# Program 10. Write a program to implement Neural network.

## Code:-

from numpy import exp, array, random, dot, tanh

# Class to create a neural # network with single neuron class NeuralNetwork():

def init (self):

# Using seed to make sure it'll

# generate same weights in every run random.seed(1)

# 3x1 Weight matrix

self.weight\_matrix = 2 \* random.random((3, 1)) - 1

# tanh as activation fucntion def tanh(self, x):

return tanh(x)

# derivative of tanh function.

# Needed to calculate the gradients. def tanh\_derivative(self, x):

return 1.0 - tanh(x) \*\* 2

# forward propagation

def forward\_propagation(self, inputs):

return self.tanh(dot(inputs, self.weight\_matrix))

# training the neural network.

def train(self, train\_inputs, train\_outputs,

num\_train\_iterations):

# Number of iterations we want to # perform for this set of input.

for iteration in range(num\_train\_iterations): output = self.forward\_propagation(train\_inputs)

# Calculate the error in the output. error = train\_outputs - output

# multiply the error by input and then

# by gradient of tanh funtion to calculate # the adjustment needs to be made in weights adjustment = dot(train\_inputs.T, error \*

self.tanh\_derivative(output))

# Adjust the weight matrix self.weight\_matrix += adjustment

# Driver Code

if name == " main ": neural\_network = NeuralNetwork()

print ('Random weights at the start of training') print (neural\_network.weight\_matrix)

train\_inputs = array([[0, 0, 1], [1, 1, 1], [1, 0, 1], [0,

1, 1]])

train\_outputs = array([[0, 1, 1, 0]]).T

neural\_network.train(train\_inputs, train\_outputs, 10000) print ('New weights after training')

print (neural\_network.weight\_matrix)

# Test the neural network with a new situation. print ("Testing network on new examples ->")

print (neural\_network.forward\_propagation(array([1, 0,

0])))

## Output :

Random weights at the start of training [[-0.16595599]

[ 0.44064899]

[-0.99977125]]

New weights after training [[5.39428067]

[0.19482422]

[0.34317086]]

Testing network on new examples -> [0.99995873]