Printed Pages: 02 **Sub Code: NOE041/ EOE041**

Paper Id: | 1 | 9 | 9 | 4 | 1 | 1 | **Roll No.** | | | | | | | | | | |

B.TECH
(IV SEM) THEORY EXAMINATION 2017-18
INTRODUCTION TO SOFT COMPUTING

Time: 3 Hours ***Total Marks: 100***

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 10 = 20

a. Define activation function.
b. What is the significance of threshold value in neural network?
c. Whether the perceptron learning rule is an example of unsupervised learning or not, justify your answer ?
d. Draw the block diagram for back propogation training.
e. Let A and B be the two fuzzy sets given by: A={(a,0.3), (b,0.4), (c,0.6)}, B={(a,0.2), (b,0.5), (c,0.7)}. Find the membership value of c in AUB.
f. Explain Linguistic Variable in Brief.
g. What do you mean by fuzzy proposition?
h. Write GMP fuzzy inference rule.
i. Briefly explain route-wheel selection in genetic algorithm.
j. What do you mean by mutation in genetic algorithm?

SECTION B

2. Attempt any *three* of the following: 10 x 3 = 30

a. Define artificial neural network. Explain model of artificial neuron with the help of diagram.
b. Implement AND function using perceptron network for bipolar inputs and targets until all the calculated outputs are equal to the target outputs.(initialize all the weights, bias, threshold to zero and take α =1)
c. Differentiate between fuzzy logic and crisp logic. For a speed control of DC motor the membership functions of series resistance, armature current and speed are given as follows:

Rse = { 0.4/30, 0.6/60, 1.0/100, 0.1/120}
Ia= { 0.2/20, 0.3/40, 0.6/60, 0.8/80, 1.0/100, 0.2/120}
N= {0.35/500, 0.67/1000, 0.97/1500, 0.25/1800}

Compute relation T for relating series resistance to motor speed that is Rse to N.

d. Describe Fuzzy rule based system.

Let X= {a, b, c, d}, Y= {1, 2, 3, 4}

and A= { (a, 0), (b, 0.8), (c, 0.6), (d, 1)}

B= { (1, 0.2), (2, 1), (3, 0.8), (4, 0)}

C= { (1, 0), (2, 0.4), (3, 1), (4, 0.8)

Determine the implication relations IF x is A THEN y is B ELSE y is C.

e. Discuss the biological background of genetic algorithms.

SECTION C

3. Attempt any *one* part of the following: 10 x 1 = 10

(a) Differentiate between supervised and unsupervised learning.

(b) Explain the concept of Linear Separability with the help of suitable diagram. Implement the AND function using McCulloch-Pitts neuron.

4. Attempt any *one* part of the following: 10 x 1 = 10

(a) Explain the architecture of Perceptron Neural Network Model.

(b) Using back-propagation network, find the new weights for the network shown in figure. Use a learning rate α= 0.25 and binary sigmoidal activation function.

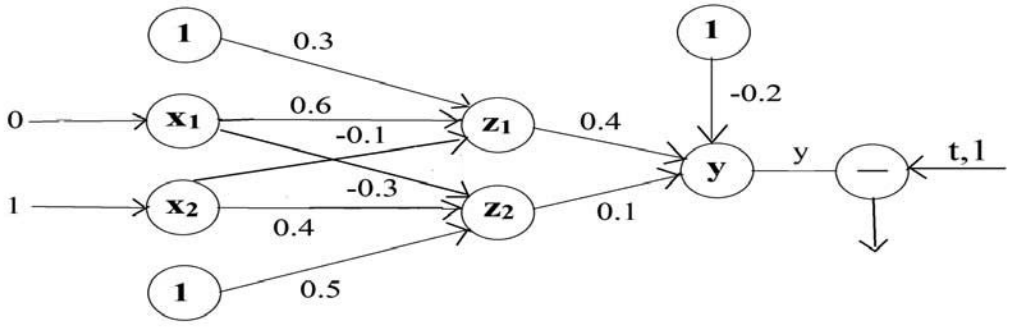

Figure: Back Propagation network

5. Attempt any *one* part of the following: 10 x 1 = 10

(a) Explain the following fuzzy set operations:

i) Union ii) Intersection iii) Complement iv) Concentration v) Dilation

(b) Consider three fuzzy sets given by:

P = { (x, 1), (y, 0.2), (z, 0.5) }

Q = { (a, 0.9), (b, 0.4), (c, 0.9) }

R = { (x, 0.1), (y, 0.2), (z, 0.7) }

i) Find the fuzzy relation for the Cartesian product of P and Q i.e. R=P X Q

ii) Find CoR using max-min composition

6. Attempt any *one* part of the following: 10 x 1 = 10

(a) What are the different methods of fuzzy to crisp conversion process? Discuss in detail.

(b) Discuss some industrial applications of fuzzy system.

7. Attempt any *one* part of the following: 10 x 1 = 10

(a) Discuss the working principle and flowchart of G.A.?

(b) Write the short note on:

i) Fitness Function

ii) Rank Selection