LABORATORY NO: 4	**Title:** AND function with bipolar inputs and targets using Perceptron Net

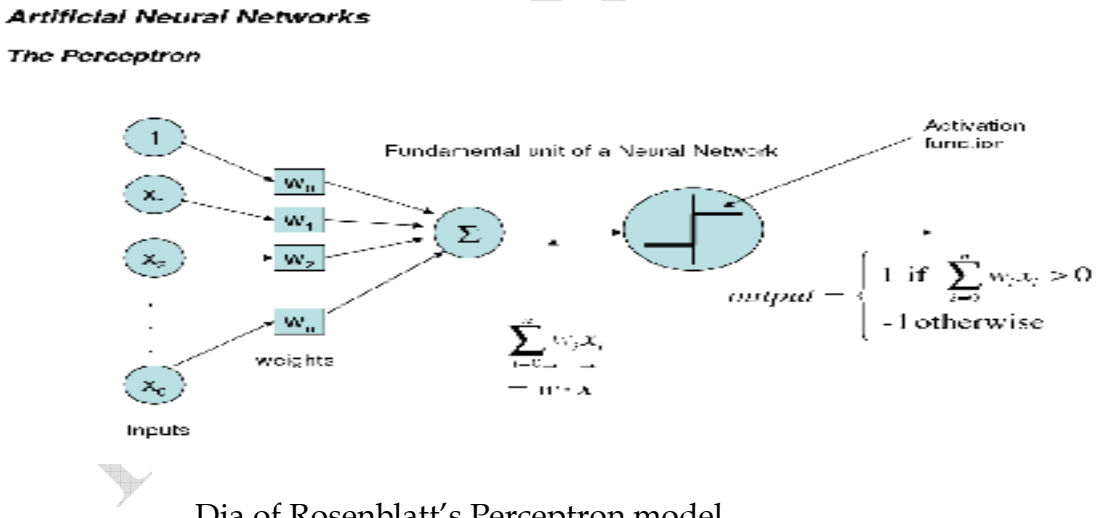
Aim: Write a MATLAB program for perceptron net for an AND function with bipolar inputs and targets.

Objective :

Objective is to understand perceptron model and designing perceptron for AND function

Theory:

The Rosenblatt's Perceptron model for an artificial neuron consists of outputs from sensory units to a fixed set of association units, the output of which are fed to an MP neuron (1958).the association units perform predetermined manipulations on their inputs, the main derivation from the MP model is that learning (i.e. weighting of weights)is incorporated in the operation of the units. The desired or target output (b) is compared with the actual binary output(s), and the error (d)is used to adjust the weights . the following equations describe the operation of the perceptron model of neuron:



Dia of Rosenblatt's Perceptron model

Output signal:- s=f(x)

Error:-d=b-s

Weight change:

Perceptron Weights Adjustment

$$\Delta w = \eta \times d \times x$$

$d \rightarrow$ Predicted output - Desired output

$\eta \rightarrow$ Learning rate, usually less than 1

$x \rightarrow$ Input data

Where η is the learning rate parameter.

There is a perceptron learning law which gives a step by step e procedure for adjusting the weights adjustment converges or not depend on the nature of the desired input-output pairs to be represented by the model.

The perceptron convergence theorem enables us to determine whether the given pattern pairs are re-presentable or not.

Perceptron Convergence Theorem: Says that there if there is a weight vector **w*** such that f(**w***p(q)) = t(q) for all q, then for any starting vector **w**, the perceptron learning rule will converge to a weight vector (not necessarily unique and not necessarily **w***) that gives the correct response for all training patterns, and it will do so in a finite number of steps.

If the weight values converge, then the corresponding problem is said to be represented by the perceptron network.

The Perceptron can represent most of the primitive Boolean functions: AND, OR, NAND and NOR but cannot represent XOR.

AND function:

Truth Table:

X1	X2	Y
1	1	1
1	-1	-1
-1	1	-1
-1	-1	-1

EXPECTED OUTPUT / CALCULATION / RESULT:

Enter the learning rate1.5
Enter the threshold value1
1 -1 -1 -1

Final weight matrix
1.5000 1.5000

Final bias
-1.5000