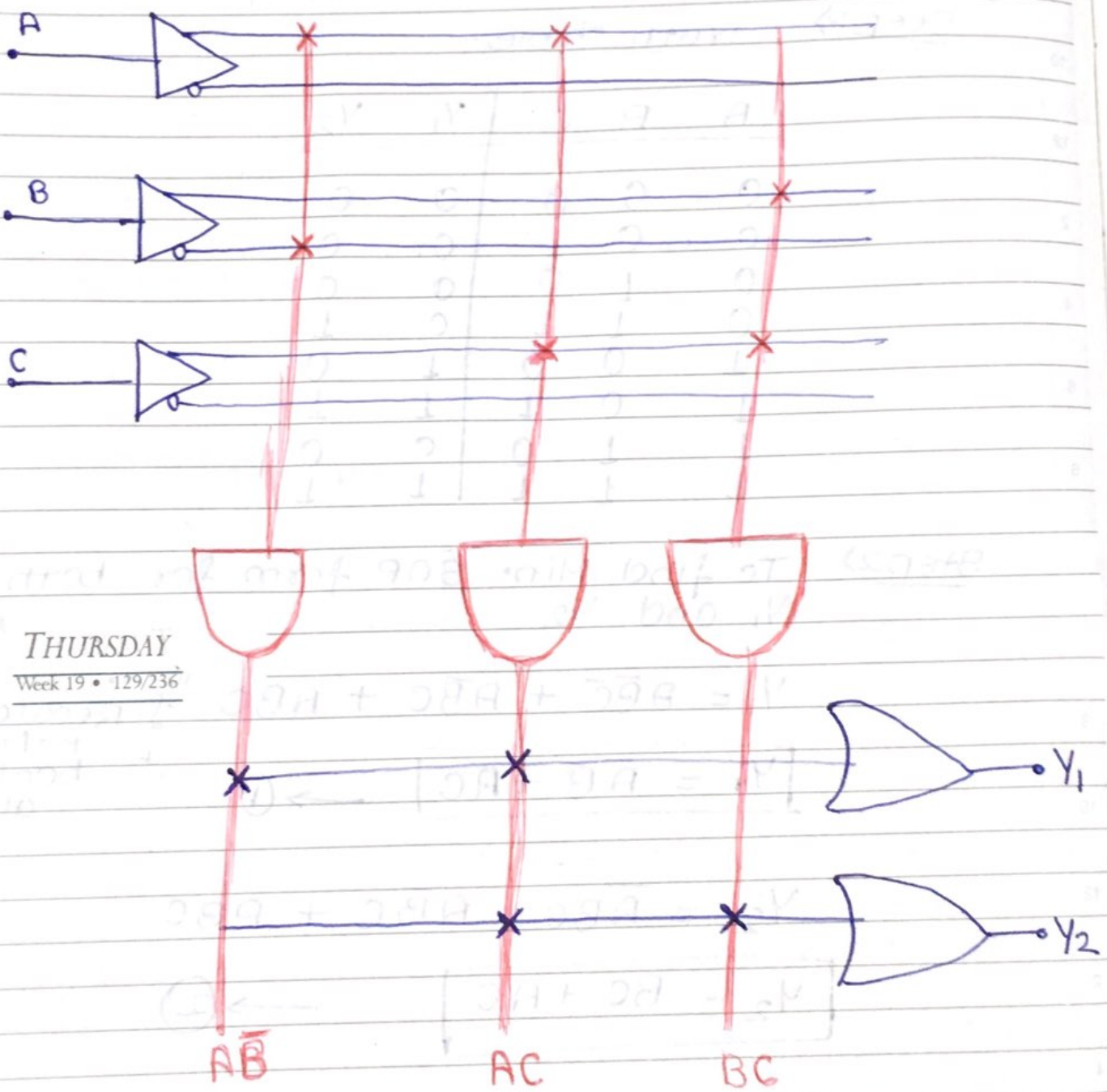
$Y_2 = \bar{A}BC + A\bar{B}C + ABC$

$$\boxed{Y_2 = BC + AC} \longrightarrow (2)$$

Step 3) No. of I/P buffers $\boxed{= 3}$







9 THURSDAY

Step 4) To find No. of Programmable AND gates = No. of Minterms

→ should not be repeated.

from Eqn (1) and (2) there are 4 minterms $A\bar{B}$, AC & BC, AC

$A\bar{B}, AC \rightarrow Y_1$

$BC, AC \rightarrow Y_2$

but AC is repeated twice so we will take 3 minterms.

Step 5) To find Programmable OR gate = No. of functions → Y_1, Y_2

= 2

Example2) Implement the following Boolean functions using PLA.

$$A = XY + XZ'$$

$$B = XY' + YZ + XZ'$$