Sairam INSTITUTIONS

Sri SAI RAM ENGINEERING COLLEGE
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| YEAR | SEM |
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# CS8351

# DIGITAL PRINCIPLES AND SYSTEM DESIGN

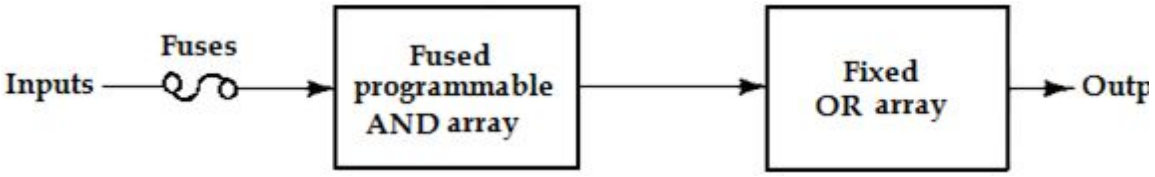
## UNIT No. 5

### 5.6 PROGRAMMABLE ARRAY LOGIC

Version: 1.XX

## Programmable Array Logic (PAL):

The basic PAL consists of a programmable AND array and a fixed OR array. The AND gates are programmed to provide the product terms for the Boolean functions, which are logically summed in each OR gate.




It is developed to overcome certain disadvantages of the PLA, such as longer delays due to the additional fusible links that result from using two programmable arrays and more circuit complexity.

**Programmable Array Logic (PAL)**

Realize the given function by using PAL:

Any form from sum of product (SOP) form or product of sum (POS) can be used for realization of a boolean function.

There are three inputs A, B, C and three functions X, Y, Z. Using sum of product (SOP) terms to express the given function as follows:-

X(A,B,C)=m(2,3,5,7)

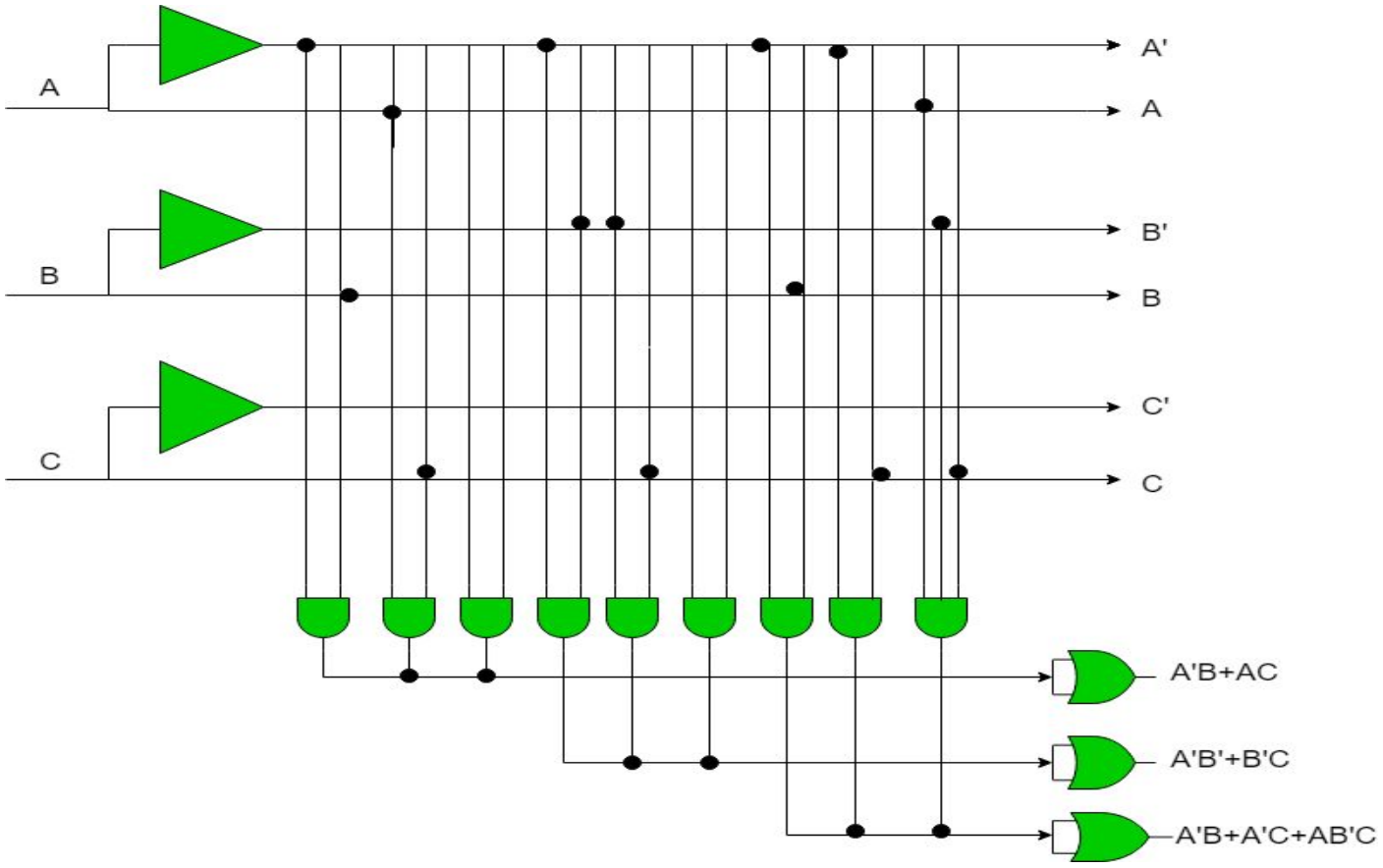
Y(A,B,C)= m(0,1,5)

Z(A,B,C)=m(0,2,3,5)

Following Truth table will be helpful in understanding function on number of inputs:

| A | B | C | X | Y | Z |
|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 1 | 1 |
| 0 | 0 | 1 | 0 | 1 | 0 |
| 0 | 1 | 0 | 1 | 0 | 1 |
| 0 | 1 | 1 | 1 | 0 | 1 |
| 1 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 1 | 1 | 1 | 1 |
| 1 | 1 | 0 | 0 | 0 | 0 |
| 1 | 1 | 1 | 1 | 0 | 0 |

X = A'B + AC
Y = A'B + B'C
Z = A'B + A'C + AB'C




AND array has been programmed but have to work with fixed OR array as per requirement.

Desired lines will be connected in PLDs.

**Advantages of PAL:**

- Highly efficient
- Low production cost as compared to PLA
- Highly secure
- High Reliability
- Low power required for working.
- More flexible to design.

2. **X =AB + AC'**

**Y= AB' + BC'**

**Design the above boolean** expression using programmable array logic