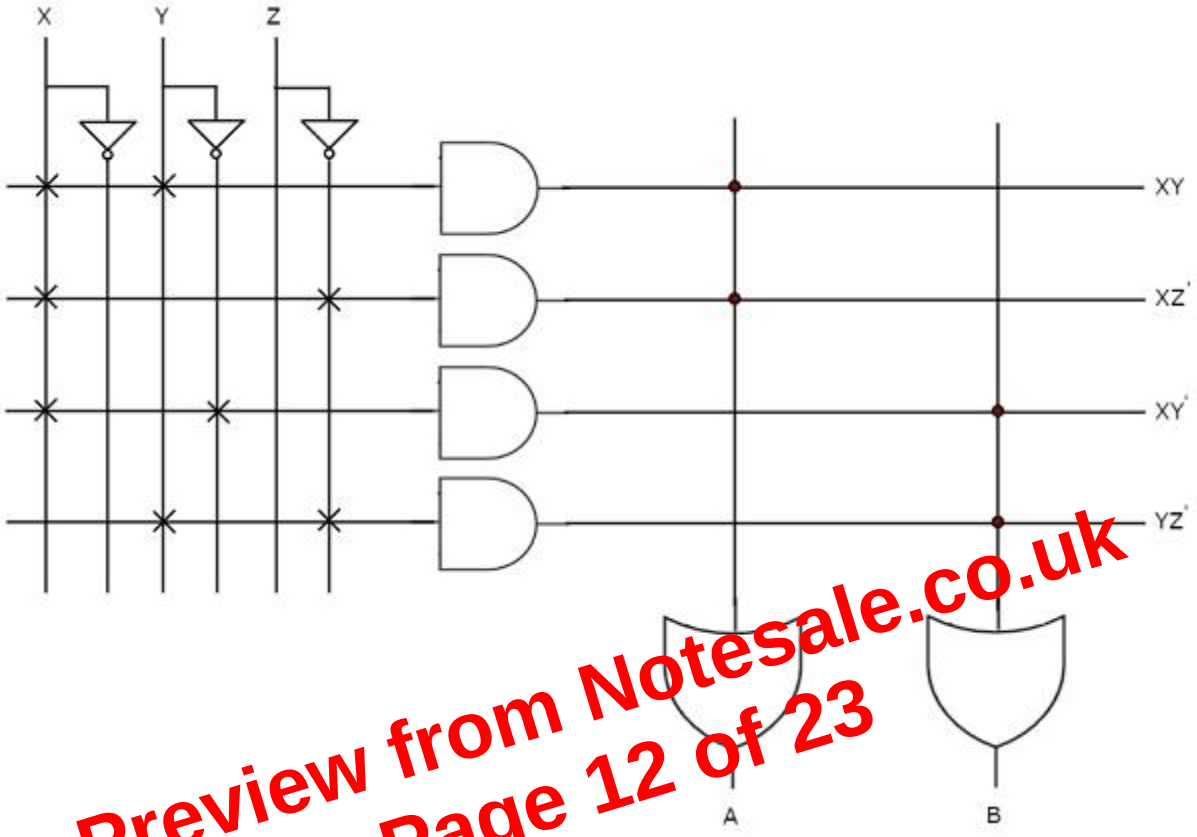
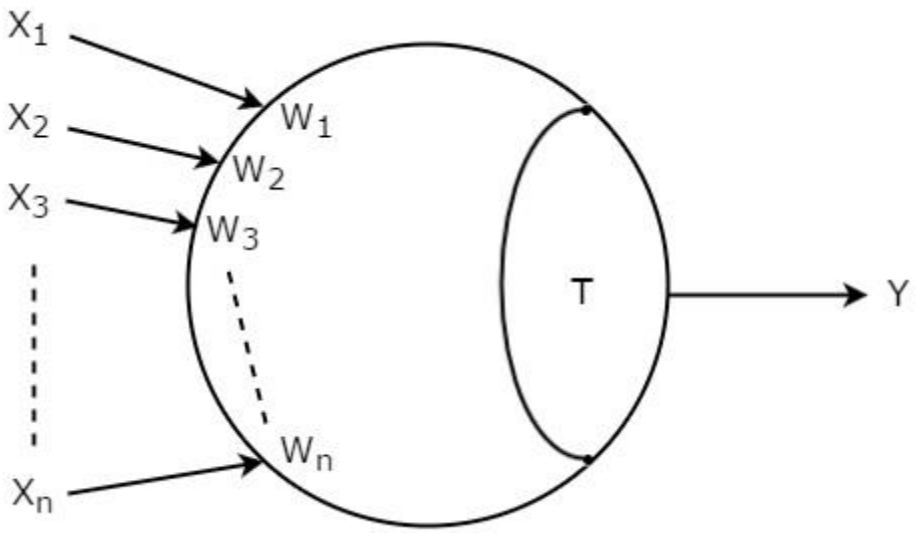
producing those two functions. The corresponding PAL is shown in the following figure.






The programmable AND gates have the access of both normal and complemented inputs of variables. In the above figure, the inputs X, X'X', Y, Y'Y', Z & Z'Z', are available at the inputs of each AND gate. So, program only the required literals in order to generate one product term by each AND gate. The symbol 'X' is used for programmable connections.

Here, the inputs of OR gates are of fixed type. So, the necessary product terms are connected to inputs of each OR gate. So that the OR gates produce the respective Boolean functions. The symbol '.' is used for fixed connections.




Threshold gate is represented with a circle and it is having 'n' inputs, $X_1$ to $X_n$ and single output, Y. This circle is made into two parts. One part represents the weights corresponding to the inputs and other part represents Threshold value, T.



The sum of products of inputs with corresponding weights is known as weighted sum. If this weighted sum is greater than or equal to Threshold value, T then only the output, Y will be equal to one. Otherwise, the output, Y will be equal to zero.

Mathematically, we can write this relationship between inputs and output of Threshold gate as below.

$$Y=1,ifW1X1+W2X2+W3X3+...WnXn\geq TY=1,ifW1X1+W2X2+W3X3+...WnXn\geq T$$

$$Y = 0, \text{otherwise.}$$

Therefore, we can implement various logic gates and Boolean functions just by changing the values of weights and / or Threshold value, T.

- If the output of Boolean function is 0, then the weighted sum will be less than Threshold value for those combination of inputs.

Step 4 − Choose the values of weights & Threshold in such a way that they should satisfy all the relations present in last column of the above table.

step 5 − Draw the symbol of Threshold gate with those weights and Threshold value.

Example

Let us implement the following Boolean function using single Threshold gate.

$$Y(X1,X2,X3)=\sum m(0,2,4,6,7)Y(X1,X2,X3)=\sum m(0,2,4,6,7)$$

The given Boolean function is a three variable function, which is represented in sum of min terms form. The Truth table of this function is shown below.



| Inputs | | | Output |
|---|---|---|---|
| $X_1$ | $X_2$ | $X_3$ | Y |
| 0 | 0 | 0 | 1 |
| 0 | 0 | 1 | 0 |
| 0 | 1 | 0 | 1 |